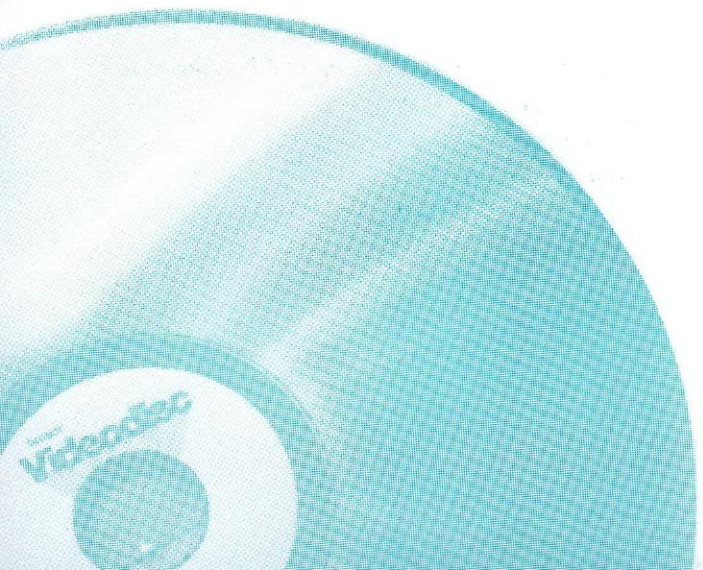
IICS

International
Interactive
Communications
Society

Executive Office
P.O. Box 1862
Lake Oswego, Oregon 97035



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WHY YOU SHOULD JOIN IICS:

The International Interactive Communications Society brings together professionals from the allied fields of training and education, computer science, instructional design, marketing, multimedia production and communications. IICS is dedicated to the advancement of interactive technologies.

By joining IICS, you will enter an active, growing network of professionals willing to share ideas, demonstrate their latest innovations, and help you build relationships with the most creative people working in the new media.

IICS operates primarily at the local level, with dozens of chapters all across the US and Canada. Most chapters hold monthly meetings to keep IICS members in touch with the most recent developments in this fast-paced field. And our international presence makes it possible to keep up with colleagues in Europe, the Middle East and Japan.

IICS Membership benefits include:

- subscriptions to the *IICS Reporter*, a monthly newsletter; and *Interact*, the primary scholarly publication on interactive media.
- a copy of the *Annual Membership Directory* with extensive listings of each member's background and current projects.
- discounts on major trade journals, books, and entrance fees to national conferences.
- invitations to special workshops, seminars, and events such as previews of interactive museum displays, trade shows, and award competitions.
- standing invitations to attend meetings in other chapters when traveling.
- an opportunity to serve on a local or national committee or run for office in the IICS.
- a local newsletter in most chapters, featuring news of current activities in your area.
- networking opportunities to meet people who share your professional interests.

Membership Application

NAME_____

COMPANY_____

ADDRESS_____

CITY_____

STATE _____ ZIP_____

DAY PHONE ( ) _____

Type of Membership

❑ Individual ($75)

❑ Corporate ($500)
Allows an organization to enroll up to eight individuals in any local chapter. Please attach names and addresses.

❑ Student ($40)
Please attach a copy of your ID.

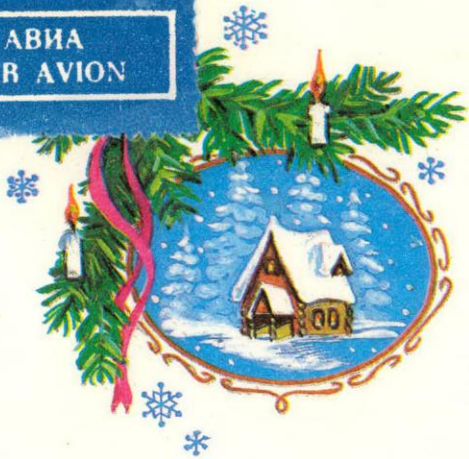
This is a ❑ Renewal ❑ New Application
Please indicate date of check :_____

Referred by:_____

Chapter you want to join: _____

Please send Application and Payment to:
IICS Executive Office
P.O. Box 1862
Lake Oswego, Oregon 97035
Or the local chapter below:

АВИА
PAR AVION



США

Tom Nemeth
Community Memory
2617 San Pablo Avenue
Berkeley,
California 94702
U.S.A.

Куда

Кому

Индекс предприятия связи
и адрес отправителя

Индекс предприятия связи места назначения

Внимание!
Образец написания цифр цифекса:

Издательство «Правда».

Художник К. Андрианов

Заказ 550. Тираж 500 000. Цена открытки с конвертом 17 коп.

DEAR SIR,

MERRY CHRISTMAS AND
HAPPY NEW YEAR!

JOY AND HAPPINESS TO YOU
IN THE NEW YEAR!

BEST REGARDS,

INTERNATIONAL COMPUTER CLUB

SERGEI A. ULIN

INTERNATIONAL COMPUTER CLUB

STATUTE

HEAD OFFICE: 101813, USSR,
MOSCOW
PROYEZD SEROVA, 4
Telex 411630, Tel. 921—09—02

STATUTE
of the International Computer Club

GENERAL PROVISIONS

1. The International Computer Club shall be an international non-governmental public organization created on an independent basis with the aims at comprehensive development of international co-operation in modern computer technology and informatique, dissemination of computer literacy and culture.

2. The International Computer Club shall enjoy the capacity necessary to perform its functions and fulfil its purposes.

The International Computer Club starting from the date of signature of the Agreement on the Establishment of the International Computer Club – approval of the present Statute – shall acquire the capacity of a legal entity, and can, in its own name, enter into agreements and contracts, acquire proprietary and personal non-proprietary rights and bear responsibilities, to sue and be sued in the court of law, arbitration and reconciliation courts, as well as take other actions in accordance with its purposes and objectives.

The International Computer Club shall enjoy the status of an international organization on the basis of its direct and/or indirect recognition in this capacity by the bodies of States or international organizations and/or on the basis of special agreements reached by the International Computer Club with such bodies.

3. The International Computer Club shall bear responsibility in accordance with its obligations within the scope of its property. Neither the Founders and Members, nor the State of the officially registered seat of the International Computer Club and/or its affiliates shall bear responsibility in connection with obligations of the International Computer Club, nor shall the International Computer Club and/or its affiliates bear responsibility in connection with obligations of its Founders and Members, and the State of the officially registered seat of the International Computer Club.

4. The name of the Organization shall be "the International Computer Club".

This name shall be used as officially adopted in all documents approved by the Organization and/or issued on its instruction and in its name when registering the Organization with

the Government bodies of any State and/or bodies of international organizations, as well as in all other cases when the Organization shall be a party to any legal relation while performing its functions aimed at fulfilling the Organization's purposes and objectives.

The Organization may also use an acronym "ICC" as an officially adopted name.

The International Computer Club shall have its own emblem and seal, approved in accordance with the present Statute.

The officially adopted name and an emblem shall be used in the seal image, forms, publications, trade marks of the International Computer Club's products and after an appropriate registration shall be protected by law.

5. On terms and conditions set forth in the present Statute the International Computer Club can open its affiliates, create and/or participate in creation and operations of associations, enterprises and organizations both in the territory of the country of the seat and in the territory of other countries.

The status and location of affiliates, terms and conditions of establishment and/or participation in establishment and operation of associations, enterprises and organizations shall be determined by the International Computer Club and appropriate agreements between the International Computer Club and competent Government bodies of the relevant countries.

6. The registered seat of the International Computer Club shall be established in Moscow, USSR. The address of the International Computer Club in Moscow, USSR, shall be the subject to approval and may be altered in a prescribed manner.

7. The official languages of the International Computer Club shall be Russian and English.

8. The duration of the International Computer Club's operations shall not be limited.

PRINCIPLES, PURPOSES, OBJECTIVES AND FUNCTIONS

9. The Founders of the International Computer Club proclaim their adherence to the principles laid down in the United Nations Charter, unconditional respect for which shall be the basis for activities of the International Computer Club.

10. The International Computer Club shall function under the motto "Informatique at the service of international dialogue", in order to:

– develop international co-operation between different countries in the field of modern computer technology and informatique;

– develop modern technology in computer software and hardware;

– create conditions for further social progress, strengthen peace and mutual understanding through uniting the efforts of organizations and individuals of different countries in expanding and deepening the international co-operation, mutual information and trust, inter alias, on the basis of utilization of modern computer and communication technologies;

– widely disseminate basic computer literacy and culture, promote computer knowledge, introduce computer technology in all areas of human activity in order to promote social progress;

– introduce principles of computer aesthetics and modes of work with information technologies that are most safe for human health.

11. With the aim to fulfil its purposes and objectives the International Computer Club:

– promotes the development of new, non-conventional forms of business co-operation, inter alias, on multilateral basis, through cross-representation of interests of its Founders and Members, commercial intermediation and promotion of direct contacts between interested enterprises and organizations;

– creates open, easily accessible data banks of reference, commercial and other information necessary for fruitful co-operation;

– examines needs, implications and prospects of computer applications, particularly as concerns personal computers, including problems of work place automation, introduction of electronic mail, compressed video signal transmission techniques and other means to promote dialogue between international partners in economic, scientific, cultural, humanitarian and other fields of international co-operation;

– utilizes the results of conducted research to provide the International Computer Club Founders and Members, as well as interested organizations, with advisory service packages;

– studies, develops and introduces new active and flexible forms and methods of teaching and training on the basis of application of modern computer technology, promotes general computer culture;

– undertakes studies of world computer software and hardware markets, relevant legislation and customs in computer use and application in different countries, their management and organizational experience;

– provides advisory services in marketing, advertising, copyright protection, establishment of joint ventures and other related issues;

– organizes international meetings, conferences, competitions, exhibitions and demonstrations of advanced computer technology; exchange of delegations, professionals and tourist groups sharing particular interest;

– encourages and provides financial and technical assistance in undertaking joint projects, research and development;

– undertakes other scientific research, design, engineering, production, foreign economic activities and other kinds of operations, relevant to its purposes and objectives.

12. While pursuing its aims the International Computer Club shall establish relations and make contacts with international organizations, Government bodies and with associations, enterprises and organizations established on governmental, co-operative, private or public basis, as well as with individuals from different countries whose activities shall be related to or can promote international co-operation in the field of modern computer technology and informatique and who shall accept principles, purposes and objectives of the International Computer Club. The nature and forms of such relations shall be determined by the International Computer Club.

PARTICIPANTS OF THE INTERNATIONAL COMPUTER CLUB

13. The International Computer Club shall be open for participation of organizations and individuals, irrespective of their nationality, subject to their recognition of principles, purposes and objectives of the International Computer Club, and shall unite its participants on a voluntary basis as well as on the basis of mutual business, professional and creative interests, mutual respect and co-operation.

14. The participants of the International Computer Club shall be Founders and Members.

14.1. The Founders shall be the Organizations that have signed the Agreement on the Establishment of the International Computer Club in Moscow, December 15, 1988, as well as Organizations that have joined the Agreement in a prescribed manner.

14.2. The Members shall be organizations and individuals who have applied for membership of the International Computer Club and have been admitted in a prescribed manner.

15. Government bodies, establishments and representations, international organizations, associations, enterprises and organizations established on Government co-operative, private or public basis, irrespective of their national origin and location, as well as any physical persons, irrespective of their citizenship or nationality and place of residence may become the participants of the International Computer Club.

16. Membership of the International Computer Club may be individual and collective.

16.1. The individual members shall be separate organizations and physical persons.

16.2. The collective members shall be national and regional associations of organizations and citizens aiming at participation in the International Computer Club's activities.

17. Participation in the International Computer Club as a Founder or as a Member shall be related to payment of entry and annual fees, differential amount of which shall be determined by the International Computer Club depending on the status of the participant.

THE RIGHTS AND DUTIES OF FOUNDERS AND MEMBERS

18. The International Computer Club Founders and Members shall have the right:

- to participate freely in all kinds of its activities;
- to receive the International Computer Club's publications;
- in a prescribed manner to receive from the International Computer Club financial, advisory, intermediary, scientific, technical and other assistance relevant to the purposes and objectives of the International Computer Club;
- to establish and develop bilateral and multilateral ties through the International Computer Club;
- to put forward proposals concerning the improvement of the International Computer Club's operation and development of international co-operation within the scope of its activities;
- to involve new interested members in the International Computer Club's work.

19. In addition the Founders shall have the right:

- to participate in the management of the International Computer Club, in the work of its governing and executive bodies;
- to make use of the International Computer Club property in a prescribed manner;

20. When entering the International Computer Club collective members may specify the conditions and forms of their participation unless these are contrary to the present Statute.

21. Founders and Members shall undertake:

– to observe terms and conditions of the present Statute;

– to take an active part in the International Computer Club's activities and/or promote its activities.

GOVERNING AND EXECUTIVE BODIES

22. The bodies of the International Computer Club shall be:

– a Council of Founders;
– a Scientific Council;
– a Board of Directors;
– an Audit Commission.

COUNCIL OF FOUNDERS

23. The highest governing body of the International Computer Club, shall be the Council of Founders. The Council of Founders shall consist of authorized representatives of the Founder-Organizations of the International Computer Club that have signed the Agreement of December 15, 1988 (Moscow). The exclusive competence of the Council of Founders shall include:

a) making amendments and additions to the Statute of the International Computer Club;

b) admission of new participants to the International Computer Club as Founders, approval of admission of new members, granting special rights to collective members that are in conformity with the terms and conditions of the present Statute;

c) determination of main directions of activities, scientific research and other programs and developments of the International Computer Club, relevant to its purposes and objectives;

d) determination of the size of the Authorized Fund as well as other International Computer Club's special funds, determination of procedure of their creation and utilization;

e) determination of the amount, the mode of payment and the due date of entry and annual fees;

f) approval of the International Computer Club's budget for the next financial period, consideration and approval of financial and other results of activities and reports;

g) approval and alteration of the International Computer Club's structure, Rules of Procedure of the Council of Founders,

terms of reference of the Board of Directors, Audit Commission and Scientific Council, making decisions on establishment and closure of the International Computer Club's affiliates, on establishment and/or participation in establishment and operation of associations, enterprises and organizations;

h) election of the President and Vice-Presidents of the International Computer Club, appointment of the Director-General and his or her first deputy, Chairman and members of the Audit Commission, approval of appointment of the Director-General's deputies, Directors (Division Chiefs) and members of the Scientific Council.

i) determination of the number of the International Computer Club's staff, salary fund, approval of the Staff Regulations, General regulations on premiums and allowances, making decision on the number of stuff members that can be recruited to the International Computer Club from among candidates without permanent residence in the country of the International Computer Club's location, including those on the basis of contractual agreement to perform particular job or provide advisory services;

j) consideration and approval of reports on the work of the Board of Directors, affiliates, other organizations, created under the auspices of the International Computer Club, hearings of the Audit Commission's reports on the results of annual and extraordinary audits;

k) making decision on establishment and maintaining relations with international organizations, concluding international agreements with Government bodies;

l) approval of decisions on receiving and extending financial assistance in other forms, financing programs and development, on arrangement of congresses, international meetings and symposiums, organization of fund-raising campaigns and activities;

m) approval of the International Computer Club's address in the country of the International Computer Club location and its alteration, the emblem and the specimen of the seals;

n) making decision on termination of the International computer Club's operations and convening an appropriate liquidation commission.

The Council of Founders may entrust its capacity to take decision on particular issues of its exclusive competence to the Director-General.

25. The Council of Founders shall convene its meetings at least once a year usually in the country of the International Computer Club's location.

Extraordinary meetings of the Council of Founders may be convened by the President of the International Computer Club upon

the proposal of the Founders, Director General and Scientific Council, subject to support of such a proposal by majority of Founders.

26. Each Founder-Organization shall have one representative in the Council.

Members of the International Computer Club and – upon invitation of the International Computer Club – prominent Statesmen and international personalities, scientists and others shall be eligible to participate in the proceedings of the Council without vote.

The meetings of the Council of Founders shall be conducted in accordance with its Rules of Procedure under the chairmanship of the President of the International Computer Club or on his or her instruction – of one of the Vice-Presidents.

27. Each representative of the Founders, including the President and Vice-Presidents, shall have one vote at the meeting of the Council.

Decisions of the Council of Founders shall be made by majority vote.

On issues mentioned in paragraph 24, sub paragraphs a), b), c), d), e), f),l) and n) of the present Statute decisions of the Council of Founders shall be made by a two-thirds majority of all Founders present at the meeting.

The Council of Founders shall endeavour to make decisions on the consensus basis.

The decisions made shall be considered valid if not less than two-thirds of all Founders have been present and/or have been represented at the Council of Founders meeting, and shall come into force as of the date of signing the report of the meeting, unless otherwise shall be stipulated in the decision itself or shall proceed from the nature of the decision.

In order to expedite the decisions a correspondence co-ordination and voting can be conducted with participation of all authorized representatives of Founders. Such a co-ordination must be in the written form and all Founders should be informed of the results of the correspondence vote.

28. The President and Vice-Presidents of the International Computer Club shall be elected by the Council of Founders from among authorized representatives for the term of five years.

Prominent Statesmen and international personalities, diplomats, scientists and others who have necessary authority and experience in the field of informatique and international co-operation and who are not representatives of Founders may be elected President and Vice-Presidents of the International Computer Club.

The President of the International Computer Club shall:

– preside at the meetings of the Council of Founders and Scientific Council and sign the reports of the meetings;

– make decision on matters of convening, date and place of the Council of Founders and Scientific Council meetings, inform the Founders and members of the Scientific Council accordingly;

– provide efficient connections and preliminary co-ordination of the Founders views;

– conduct co-ordination and voting the decisions of the Council of Founders by correspondence;

– in the name of the International Computer Club enter into international agreements with international organizations and Government bodies;

– provide general management of the activities and head the Scientific Council.

In the absence of the President or upon his or her instruction his functions are fulfilled by Vice-President.

SCIENTIFIC COUNCIL

29. The Scientific Council shall be an advisory body attached to the Council of Founders of the International Computer Club.

Members of the Scientific Council shall participate in its work in their personal capacity. Individual membership of the Scientific Council shall be determined by the Council of Founders upon the recommendation of the President of the International Computer Club from among prominent scientists, public and State figures.

30. The Scientific Council shall:

– develop and co-ordinate major directions of research and development activities and programs of the International Computer Club in accordance with its purposes and objectives stipulated in the Statute;

– give opinions and recommendations on other issues of the International Computer Club activities within the authority stipulated in the Terms of Reference of the Scientific Council which are approved by the Council of Founders.

31. The Director-General shall inform the Scientific Council on progress in the major areas of research and development activities and programs of the International Computer Club.

The Scientific Council shall usually convene its meetings in the country in the International Computer Club's location.

The meeting of the Scientific Council shall be conducted in accordance with its Rules of Procedure under the chairmanship of the President of the International Computer Club or, upon his or

her instruction, of one of Vice-Presidents or one of members of the Scientific Council.

32. Decisions and opinions of the Scientific Council shall have the nature of recommendations and shall be subject to approval by the Council of Founders.

BOARD OF DIRECTORS

33. The highest executive body of the International Computer Club shall be the Board of Directors. Headed by the Director-General who shall act on the basis of the principle of one-man leadership, the Board of Directors shall carry out current activities of the International Computer Club.

34. The Director-General shall head the Board of Directors which shall consist of his or her first Deputy, two Deputies, and, upon the decision of the Director-General, Directors (Division Chiefs).

The Board of Directors shall have the necessary technical and service staff. The structure of the Board of Directors shall be approved by the Council of Founders.

The Director-General and his or her first Deputy shall be appointed upon the decision of the Council of Founders, two Deputies and Directors (Division Chiefs) shall be appointed and relieved from duties by the Director-General, subject to approval by the Council of Founders.

The term of office of the Director-General and his or her first Deputy shall be five years.

The Director-General shall be subordinate to the Council of Founders and responsible to it for his activities.

For the purpose of preparing draft decisions and providing for implementation of decisions made, as well as for appropriate monitoring of implementation of decisions made the Director-General may establish appropriate temporary working bodies that shall report to him or her.

35. In accordance with his or her terms of reference stipulated in the present Statute and decisions of the Council of Founders the Director-General shall:

a) manage the current activities of the International Computer Club, promote implementation of its plans, programs and individual activities, the Council of Founders decisions;

b) represent the International Computer Club in relations with other organizations, institutions and enterprises on all matters of activity of the International Computer Club with the exception of conclusion of international agreements with international organizations and Government bodies;

c) make use of financial means and property of the International Computer Club within the framework determined by the Council of Founders;

d) in the name of the International Computer Club enter into agreements and contracts related to the activities of the International Computer Club and ensure their implementation;

e) bearing in mind recommendations of the Scientific Council, establish temporary groups of experts to solve particular scientific and research problems, as well as sections to co-ordinate work along particular lines, manage the work of these sections;

f) provide general management of logistics of the International Computer Club;

g) provide for preparation of necessary documents and reports for the meetings of the Council of Founders and the Scientific Council;

h) provide for monitoring of implementation of the Council of Founders decisions;

i) provide for legal support of activities of the International Computer Club;

j) create and manage organizations established for business and commercial activities with the view to fulfil purposes and objectives of the International Computer Club;

k) take and place orders for research and development, technical, advisory, intermediary and other services related to International Computer Club;

l) solicit and extend loans;

m) organize congresses, meetings, symposiums and seminars;

n) organize training of representatives of different countries on a temporary or permanent basis;

o) provide for participation in international exhibitions and fairs;

p) organize issuance of publications, information, advertising and other materials;

q) perform other duties arising from the present Statute and decisions of the Council of Founders.

36. The Director-General shall have the right to:

- approve staff table, in accordance with the Staff Regulations, appoint and relieve the International Computer Club staff members from their posts with the exception for staff members appointed upon the decision of the Council of Founders, take measures of encouragement and penalty towards staff members;

- act in the name of the International Computer Club without proxy, represent it in all institutions and organizations, including judicial and arbitration, issue proxies of the

International Computer Club to perform such actions certified by his or her single signature;

– make different kinds of transactions, conclude agreements, open accounts in banking institutions and perform other legal actions;

– take other actions necessary to fulfil other duties which, in accordance with the present Statute and decisions of the Council of Founders, shall be within his or her terms of reference.

37. Deputies Director-General shall fulfil tasks and bear responsibility for fields of activities and operations of the International Computer Club assigned to them by the Director-General, and when needed shall act as the Director-General within the scope of his or her rights and obligations.

AUDIT COMMISSION

38. With the aim to provide monitoring by the Council of Founders of the financial and business activities of the International Computer Club the Council of Founders at its meetings shall elect the Audit Commission for the term of three years which shall be composed of a Chairman and two members.

Staff members of the Board of Directors or other staff members of administrative structure can not be a Chairman or members of the Audit Commission.

The Audit Commission shall be responsible to the Council of Founders for its activities and shall submit annual reports to it.

The Director-General shall place at the disposal of the Audit Commission materials and documents, necessary for audits and inspections, and shall provide conditions to carry out these.

Procedure of the Audit Commission and the way of implementing its decisions shall be determined by the Terms of Reference of the Audit Commission approved by the Council of Founders.

PROPERTY OF THE INTERNATIONAL COMPUTER CLUB

39. The property of the International Computer Club shall be acquired through:

– entry and annual fees of the International Computer Club Founders and Members;

- business and other commercial activities of the International Computer Club and the organizations established by it;

- ad-hoc revenues, donations, testaments, grants, and charities in cash and in kind from individuals and organizations.

Fees to the International Computer Club shall be paid in national currencies of participants, hard currencies, transferable roubles, SDRs and ECUs; besides, buildings, structures, equipment, computer hardware and software, property and other rights, including copyright on invention, know how, etc. may also be accepted.

With a view to raise additional funds the International Computer Club can arrange different campaigns and events.

Participants shall not have any right of property or can not make any claims on particular objects, assets or other parts of property of the International Computer Club, including the part of property formed through fees.

40. With the view to provide support for the International Computer Club activities an Authorized Fund shall be established through entry fees of Founders; its structure and amount shall be approved at the meeting of the Council of Founders.

The Authorized Fund may be replenished through income from business and other commercial activities, as well as through other assets belonging to the International Computer Club.

41. Annual and entry fees of members and income of the International Computer Club from business and other commercial activities and/or activities of organizations established by it shall be used to form the International Computer Club's special funds, provision of financial and other assistance to persons and organizations promoting comprehensive development and dissemination of computer culture.

42. The International Computer Club may establish special funds.

Composition, purpose, sources of formation of special funds shall be determined by the Council of Founders.

The assets of special funds shall be at full disposal of the International Computer Club.

FINAL PROVISIONS

43. All disputes in relation to implementation of provisions of the present Statute should be resolved on an amicable basis. In case the parties fail to reach agreement, they by decision of the President of the International Computer Club shall be subject to consideration by arbitration or reconciliation court, without recourse to general courts.

44. The operations of the International Computer Club shall be terminated only upon the unanimous decision of the Council of Founders.

Done at the City of Moscow, on December 15, 1988, in a single copy in Russian.

The original text of the present Statute shall be forwarded for safe-keeping to the All-Union Society "Znanie" which will serve as a Depositary. Certified copies of the present Statute and its English translation shall be transmitted by the All-Union Society "Znanie" to all Contracting Parties within three months from the date of adoption of the present Statute.

ИПМ Заказ № 235. Тираж 300 экз.

МЕЖДУНАРОДНЫЙ КОМПЬЮТЕРНЫЙ КЛУБ (МКК)

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International Computer Club (ICC)

Dr. Sergey A. ULIN

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103813, Moscow, Center,
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МЕЖДУНАРОДНЫЙ
КОМПЬЮТЕРНЫЙ КЛУБ (МКК)

АМДИЛЯН
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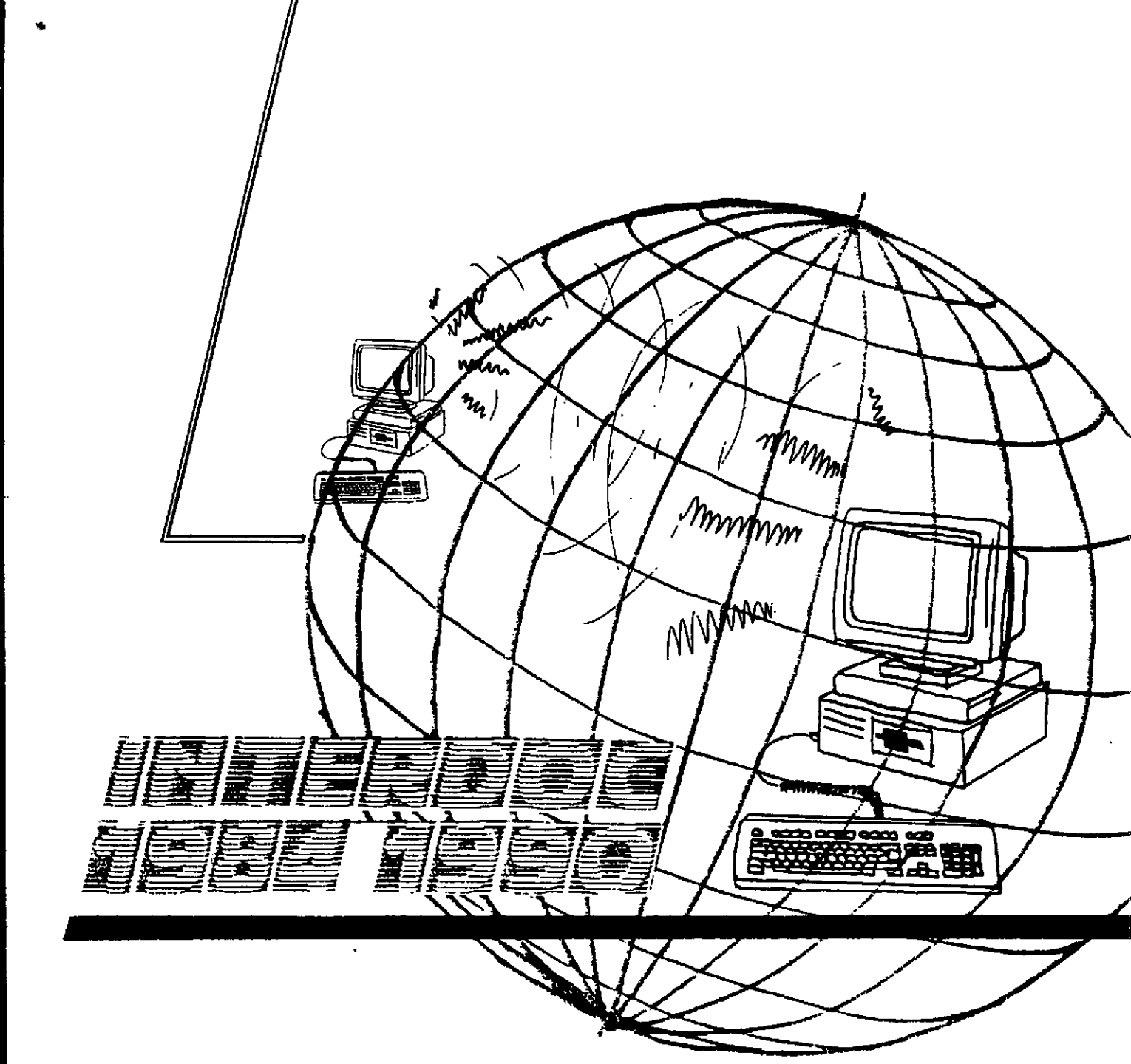
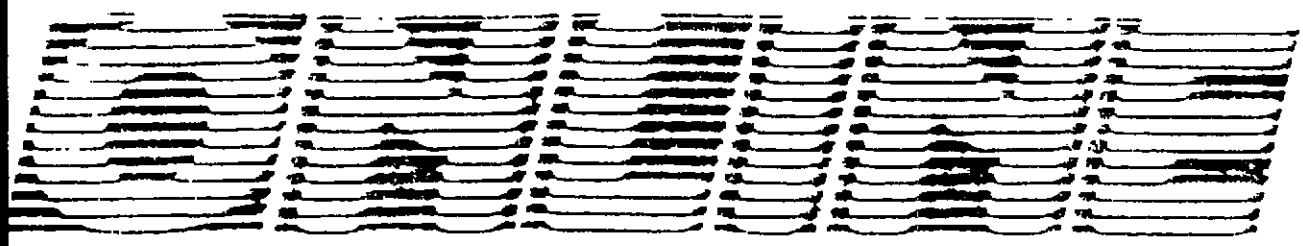
Message 2 (22 lines)
From jswan Thu Aug 31 09:24 PDT 1989
To: tnemcik
Subject: icc

Hi Tom ,

The way to reach icc is to add the prefix to their login 'sfmt'.
So at the 'To" prompt enter 'sfmt:icc'. Hope this works, gotta
run... -- Jenny
>From tnemcik Wed Aug 30 16:54 PDT 1989
To: jswan
Subject: icc
Status: R

Jenny, Hi!
how would I send mail to Ulin or Amdilyan at International Computer Club (ICC)
in Moscow? They assured me they had accounts on IGC, but I cannot find
user listings Is this top secret? or just plain old criptic?
-tom





An IDOC Publication

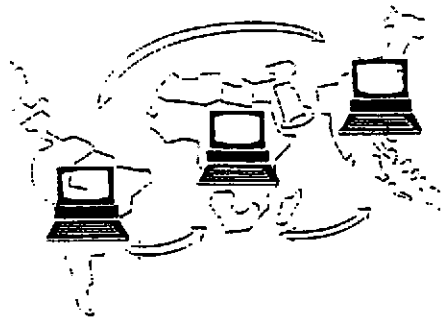


Table of Contents

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Welcome to INTERDOC!

This small publication's purpose is to offer readers a quick introduction to the INTERDOC electronic and to present some of the main concerns it has taken to heart during the last five years.

The articles reproduced here are by no means a "state–of–the–art" account of electronic messaging among NGOs today. Rather, they are meant to be a point of departure for newcomers to INTERDOC and a handy reference for long-time members.

INTERDOC is a network of some 100 non-governmental research and documentation centers, mostly in Asia, Africa and Latin America, linked through an electronic mail system. More than a formal structure it is an idea, a project, a loosely linked group of NGOs.

The amorphous "network" began in 1984 at Velletri, near Rome, when some 25 NGOs from several continents agreed to pool their efforts at information exchange. They also resolved to work for the democratic appropriation of the new information and communication technologies emerging throughout the world. They pledged their support to the struggle against global information monopolies.

In May 1990, six years after INTERDOC's founding, members will meet for a week in Epe, the Netherlands to examine the road travelled so far and look to future tasks. *Online* is designed for the Epe conference as a service to INTERDOC, the network's members and prospective new participants.

Many articles are taken from *Contact=0*, INTERDOC's bi=monthly newsletter; others are original material. Some are reprints of accounts published in *Contact–0*'s English or the Spanish edition; others are summaries based on series of *Contact–0* articles. The lead article by David Molineaux, which briefly introduces electronic mail and describes how to link up with an e-mail system, summarizes elements from several Spanish *Contact–0* issues and a manual published for that series by Gabriel Rodriguez in Santiago, Chile.

Technology develops quickly and renders obsolete many of its much-praised achievements; but the INTERDOC idea remains. Whatever future organizational structure INTERDOC chooses, its purpose remains that of pooling resources and expertise, to enable the small action groups to make use of appropriate communications tools–and to place them at the service of organizations devoted to the liberation of the poor and powerless.

Getting on line: Helpful hints for E-mail neophytes

by David Molineaux

Until the late 1970s, computers were available only to the largest, wealthiest institutions and to governments and their military establishments. They were bulky, often required custom-designed buildings, and were extremely expensive. Only specialized personnel could make them run at all.

The advent of microcomputers swiftly transformed this situation,putting compact but powerful data processing tools into the hands of individuals and small institutions throughout the world. Microcomputers have become ubiquitous not only in the industrialized North, but in Asia, Latin America and Africa.

Computers have become indispensable tools in the hands of information workers, labor unions, women's groups, health care teams, ecological organizations, research institutes and human rights activists.

These groups need not only to process information, however: they need to share it. By the nature of their work, they have always created communications networks in order to increase their effectiveness and make their resources and experiences available to those who share similar activities and concerns.

Today, many of these networks are electronic. They connect non-governmental organizations locally, nationally and internationally. Geonet, Alternex, Peacenet, Greennet have acted as links, allowing an ever broader sector of NGOs to exchange data in a more sophisticated way.

Computer networking: what is it?

What exactly are computer networks, and what can they do?

There are three ways computers share data among themselves:

Magnetic means. All microcomputers use diskettes to store information. These "floppy disks" are thin magnetic sheets made of material similar to that used in cassette tapes. A typical diskette can store the equivalent of 200 to 400 pages of typed, single-spaced information. Diskettes can be physically carried or mailed from one computer to another.

The disadvantage of this way of exchanging data is that it is slow and cumbersome; and the amount of information a diskette contains is limited. Also, in order to share data, computers must record it in similar formats or be able to read one another's formats. For an IBM compatible computer to read data from an Apple disk, for example, a translation program must be obtained--as well as some expensive hardware.

Cable connections. Two computers can "talk" to each other if they are connected by a so-called interface cable, which fits a socket or "port" on the rear of each machine. But they have to be physically close together -- generally in the same room. Using newer technology, several computers can now be made to work together on a "local area network" that spans a whole building or several buildings, for instance. But a greater need is often to exchange data between machines in different cities or countries; and local area networks are by definition closed circuits, limited to a small number of users.

Network connections. For long-distance communications, computers use an apparatus called a modem, which translates computer codes into signals that can be transmitted over telephone lines.

The fastest and easiest way to do this is by subscribing to an electronic mail (e-mail) service. These systems allow computers to communicate with other computers, and usually offer other services as well (telex, fax transmission etc.).

When two or more computers are connected by phone lines or other data transmission links, they are said to be in a network. Networks offer several advantages.

First, they allow computers to share resources. Users can obtain information stored in faraway places as if it were stored in their own computers.

Second, they are a powerful means of communication linking people in different places. For example, they permit two (or several) people to instantaneously discuss and co-author an article.

Finally, computer networks "abolish" physical distances, making it easy to coordinate actions and projects of all kinds.

Types of networks

Computer networks can be local, national or international. They can join two computers in the same room, a dozen around a large university campus or hundreds of thousands on several continents.

Basically, there are three types of computer networks:

Private nets. These are by far the most common. Access to them is limited to the specific users that own or maintain them. Private networks can link banks, NGOs, universities, veterinarians, stamp collectors, human rights organizations, agricultural development specialists, etc.

Commercial nets. These offer speed, ease of use and other facilities. They can be accessed by a very large number of users. Tymnet and Telenet are two such commercial services in the United States, and Geonet is another in Britain. Private nets generally rent the services of large commercial networks

in order to carry on their own activities. The private international NGO network INTERDOC, for example, uses the services of the commercial Poptel net.

Public networks. Many governments today offer international data transmission services to those interested in subscribing. These are generally linked to the public telephone service. They charge for their services, offering access locally and internationally -- in most cases through satellite transmissions.

The great advantage of national data transmission services (called packet switching services in telecommunications jargon) is that they can link you to international networks by means of a local phone call. They are far cheaper than long distance phone connections and transmit at far higher speeds.

What equipment do I need to join a network?

The basic equipment needed to join a network is the following:

A microcomputer with monitor and disk drive (printer optional but virtually essential); preferably with at least 128K of RAM (Random Access Memory)

A modem to transmit signals to other computers and cables that connect it to the computer and phone lines

Software: a communications program

A telephone line.

What will the service cost?

There are several kinds of costs involved in getting "on line." They are:

The hardware: a computer and a modem with the necessary cables. Today, an adequate microcomputer can be purchased for less than US $1,000, and a basic modem can cost as little as $50.00-$100.00, plus cables (sometimes another $25.00 or more).

A software program. This is quite inexpensive compared to the hardware. Some "public domain" programs cost only the price of the disks on which they are copied; most commercial communications programs cost less than US $100.00. In fact, when you purchase a modem the manufacturer frequently provides communications software as part of the "package."

The cost of joining the e-mail service. This is typically US $20.00-$60.00. In some cases there is also a deposit or installation fee charged by the national data transmission service.

Fixed costs: a rate (usually monthly) for the use of the e-mail service; and another for the use of the national data transmission service. If you join INTERDOC, the GEONET charges will be 7 Bps. a month for the mailbox.

Variable costs. These depend on how long you spend on line and how much information you transmit. They are calculated separately by the national data transmission service and the international e-mail service, and include:
Connection time: how long you spend on line. GEONET charges 8p a minute, with 60 minutes a month free.
Volume of data transmitted: you are charged a certain rate per thousand characters sent or received. Naturally, the latter costs vary according to the country you are in and the e-mail service you use. See the table on page 6 for a survey of on-line charges by some of the most common e-mail carriers.

If you have a microcomputer already, the cost of getting on line can be as low as US $200.00 including modem, software and registration in the e-mail service and the national telecommunications service. Fixed costs for an individual or small institution should be less than $50.00 a month; and variable costs will depend on how much you use the service.

How do I connect? Concrete steps.

If you're not yet part of an e-mail network and would like to be, you should do the following:

Assess your needs and local facilities. At the beginning you should consider the following:
With whom do you need to communicate? What are their concerns and interests? What electronic mail

services do they use? (See the map of alternative e-mail services, page 21.) What data transmission services are offered in your country? Which e-mail systems can be easily accessed using these?

Select the e-mail service that seems most appropriate to your situation. Here you should consider the cost of each service; ease of use; special services offered; availability of manuals or technical support; and which services have representatives in your country. If your organization wants to join INTERDOC, write to: *Antenna, Postbus1513, 6501 BM Nijmegen, The Netherlands.*

If your country has a national data transmission (packet switching) service, register with this service and indicate which e-mail service you want to connect with. You may pay an installation fee or deposit, and will receive a user name and password along with information on how to connect with the service.

(If your country has no packet switching service, you may be able to use that of a neighboring country that does, and still save on telecommunications costs. You'll have to use the service by placing long-distance calls to the other country, but this can be far cheaper than an intercontinental call or fax message because such transmission is very fast and uses little phone time.) At the same time contact the e-mail service and register. You will receive a mail box, user number and password.

Technical points

In electronic communications, things can get very technical very fast. We will not embark on a discussion of parity bits, scramble polynomials or dip switch settings; however, there are some technical considerations you should keep in mind when purchasing and setting up equipment.

Will it work with my computer?

Virtually any microcomputer can communicate with any other. It must have either an internal modem or a plug called a communications port (RS 232 port) that can be connected to a modem using a cable.

What do I need to know when buying a modem?

There are several technical points to keep in mind when you are shopping for a modem. These are:

The country in which you will be using it. At present there are two general standards for modems. One, called CCITT, is European (and generally used in Latin America); the other is the Bell standard and is used in North America. Many modems today can be set to either standard, but be sure to check before buying one.

Modem speed. Modems operate at different speeds, the most common being 300, 1200 and 2400 bps (bits per second or bauds). E-mail systems usually offer the option of transmission at either 300 or 1200 bps.

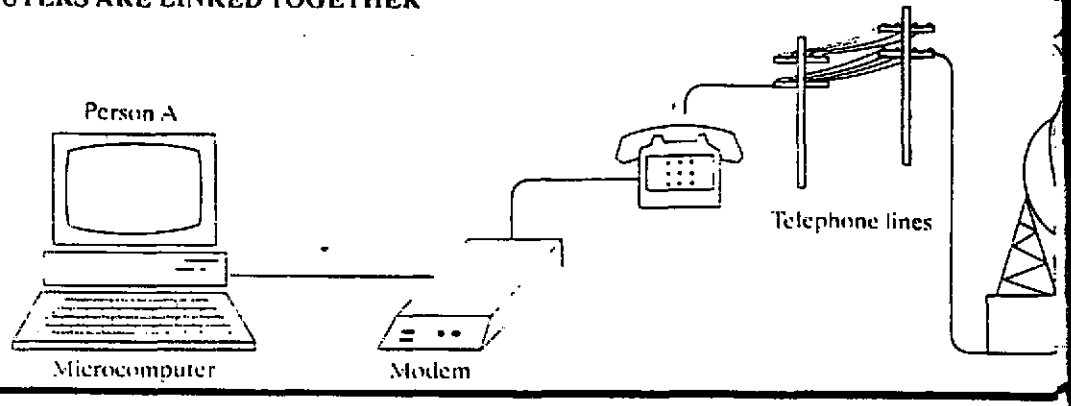
Faster transmission is of course desirable in many ways; where phone lines are poor, however, 300 baud transmission is more accurate. So if you buy a 1200 baud modem, you should assure that it also has the ability to transmit and receive at 300 bauds.

Interfaces and cables. When shopping for a modem, be sure you know what kind of interface port (plug for the modem cable) your computer has. You'll need to buy an interface cable (called an RS-232 cable or V.24 cable) to connect computer and modem. The ports come in two sizes (9 pin and 25 pin) and can have either male or female connectors. Many dealers will be able to tell you which cable to buy for your type of computer; but don't buy one until you're sure you know what you're doing.

Some computers will receive an internal modem, which fits into a slot inside the case. If you buy an internal modem, you won't need an interface cable at all.

Hayes compatibility. It's important that the modem you buy be "Hayes compatible," that is, that it incorporate certain commands that have become standard in the field of computer communications. This will ensure that your modem works with your communications program.

HOW MICROCOMPUTERS ARE LINKED TOGETHER



What about software programs?

For e-mail you can use any communications program that works with your computer. A program for an Apple computer won't work with an IBM compatible, for example. But to send a message to another user, you don't have to both use the same program. The e-mail service transmits your message in ASCII code, a standard for all computers today.

To become part of an electronic network requires some effort and the acquisition of a certain amount of technical acumen. Once you're online, however, you'll have access to one of the fastest, least expensive forms of international communication available.

E-Mail: Measuring the costs

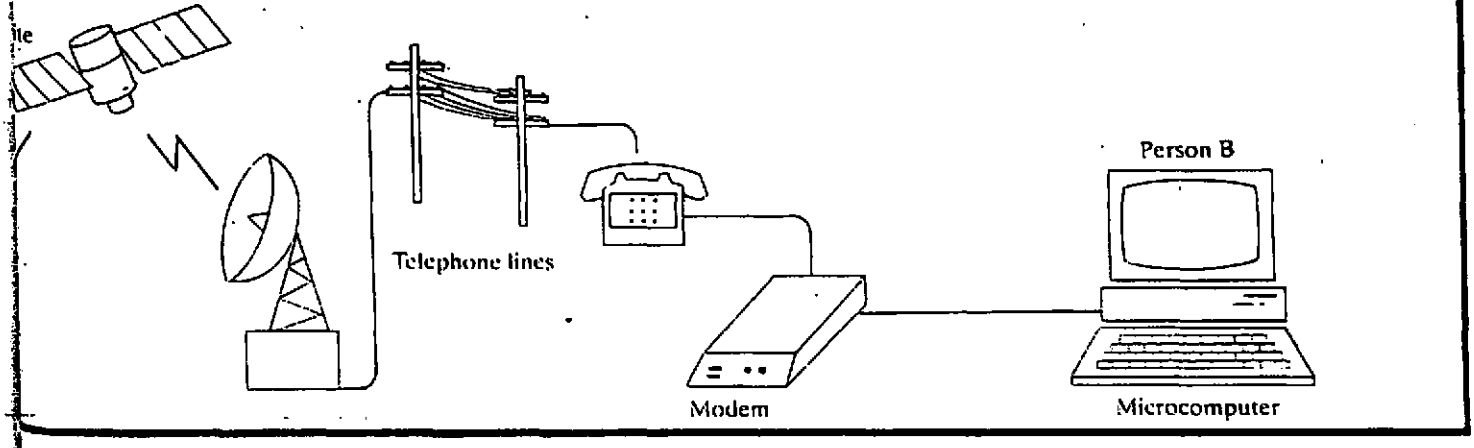
E-Mail has another, very practical advantage over telex and fax: it's cheaper – especially if you use an integrated network.

The following chart shows the costs involved in sending a 300 – word text from SATISNet headquarters in the Netherlands in three different cities. (SATISNet is a global network of NGOs working in appropriate technology.)

from a Netherlands connection to:	Milan	Miami	Manila	Domestic
via SATISNet to	Italy	USA	Philippines	
1. a Geo2 mailbox	0.14	0.14	0.14	0.14
2. another Geonet box	0.24	0.24	0.24	0.24
3. another system box	0.95	0.95	0.95	0.95
4. via Geotelex to a telex	1.97	3.87	7.20	1.50
5. via Geofax to a fax	1.36	1.53	1.53	1.36
via other routes				
6. normal Post Office airmail	0.38	0.65	0.65	0.38
7. SATISMail/ airmail	0.21	0.41	0.41	n.a.
8. on your own telex machine	1.60	5.30	10.60	0.30
9. on your own fax machine	0.72	2.00	3.35	0.32
10. direct conversation/dialog				
by direct-dial phone	0.72	2.00	3.35	0.32
by dialog on Geonet	0.14	0.14	0.14	0.14

Prices are converted to US dollars. Transmission times are: Email = 1 second telex = 4 minutes; fax = 1 minute

To complete your calculations, here are indications of fixed costs for depreciation, mainteinance and subscriptions:
a) fax machine $ 110 per month; b) telex machine $ 150 per month; c) SATISnet: $ 40 per month (modem $ 10; PSN access $ 15; SATISnet fee $ 15 *(SATISNews 2 - 1988)*



What do I need? Comparing telex, fax and E-mail

by Heinz Hunke

"We don't need E-mail, we have telex"

The global telex network is well established, and being an "old" technology, it is also widely diffused in Third World countries.

Since telex relies on its own cable infrastructure, it is normally more robust than the more sensitive, often overloaded and noisy telephone lines. This is very important in many parts of the developing world.

On the other hand, telex use is relatively expensive and slow. It is for this reason that "telex" has become almost synonymous with the "short simplified message", and is not apt for long text transmissions.

Furthermore, in many countries the expenses for renting the machine and the installation of a line are exorbitant.

Telex vs. E-mail

The installation costs for telex are normally higher than the purchase of the equipment necessary for E-mail connection: a PC, a modem, a communications software program. The difference is that while the expenses for the computer equipment are a once-only investment for a variety of tasks, the expenses for telex continue as recurring rental expenses.

Linking to an E-mail network provides various service opportunities besides exchanging information between network (mail box) subscribers: most international host systems also provide telex connections, so that an E-mail subscriber can send and receive telex messages to/from any telex user in the world. And this in many cases at a cheaper rate than in one's own country.

While subscription to an E-mail network is normally not expensive considering the amount of text that can be exchanged and the provision of various services, the access to a national "switchboard" or "packet switching service" (PSS) may be extremely costly and a more serious disadvantage. While these rates are quite economical in most European and North American countries, some Third World countries offer this national access service at rates that limits these services the exclusive domain of airline companies and banks. There seems to be a deliberate policy of excluding NGOs from this versatile tool of global communications.

With the fast development of modem technology, this financial disadvantage is decreasing. Modems allow faster and more adequate transmissions, so that after a critical mass of material to transmit justifies E-mail use, the long distance call from a Third World country to the place of the E-mail host system is becoming economical.

While the specific task of a telex service, namely the sending and receiving of (short) messages within the global subscriber network is fully achievable through E-mail also, this latter offers many other services which will be considered in the paragraph "E-mail Advantages".

"We don't need E-mail, we have FAX"

FAX is the fastest growing telecommunications tool these days. Experts foresee another FAX boom in 1990.

Its advantages over telex are obvious: there is no need for a special line other than the telephone line, except if one decides to have a telephone line added for the exclusive connection of one's telefax.

The fax machine, although it costs about US$ 1,000, is much less expensive than the telex machine.

The handling of the FAX equipment is "user-friendly": it does not require more than putting the paper with the message in the right way into the machine. Except for the normal dialing, only obvious "go ahead" commands have to be given.

The cost of the operation is exactly the amount for the corresponding telephone use, both in terms of a local and of a long-distance call.

Calculating the expenses for a fax message are therefore extremely simple (unless charges also include amortization and paper use, especially the relatively expensive thermal paper needed by fax for printing received messages, etc.).

The great advantage of FAX is its capability of transmitting graphics, pictures, and - particularly important in certain regions of the world - any type of alphabet. This is its great advantage, for the time being, over E-mail.

There are some serious drawbacks with fax, however: telephone lines carry a lot of noise, and in many countries a fax message will carry a great amount of distorted symbols and characters because of this, which may jeopardies the intelligibility of a message.

Sending a certain message to all members of a group or network means the multiplication of transmissions and their costs for each addressee.

While the service of text transmission can be fully achieved by E-mail (not so the transmission of graphics, non-Latin alphabets, etc.), this latter has definite advantages in speed and costs. This cost saving grows with any increase in transmitted text and transmission distance. E-mail is not bound by kilometers or miles.

Within an E-mail user group

the transmission of a message to one member costs almost the same as transmitting it to 20 group members dispersed all over the globe.

E-mail: a wholly different experience

The comparison between the various telecommunication tools-- telex, fax, E-mail-- could entail a long debate of advantages and disadvantages. But E-mail is not just a telecommunication tool, it is that and much more.

As a communication tool, it has the advantage of being just one more function of the electronic machine, which has been purchased normally for several other purposes. It relies on a computer and a telephone line and needs for itself only a modem and additional software.

A modem is a small instrument which should not cost much more than US$ 300. Appropriate software is widely available and programs such as Shareware can be copied without charge.

But the overriding reason that puts E-mail into a totally different category in telecommunications compared to telex, fax and phone is because an E-mail message is part of the electronic computer brain. And this means that information processing and information transmission are no longer two different work processes, but are one integrated communications process. For example, it is possible to excerpt a block from an existing file in the computer memory, edit it and send it via E-mail. In the same way, the received message can be stored, re-edited, re-sent, split, added to other existing files, added to a data base or an information retrieval programme, and, without any re-typing, loaded into a desktop publishing programme, etc.

It is true that graphics cannot be sent via E-mail, except as binary file transmission, which presupposes the same software use on the transmitting and the receiving end. That is why E-mail makes use of powerful transmission protocols for automatic error correction, another advantage of E-mail over FAX, in that it is more sensitive to line noise.

Mediation of a mailbox system

Another disadvantage of E-mail over the other tools: its lack of immediacy. Messages can remain unread for long periods if the partner does not open her/his mailbox. Often enough, even among "dedicated" members of INTERDOC, a phone call had to alert receivers to urgent messages to which they were expected to react. But who guarantees an infallibly prompt reaction to telexes or faxes?

What is expressed here as a disadvantage may well be seen as an advantage in other respects.

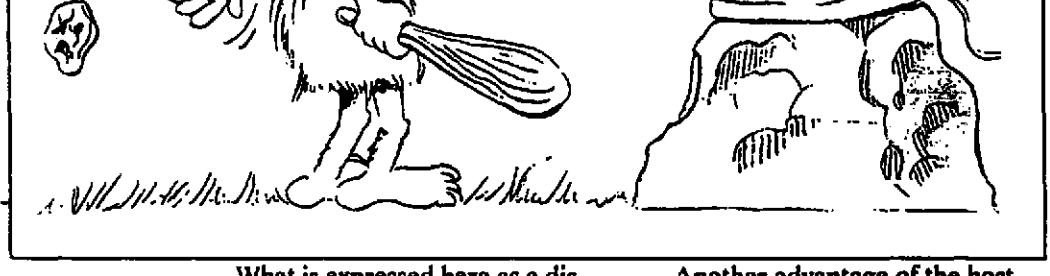
The mediation of the transmission through the large E-mail host system make partners independent from intercontinental time differences while the computer is switched off after office hours (or during other time spans during the day or the night). Or even when all my equipment has broken down, even if the national telephone system does not work for a day, my partners do not have to call again or give up desperately after a few aborted efforts: the messages wait in my mailbox until I open it again.

What is more: for quite some time they remain in the box, even after I have taken them out! Unless I have deleted them purposefully with a special command, I can always reread a message, which I cannot with lost or misplaced paper letters.

This mediation of the E-mail host system also allows independence from a given transmission place. Where ever I have a computer and a phone, I can hook up with my mailbox, read and send messages. In order to facilitate this operation, some major E-mail networks have their nodes internationally distributed or are accessible through interswitch services.

Another advantage of the host mediation is compatibility. It is irrelevant which hardware or text processing software the partners of E-mail networks are using. Files are transmitted as ASCII files, i.e. according to the international coding system. Because of this, it is possible to work at home on an IBM compatible laptop with 3,5" diskette, transmit it into the E-mailbox, possibly in an other continent, and

InfoAge: Defining the needs for tomorrow's Information Society



"download" it next morning in the office into a MacIntosh and copy the file directly into its desktop publishing programme.

Disadvantages of E-mail

We have mentioned the limits of E-mail in transmitting graphics or non-Latin characters. Where this type of messaging is dominant, FAX remains a major tool.

There is no doubt that E-mail is more complicated than the use of FAX or telex. Hardware, software and international carrier structure may be responsible for many breakdowns or difficulties, which do not exist to such a large extent with other communication tools.

While it is relatively easy to master the necessary know-how for routine messaging, a lot remains to be learned before all the tricks of a communications software or the possible pitfalls of highly sophisticated modem technology become more or less transparent.

Junk mail

It is not unique to E-mail that we are bombarded with a lot of junk mail: our physical mailbox at the post office down the street is filled with it; we get a lot of phone calls which we would like to avoid if we could, the fax rattles along spitting out lots of information which is continuously filling our waste baskets.

With E-mail, the junk mail syndrome may not be so dramatic as it is in other communication systems. But the problem exists, and it is more serious when we have to pay for reading this junk mail. Incoming mail can only read if it is downloaded. This costs connection time. If we know ahead of time that a certain message is junk, we can do away with it by giving a command "read NOT". But often things are not so obvious. E-mail users have, therefore, to stick to a very strict code of conduct: the system is meant for information exchange, not for information bombardment.

Keen growth for European Email

Public Email

Installed	base (000s)	Av growth		Penetration	
		1988	1993	1988	1993
North America	1585	5360	27 %	1.3	4.3
Canada	85	210	20 %	0.8	1.9
USA	1500	5150	28 %	1.3	4.6
Europe	172	820	36 %	0.2	0.8
France	25	60	19 %	0.1	0.3
FRG	15	80	40 %	0.1	0.3
Italy	5	40	51 %	0	0.2
Spain	0.3('89)	5	100 %	0	0
Sweden	2	10	39 %	0.1	0.3
U K	125	625	39 %	0.5	2.7

The following figures show the number of electronic mail boxes at end of year. in thousands. Penetration is % of working population. Average is compound average annual growth rate.

Although growth is high. the useage of electronic mail is far behind that of North America.

Public and private Email

Installed	base (000s)	Av growth		Penetration	
		1988	1993	1988	1993
North America	9985	48960	37 %	8.1	39.4
Canada	785	3810	37 %	7.1	34.6
USA	9200	45150	37 %	8.1	39.9
Europe	819	5350	45 %	0.8	5.0
France	135	635	36 %	0.6	3.0
FRG	60	1025	80 %	0.2	4.1
Italy	35	230	45 %	0.2	1.1
Spain	2	35	80 %	0.02	0.3
Sweden	122	300	20 %	2.9	7.0
U K	465	3125	45 %	1.9	12.9

Source: BIS Mackintosh

The charts show how far ahead USA is in terms of penetration of electronic mail boxes. Presently there are 81 boxes per thousand working population which will grow to 400 per thousand by 1993. Private email tends to be used by multi-nationals. To those companies who use it. private email is now a strategic tool that offers an advantage over their rivals and as such information on these systems is becoming increasingly difficult to obtain.

INFORMATION MARKET No. 01

New technology for grassroots documentation centers

by Charles Henry Foubert

The following "Orientation Paper" by Charles H. Foubert was read at the International Meeting of NGOs Computerized Reaearch and Documentation Centers, INTERDOC's founding meeting at the Velletri (Rome-Italy) 2-7 October 1984. Foubert had been tragically killed in an automobile accident in Africa several months earlier.

In his book "*The Electronic Cottage*", first published in 1981, Joseph Dekens says that: "The personal computer of the near future will be an access port through which an individual can receive, transmit and interactively interpret data. A characteristic feature of logically coded information is its transportability, and even beyond that,its negotiability. Not only can you get information in logical form, where you want it, as easily as television or radio broadcasts or telephone hookups, but once transmitted, the information can be stored, reutilized, recombined and used directly to drive programs for whatever application ..." (*New York: Bantam Books, 1983, p. 295*)

What appears beyond the thinly veiled optimism of such a statement is the fact that today the transfer of information is no longer confined to books or paper communicated through the traditional channels of postal or even telex services. The information revolution brought about by the new technologies has opened new ways to tap today's vast information flow.

There is no need for me to stress the enormous prospects opened by the new communication technologies. The advantages of computer-to-computer hook up through the telephone system are of two kinds: First, the ability to access data held on other, larger data bases through major information utility services such as Prestel, and second. the ability to transfer files from one computer to another over thousands of miles. Commenting on this second point, Dr. C. Jackson Grayson Jr., the convenor of a major "computer conference" throughout the USA in 1983, wrote: "Bringing people together electronically by means of computers and communication links has many applications. Hence the term computer networks conveys more of the actual potential of enabling numerous busy individuals, widely dispersed, to interact over an extended period of time for a variety of purposes:

- to exchange information
- to generate and exchange ideas and innovations
- to work together on a common project
- to disseminate information rapidly and receive feedback
- to exchange opinions and interact
- to unite in seeing a common goal
- to learn
- to search for compromise consensus, and majority positions
- to obtain commitments
- to improve decisions

("*The Futurist*", *June 1984, Washington, D.C.*)

If it is true that at this time large corporations and powerful government bodies are in a better position to develop, manage and utilize these new opportunities for their own purposes, people-oriented NGOs working for grassroots development should not think of information or of the distribution of information to a wider audience as the monopoly of such institutions; indeed, they need to study the implications of these rapid developments for their own operation.

The technological debate

The very existence of research and documentation centers linked with grassroots movements in the Southern as in the Northern part of the globe is not a new phenomenon. It shows the determination of their members to remain protagonists of their own destiny and to think of themselves as cooperative producers rather than consumers of information.

If we look only at the post-World War II period, we see that the first development decade, the 1960s, fostered the emergence of such research and documentation centers at a time when the contradictions between the so-called developed and developing world sharpened at all levels (political, economic, military, and even religious). The 1970s was a time of consolidation and organization, with the systematization of research and the emergence of cooperative endeavors and groupings of centers across geographic lines around the issues of the day. Networks of documentation centers started emerging on issues such as rural development, transnational corporations, women, human rights, peace, militarism, consumer problems, health, etc. Primarily action-oriented, these groupings promoted the exchange of information with an occasional joint research program. Participants in these groups were - and most still are - using traditional information and communication methods. In retrospect, let me now offer a glimpse at the first half of the present decade, the 1980s. We notice that one of its characteristic features as far as NGO research and documentation centers are concerned, is the effort to meet the challenge of the new information and communication technologies. This has not been an easy issue to grapple with. Identification with

INTERDOC's low-profile

INTERDOC has never tried to do more than harness the collective energies of independent NGOs that see the usefulness of combined and coordinated initiatives on some aspects of information exchange. We share some perceived needs, and feel that joint action on these issues will improve our chances of success and assist our work.

As such, INTERDOC has been able to provide a non-threatening, non-partisan focal point for discussion of information exchange and new technology by development and social action NGOs. In this spirit, Interdoc has always endeavored to remain an association of equal NGOs, and to exist among and within them, rather than develop an independent, institutionalized life of its own, separate from active members. The balance between sustainability and institutionalization is however, a difficult one, and will hopefully be the subject of discussion at the May meetng. J.S.

people's concerns pointed at first towards a rejection of this sophisticated and "elitist" type of technology as well as the adoption of simpler forms of information processing, thought to be more appropriate because of their reliance on locally available tools and resources. Little by little, however, the awareness grew that the new technology was here to stay and increasingly would become part of everyday life. The new challenge, then, was to either be totally controlled by this technology or to strive to control it and use it in the interests of the people.

The whole concept of "appropriateness" was then up for discussion. In the words of the Dutch information expert Cees Hamelink. In E.F. Schumacher's thinking, intermediate technology was seen as vastly superior to primitive technology and at the same time as cheaper, simpler, freer and less violent than the 'supertechnology of the rich'. Development, however, may demand that advanced knowledge is exploited for the upgrading of primitive techniques. It may also invite the application of supertechnology precisely to subvert the rich man's use of the technology. This conception of appropriate technology points to 'technology assessment' as the most central activity of those acquiring parties that want to select, integrate and generate technology ....The development of technology assessment capacity needs the transfer of knowledge. Not only of technical knowledge, but of a wholistic package encompassing know-how of traditional techniques, anthropological, sociological, economic and juridical insights, methodologies of policy analysis, and epistemological tools. Vis-a-vis the transfer of this knowledge, the concept 'appropriate' is definitely inappropriate, because it presents an undue restriction. In constructing the capacity for selection, access to the widest possible body of knowledge is an absolute prerequisite ... Once the technology assessment capacity has been secured, appropriate technology should become a tautology". (Cees Hamelink, *"The Technology Assessment"*, in: IDOC Bulletin, n.7/1983, p.9)

In such an assessment exercise, the question is no longer "advanced" versus "appropriate" technology. It is taken for granted, as Prof. Hamelink also stresses, that the starting point remains that "people affected by technology should be involved in the choice of that technology" (ibid.). This led many groups to conclude without changing the basic orientation of their work that the new information and communication technologies could be, under the circumstances, the most appropriate to reach their objective and,in the long term, to improve their service to grassroots movements.

Hence the decision by many NGO documentation centers over the last years to computerize their operations. Theirs was a conscious option, not simply a desire to "jump on the bandwagon." It was an option based on a serious consideration of what their role and tasks as NGOs were in society. This whole field however, is entirely new to most of them and for that reason we should consider the present period as an experimentation period. In some cases, for example, initial errors involving wrong hardware or software choices seriously hampered the information processing capabilities of some groups and had to be rectified. In other cases, the results were satisfactory from the start. Between these two extremes, we find the whole gambit of possible interactions between people and machines.

The Lisbon Meeting: "Documentation for change"

When considering computerization, most centers made their decisions in isolation--not in isolation from their own direct environment, but without allowing for the possibility of a vast consultation with other NGO research and documentation centers involved in a similar decision-making process. The need for sharing and learning from each other's experience in this field was strongly felt at an international meeting of documentation centers convened in Lisbon, Portugal, in January 1982. This was one of the first international forums at the NGO level to deal with the issue of using the new information and communication technologies from a holistic point of view, including its impact on labor and society. In their final report, participants at the Lisbon meeting recommended to:

"Establish a network of groups who are exploring new technology so that we can exchange feasibility studies, experiences and findings. This network will investigate and share news about ongoing technological developments, as well as examine the adoption of standards designed to make different systems compatible, thus permitting centers to exchange electronic data or disks." *("Documentation for Change", Final Report, p.21).*

The Lisbon meeting also saw the need to familiarize the NGO centers with the new technology. A collection of short documents was

made available that provided introductory background on these issues, such as a guide to the methodological options for using the new technology, general introductory material on microcomputer systems and the fundamental questions groups need to ask themselves when assessing the new technologies. The NGOs which met in Lisbon even envisaged the formation of "a group of consultants to serve ... centers considering the use of the new technology", without precluding "the fundamental need for centers to develop knowledge independently or the freedom to seek local and sympathetic technical assistance". Looking back at Lisbon, it appears that the meeting had correctly anticipated the problem that many now face, which is not so much a transfer of technology as a transfer of knowledge about the technology, allowing NGOs to acquire the instruments to control its use to their benefit. Most importantly, Lisbon also encouraged centers to meet the technological challenge in permanent consultation and in a spirit of cooperation as the only long term solution.

Tribute to Charles Foubert: 1943-1987

by Heinz Hunke

INTERDOC emerged as a response to the felt needs and reflections of many NGOs around the globe. But no one contributed more in giving shape and identity to the project than Charles H. Foubert.

Foubert was one of the co-ordinators of the 1982 international meeting of documentation centers held in Lisbon, Portugal where the question of how to deal with the emerging information and communica- tions technology was first discussed. He made the "Lisbon mandate" his own and worked tirelessly to convene the 1984 meeting in Velletri, Italy which resulted in the foundation of INTERDOC. The founding members of INTERDOC elected Foubert as the network's first coordinator. The need to create what eventually became INTERDOC had been the driving force of Foubert's work for more than 20 years. His work as a missionary in the Philippines in the late 1960s and early 1970s convinced him that political choices are at the root of the misery of the oppressed, and that the most insidious form of oppression is that which reduces people to silence by simply controlling every possible platform of expression, especially the media.

After the Philippines, Foubert came to Rome with one overriding goal in mind: to do everything in his power to give voice to those who had been silenced and to share with the oppressed those skills that could give them access to the information needed in order to act effectively to transform their social, political and cultural environment.

During his first years in Rome, Foubert lived in a squatter community of Filipino refugees and became a rallying point for them. Old friends from his student days at Rome's Gregorian University helped him find a job that reflected his goal: the then Dutch Documentation Center for an open, ecumenical Church had developed into IDOC, an international, transconfessional documentation center on liberation efforts around the world.

At IDOC, Foubert immediately began to work on two specific projects: the first involved encouraging local action groups in the Third World to start their own information processing by collecting and methodically storing relevant documents; the second envisioned a global information exchange system, which would attempt to pull together the networking capacity of ecumenical institutions such as the World Council of Churches and the Lutheran World Federation, as well as national IDOC branches and the Rome-based InterPress Service (IPS).

To respond to the first concern, Foubert initiated a month-long training course in documentation which is held annually by IDOC in Rome. For the past 10 years, IDOC has brought together a group of about 15 participants primarily from NGO organizations in the Third World and has trained them in basic documentation skills. Foubert's second concern eventually evolved into INTERDOC, a project not so much concerned with linking major networks but with enhancing the local expertise and capacity of grassroots organizations so they can be on an equal footing and participate with other NGOs worldwide in the exchange of information for liberating action. The INTERDOC project was just getting underway when Foubert was tragically killed in a car accident while on a FAO mission in Sierra Leone in May 1987. Charles Foubert was known, trusted, and loved even in the most distant corners of the earth. The shock and sadness felt at his sudden death was communicated among friends the world over--often via electronic mail beyond the INTERDOC user group he helped establish. That group is forever indebted this modest man who worked tirelessly to make his dream of giving a voice to the oppressed a real possibility.

The Lisbon Mandate

Lisbon itself did not establish a clear organizational framework for the creation of a formal network that would permit ongoing, concrete cooperation. However, interpreting the mandate from this international meeting, IDOC International, together with the other promoters of the Lisbon meeting and with InterPress Service (IPS) in Rome, designed a communication project among development-oriented NGOs, known as the "INTERDOC Project". The list of prospective members of this network was based on the list of participants in the Lisbon meeting, with the addition of a few others.

This project was designed between 1982 and 1984. Prospective members were contacted by mail or in person. Most expressed interest, encouraging IDOC and IPS to go ahead in their efforts to concretize the project. They requested both organizations to keep the centers informed about further developments. However, there had been no real collective discussion of the terms of this first project among the centers. This occasion (the Velletri meeting)is the first opportunity we have had to meet and examine the full range of problems that the creation of a communication network through the use of new technologies would pose. "INTERDOC" should thus be considered as nothing more than a first attempt to transform the Lisbon mandate into a workable project for the future. ...

Tasks before us

Contary to the Lisbon meeting which took into consideration the wide range of issues documentation centers are dealing with--from rural development to human rights, from women's concerns to new technologies--this Velletri meeting will concentrate exclusively on the mandate to establish a network of groups exploring the new technology. By the end of this conference we should have more clarity about what that network entails, including precise operational indications for future implementation. Within this overall objective, the tasks ahead of us for the next five days are varied:

A sharing of experiences in the computerization of data. This will be done formally in the first phase of the conference through reports from participants. It will continue during the week through the workshops and in informal contacts. One of the first results of the conference on which to base any further assessment of its value and interest should be to learn from each other's experience and to bring home new ideas and proposals.

An exploration of the networking possibilities among the centers.This will be done in several phases. First a presentation of the present state of the problem: how compatible are the present systems used by the different centers? The report on this is based on the answers to the questionnaire sent to the participants last July. It will be followed by a lecture on the requirements of telecommunication. As a second step in this process, we will need to be informed on the various ongoing projects of networking and communication among NGOs in the different regions of the world. This is the meaning of the reports, which will be presented, and of the workshops divided by regions. After this, we will have to study together in separate workshops the various aspects of networking at the global level:

- the technology: technically speaking, we are told that two components are needed to connect the machine to the telephone network: first, a modem and second, a software package. We will have to examine these components and what they entail, including their costs. At the same time we have to examine the possibilities of networking via telegraphic lines, e.g. those of IPS.

- the problem of standards and of thesaurus, or, in other words, of the common language to be used in communicating data.

- the organizational framework of the network, taking into consideration various institutional models.

- the products of the network, its use and the services it could render to a wider audience.

- finances: the financial requirements for each center to hook into the network and the costs of the operation itself. This workshop will have to design a fund-raising strategy for a pilot project and examine the possibility for the network to become self-sufficient in the long run. This may mean commissioning a market study for its products.

Conclusion

If you allow me to have a dream in concluding this orientation paper, I would say this, taking an analogy from the world of the new agencies.The existing international order in the field of data collection is similar to what can be observed in the field of information dissemination. In much the same way as major news agencies located in the North tend to control and monopolize the daily flow of news, so also the major data banks in operation today are the monopoly of powerful institutions located in the North. But as a pool of news agencies from the South are attempting today to make their voice better heard to each other and to the world--and IPS's role as a support agency is crucial in this regard--so is there a need for a pool, network of development oriented documentation centers linked to the grassroots to constitute a data bank able to provide the world at large with as serious and scientific data as are coming from the existing data banks of the North. This would facilitate the exchange of information among the centers themselves on issues of common concerns. It would also allow researchers, journalists, even scientists not only to depend for their data collection on the data banks of big corporations, but also to interrogate the voice of those who today are the least heard. This is a dream but also a challenge. NGO research and documentation centers working with the grassroots in the Third World, together with international networks and national centers in the North, may have a role to play in making this dream come true.

Looking beyond INTERDOC: GATEWAYS

INTERDOC members are users of the Geonet Mail System GEO2, run by Poptel in London. But several groups also belong to one of the APC networks such as Peacenet or Econet in the USA, Web in Canada, Nicarao in Nicaragua, Alternex in Brazil, Pegasus in Australia, or Greennet in London.

A request that surfaced during the 1989 workshop in Epe was the need to establish an adequate "gateway" service among these networks.

The ACP network has its own system of regular interswitches and exchange of messages from one member network to the other. And, in the past, Greennet has taken on the "gateway" function between Geo2 subscribers and the ACP network.

But participants at that workshop felt that this was inadequate and asked that existing host systems develop a more organic form of interlinking or gateway services, so that all subscribers of the various hosts would be able not only to exchange bilateral messages but also make full use of the respective bulletin boards or conferences.

Types of gateways

The following breakdown is taken from "Information Market" no. 60, Luxembourg, Dec.89 -Feb.1990, p.6:

Gateways can be roughly divided into four categories: large hosts, small or specialized hosts, gateway companies, VANs and electronic mail (E-mail) services. A brief explanation of each:

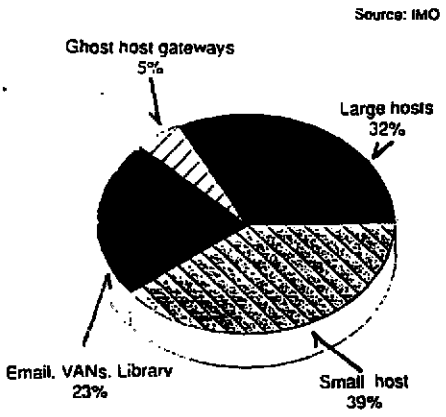
- **Large hosts**

The gateway between the European Space Agency IRS in Italy and Pergamon in Great Britain allows subscribers to use both data base holdings. The STN network that links CAS in the USA, INKA in Germany and JICST in Japan provides a worldwide gateway: users can access any database belonging to the system.

- **Small or specialized hosts**

The small national host, DataArkiv, has created a link to the larger host, DataStar. Small complementary services such as Infomart and Infocheck link their services together.

Types of gateways



- **Gateway companies**

These are often "Ghost Hosts" which do not necessarily load databases themselves. Instead, they have telecommunications agreements with a large number of database hosts. Their aim is to make life easier for the occasional user by providing an easy-to-use software and a more flexible way to pay for the services. EasyNet and iNet are examples of gateway companies.

- **VANs and E-mail systems**

Additional services, such as database information, are often offered to users around the core messaging service.

Within INTERDOC and within the APC network, an important gateway service is rendered by the "NGO small hosts". Alternex in Brazil, Nicarao in Nicaragua, and Pegasus in Australia and the Pacific have established this gateway service to allow small groups to have access to the global IGC or ACP network. Worknet in South Africa, Access in the Philippines and CCAN in Thailand have set up gateway services within the Geonet system.

DASNet: Bridging the nets

What is really needed is one cross-connecting link to bring together all on-line services via E-mail. Presumably, if all services were linked to all other services, then no one would have an "unfair advantage".

Happily, work is being done in this direction. An independent service called DASnet is working to make cross-service E-mail a reality by acting as a forwarding agent between various services. For a few cents per message, DASnet subscribers can send messages to any of more than a dozen online services - provided their "home" systems are connected with DASnet.

DASnet currently links more than 20 systems and networks, including ARPANET/BITnet, ATT Mail, DASnet(R) Network, DCMETA, Dialcom(SM), EIES, EasyLink(R), Envoy 100(TM), FAX, GeoMail, MCI Mail(R), NWI(R), PeaceNet/Econet, Portal Communications(TM), The Source(v), Telemail(R), ATI's Telemail (Japan), Telex, TWICS (Japan), UNISON(R), UUCP, The WELL, Domains e.g. ".COM" and ".EDU". A DASnet subscription costs $4.50 per month ($5.50/month for hosts located outside the USA). Users are also charged for each message sent. If you are corresponding with someone who is not a DASnet subscriber, you pay an additional cost to receive E-mail they send you.
DASnet's address:
DA Systems, Inc.,
1503 E. Campbell Ave.,
Campbell, CA 95008, USA;
Tel. 408-559-7434/Tx: 910 380-3530.

Toward an NGO Data Base

In a time of information overkill, there is still a scarcity in relevant information for intelligent action geared toward empowering people and bringing about significant change.

Data bases are being created and expanded at huge costs to make big money by information TNCs. Their content is specialized, academic, decontextualized.

NGOs the world over are looking for information that can generate knowledge on how to enable small groups, local agents, oppressed ethnic, cultural, social or political action groups to resist and safeguard their rights, dignity and development within their own environment.

NGOs struggling along these lines for some decades have certainly accumulated experiences and expertise that has been "documented" and could be exchanged and pooled.

Difficulties

The first obstacle to overcome is, of course, the innate trend of any organization to keep its knowledge to itself. This is not always explicitly motivated by the awareness of "knowledge is power," but more often by a masochistic trend of underestimating one's own assets.

Another obstacle is the technical problem: recording and retrieval methods are so different; catalogues and indexes difficult to send around.

If we think "electronically," the variety of hardware and software, as well as the different storing capacities and scopes may deter people from approaching the idea of a common NGO data base.

"NIGEL", the NGO approach to a shared data base

Antenna/Data Konsult in the Netherlands has worked on this problem and has developed a program called NIGEL. It is able to manage a data base of smaller data bases with several formats.

So far, the NIGEL programme supports the formats of dBase type files, text files (WS, WP, MW), Superfile FYI. It will also be able to manage files in Cardbox plus, CDS/ISIS, Notebook/Inmagic, System Data Format, and BASIC.

NIGEL can work in three levels or modes:

Menu: a list of options and a step-by-step procedure, guided by questions;

Command: retrieval commands compatible with most data base hosts;

Profile: command files or a programming feature to use the commands in a batch mode.

The command language is as close as possible to the most common languages, such as QUEST of ESA (European Space Agency), CCL (Common Command Language of the European Standard), STAIRS, the IBM command language, and DIALOG of the Dialog data base host.

Version 4.7 has been installed on INTERDOC's host, Poptel/Geo2 in London, for an experimental period. Before the May 1990 Conference, version 4.8 should be available, and Antenna/ Data Konsult director Michael Polman has envisaged a constant refinement and improvement of the programme.

Prospects

NIGEL offers NGOs an affordable way to establish a common data base.

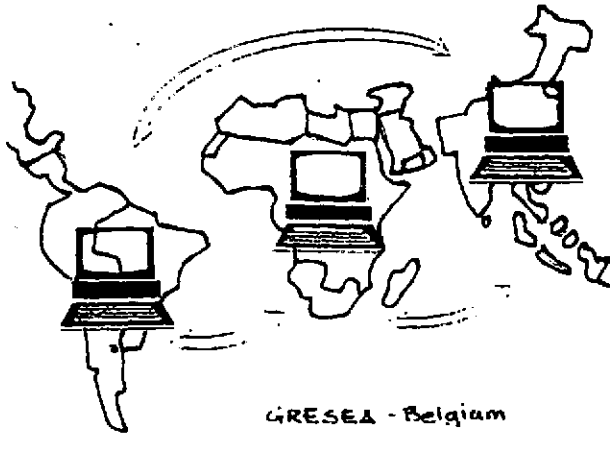
It could comprise full text data bases of newsletters, resource guides, manuals, feature services, profiles, bibliographic data bases, etc.

A great variety of groups with different data base software could contribute. A true interdisciplinary approach and input could be guaranteed.

While theoretically it is asserted time and again that networking, exchanging, pooling and possibly a common NGO data base are very much needed, it has still to be demonstrated that there is a real demand for it. This can only be verified after a longer experimental period.

The cost-benefit and cost-efficiency analysis will have to be done very carefully, considering the enormous work of a system operator, who has to defend the data base from the danger of becoming a dumping place for redundant information, the desponibility of a host system and its geo-political location, the political sensitivity of NGOs, and the economic viability of the project.

The technical door has been opened by Michael Polman, INTERDOC's technical advisor, who developed NIGEL. It now depends on the creativity and involvement of the INTERDOC constituency to share, to experiment, and to build the data base.



Grassroots networking: Small host systems

A major interest that surfaced at the Epe workshop in 1989 concerned the problem of "small host systems." This interest reflects the original INTERDOC philosophy of forming networks at the grassroots level with the resources of the grassroots groups themselves--to start where the members are, without imposing central or "global" structures on them.

In many countries small NGOs have come together to test electronic networking on a regional or national scale, without being hooked to national packet switching services or large international host systems.

This is very useful in countries where linking to international services is still very costly because of national PSS infrastructure.

INTERDOC members have been pioneers in this field: we only need to recall host systems such as Peoples Access (Philippines), CCAN (Thailand), CRIES (Nicaragua), IBASE (Brazil), Chasque (Uruguay), Worknet (South Africa).

At the Epe workshop, a special working group on this subject was formed and a specialized bulletin board for "keeping in touch" has been opened called "NGO-Smallhosts" on Geo2.

In one of the first messages on this bulletin board, members of ALTERNET in Canada have posted the following outline of intent:

"The Association of NGO Small Hosts at our founding meeting at Epe identified capabilities of PC-based hosts that we wish to demonstrate to the INTERDOC-90 conference (May, 1990). We hope to present these capabilities by means of formal presentations and by setting up an on-site PC-based host that participants could use during the conference. Responsibilities for coordinating preparations are shown in brackets for each topic:

Inherent small-host capabilities (ACCESS)

electronic mail

-locally on the individual host system;

-to other compatible systems (Eg. Fidonet mail)

conferencing

-on the local host;

-globally via echoing of conferences to compatible systems;

file and software exchange locally and between compatible systems.

Additional capabilities:

integrated on-line databases, Eg. Nigel (Worknet)

automated host emulation software for the user, Eg. Distnet (Alternet)

gateways to other systems, Eg. UUCP/APC, Geonet, etc. (ALTERNET)

HF and VHF radio access (ALTERNET)

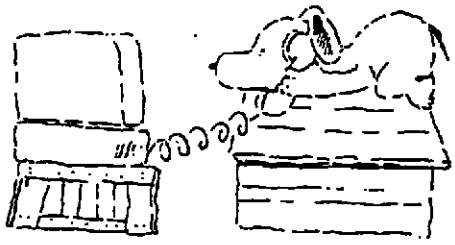
In addition, the NGO Small Hosts group wishes to participate in presentations on training of users and new system operators (CECS)

In accordance with the wishes of the INTERDOC conference organizers, the above presentations will reflect several "sectoral threads:" environment, consumers, education, women and labor.

The Small Hosts group will also attempt to achieve appropriate regional representation in its presentations and examples.

Roberto Verzola of ACCESS is responsible for overall coordination of the NGO Small Hosts preparations. It was agreed that there would be a review in November (1989) of responsibilities and progress in each of these areas. I hope the above accurately reflects what was agreed upon. Additions or clarifications are welcome. Richard Kerr, AlterNET."

What is Fido?



Yes, it is the name you might give a dog--but it is much more!

The following three articles appeared in Contact-0, No 5, February 1988 and No 6, September,1988.

Fido is a program that turns an IBM PC or compatible connected to a telephone into a stand-alone PC-based bulletin board system (BBS). Anyone with a computer, modem, and a phone can call the PC-running Fido,log in, read messages left for them by other users, and leave messages for others, as in the commercial E-mail services.

Unlike its commercial counterparts, however, Fido is geared more towards public exchange of information, rather than passing on private messages. All messages are de facto public and may be read by any user. The sender can mark a message as private, but E-mail features such as copy-furnished or forward-to are not available.

Users commonly log on to a BBS to ask for advice or to get updated on technical developments. Another use of the BBS is

for"round-table talks," where a user leaves a comment on a current topic of discussion. As more callers leave comments, a record of the discussion is preserved that is quite informative for new and old users alike. BBS message areas cover such topics as databases,communications, desktop publishing, the PC, amateur radio and other technical topics. Other subjects touched might be politics, hobbies or jokes.

A major attraction of bulletin boards is file transfer. A BBS can make available selected files (including programs) that remote users can copy thru the phone ("download") unto their own diskettes. Users may also be allowed to send ("upload") files thru the phone to the board.Hence, a BBS frequently becomes a center for software and data exchange.

A PC, a modem and a phone line are all that Fido needs. With such modest requirements, no wonder many have set up their own bulletin boards. There is no better way to explore computer communications and meet people of similar interests. BBS operators (system operators or "sysops") are in total control of their system: they can choose the topics in each message area; they can screen users and assign security levels; they can makes their BBS totally public, accessible to anyone who calls, or totally private, by prior registration only.

Fido has an added feature, called Fidonet, that makes it very useful for networking: it can be programmed so that at a specific time of day (or night) it will automatically make (or wait for) a call to another BBS. The two boards will then transfer messages addressed to each other's users. The Fido sysops' organization, International Fido Network Association (IFNA), routinely transfers messages and files using Fidonet from the USA to Europe, Latin America, Asia and Australia.

Fido author Tom Jennings writes in the Fido manual that "volunteer-run, not for profit organizations ... serving their community can use Fido freely; they can either purchase the copy to get the update capability or download it for free and maintain it themselves".

Asian Fidonet Experiment

To explore the possibilities of automatic message forwarding between computer-based bulletin board systems (BBS), three institutions performed an experiment recently using the Fido BBS software, version 11w. Roberto Verzola of People's Access (Philippines), Surachet Vetchapitak and Yongchai Jerdampai of RUDOC (Thailand), and John Sayer of Interdoc/AMRC (Hong Kong) successfully exchanged messages in November 1987. The experiment culminated in a well-appreciated demonstration of the system before the Nov.28-Dec.1 Regional Meeting in Manila of the Southeast Asian Forum for Development Alternatives (SEAFDA). The meeting was attended by participants (nine from each country) from Indonesia, the Philippines, and Thailand. Subsequently, similar experiments were conducted by Heri Akhmadi of INSAN and Vetchapitak between Singapore and Thailand.

As a result of the successful demonstration, SEAFDA decided to establish a Fido-based network in five ASEAN countries to facilitate the exchange of messages, files and information among SEAFDA members, with Roberto Verzola as coordinator.

During the experiment, RUDOC and AMRC first tried to log on to People's Access BBS as users, using the Crosstalk communications program. Reliable connection was easily established at 300 bps. At1200 bps, some connects were relatively noise-free, but others were plagued with interference. Logging in as users, Vetchapitak and subsequently Sayer and Jerdampai read messages for them and left messages for their Philippine friends. They tried the Fidonet feature next. Vetchapitak, Sayer and Verzola set up each of their computers as a BBS, pre-programed to run Fido's automatic message-forwarding feature, called Fidonet, at midnight, Philippines time. The Thailand and Hong Kong BBS were to call the Philippine BBS, which was chosen to act as the central node for the experiment.

On the first try, Thailand was able to send its messages to the Philippines, but did not pick up Philippine messages meant for Thailand. Hong Kong did not connect at all. After a few more sleepless nights of trying and fiddling with the modems and Fido routing files, subsequent tries by Vetchapitak and Sayer finally resulted in completed Fidonet connections. Messages for AMRC correctly found their way to the Hong Kong BBS; messages for Thailand ended up, as expected, in the RUDOC BBS; and People's Access got all messages to the Philippines.

The unsuccessful connects may have been due to one of the following causes:

Noisy telephone connections. This can be corrected by trying again or by using a different phone line that is less noisy. Noise can cause errors in block data, and when there are too many errors, the data transfer aborts.

The calling modem could abort the call too soon; or it may not wait long enough for the called modem to respond. This problem can be corrected by increasing the "carrier wait time" (modem register S7).

The calling modem could mistake the ringing signal for a carrier tone. In some phone systems, the tone of the ringing signal is so close to the carrier tone that it could be misread. The solution: increase the "carrier detect time" (register S9).

The modem could overheat. This can be corrected with an electric fan or blower. This problem can be detected if you suspect that some modem default values have changed, although no command was issued to change them.

There could be an inadequate operator mastery of the Fidonet software. Read the manual!

Other problems have remained unexplained. Occasionally the computers indicated a "Connect 300" or "Connect 2400," followed by failure to respond to the carriage returns

sent by the calling modem. Turning the modem off and on again usually solved the problem.

Plans are now underway to form a network of NGO computers for exchanging messages and files twice a week. SEAFDA, itself a network of ASEAN NGOs with many activities, will use this BBS network heavily for information exchange. To determine whether such a network can be a reliable channel for data and information, RUDOC, INSAN and People's Access continued their testing into January,1990.

Once the network is operational, it is easy to imagine linking such a BBS network to the packet switching networks. One node may act as "gateway" by connecting directly to the PSN or by sending PSN-bound messages manually to an electronic mail service such as Geonet.

Fidonet offers the opportunity to countries with no PSN but with telephone facilities (in the case of Africa or India, for example) to become linked to the worldwide network of NGO computer users for exchanging data and information.

BBS Software proliferate

With the release of the Fidonet electronic mail standard into the public domain, a number of Fidonet-compatible message systems and BBS utilities have cropped up. Many BBSs have, in fact, shifted to Shareware Fido-compatible systems, as Fido itself, starting with version 12, became a commercial product.

Among the most popular of these Shareware programs are:

Opus. A BBS program that can communicate using the Fidonet packet format. Opus also adds a number of improvements to Fido, foremost of which is Echomail. With Echomail, not only individual messages, but entire message areas are exchanged between bulletin boards.In an apparent dig at Fido's new commercial status, Opus' authors stress that their program is "militantly public domain".

Binkley Term. Another freeware "front-end mailer" which can be used to enable a BBS to communicate with another BBS. Binkley Term is a much improved mailing package that uses the advanced Z modem protocol and implements automatic file requests between bulletin boards

Confmail. This program is the stand-alone equivalent of Opus'echomail. Echomail is a BBS feature where two or more bulletin boards share the same message area. New messages in each BBS are passed to the other BBS during mail time, updating each message area. With echomail, entire conferences are passed on from BBS to BBS.

Arc Mail. A mailing system that compresses mail packets before sending them. As the volume of messages between bulletin board systems steadily increases, compressing messages and files before passing them on has become a necessity.

Bulletin board systems and BBS networking continue to grow in tandem with commercial e-mail systems. The attraction of the BBS is that it uses an ordinary PC and does not depend on an infrastructure of commercial packet switches, which is absent or very expensive in many developing nations. As more NGOs tap the power of the microcomputer for their own operations, one can expect interest in these new forms of networking to grow.

Icons help you get the thought out!

Are you afraid that you come across differently electronically than you do on paper, over the phone or in person? The answer may be icons!

The icons listed below can help you express those non-verbal signals that are all but impossible to express over the net.

Any additions to this list would be greatly appreciated! Send all comments and additions to David Melnik at 107/233.

:-)	Smiling
:-(	Frowning
;-)	Wink
:-I	Sardonic incredulity
:'-)	Drunk with laughter
:-'	Pursing lips
:-O	Wow!
:-|	Grim
:-= |	Baboon
:-v	Speaking
:-V	Shouting
:-W	Speak with forked tongue
:-r	Sticking tongue out
:-*	Oops! (covering mouth with hand)
:-T	Keeping a straight face (tight-lipped)
:-D	Said with a smile
:-x	Kiss
:-c	Real unhappy
:-C	Just totally unbelieving! (Jaw dropped)
:-B	Drooling
:-.	Smirk
:-||	Anger
:-S	Uncertainty
:-#	Mouth zipped
:-&	Tangled up tongue
:-@	Swearing

(From FidoNews Vol 5 No 6, 8 Feb 1988)

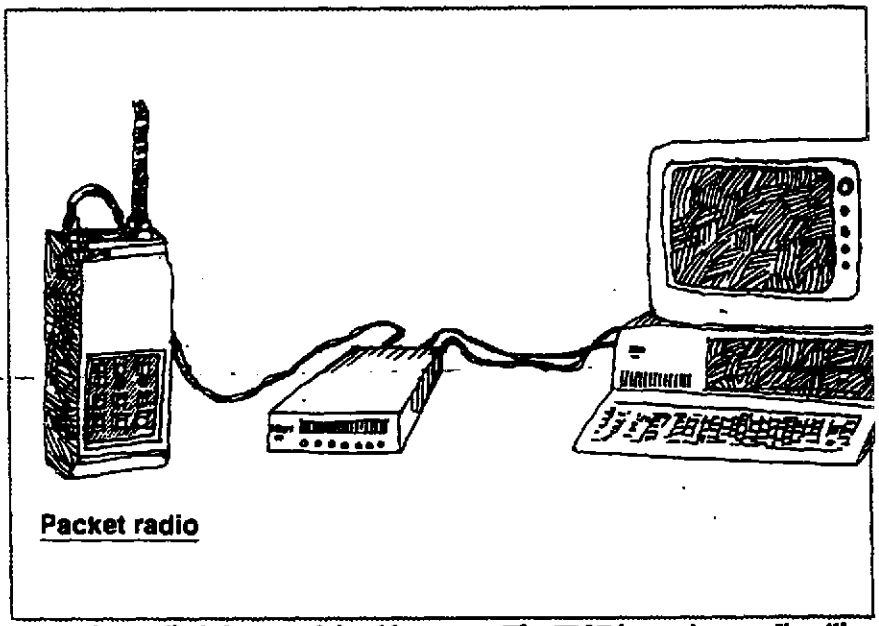
Packet Radio: Networking on the air

Although INTERDOC has been busy mainly with linking members to phone-based electronic messaging techniques, some individual INTERDOC members have gathered experiences in computer communication based on packet radio, described below. During the Epe Workshop in September 1989, demonstrations and an exchange of experiences took place involving the use of packet radio in Latin America (Bolivia and Colombia), Africa (Kenya and Botswana) and Europe (Netherlands).)

A new mode of amateur radio communications, called "packet radio", should be of interest to NGOs involved in computer communications.

"Packet radio" was born just a few years ago and has already enjoyed explosive growth throughout the world. Amateurs now routinely transfer messages and binary files from the US to as far as Southeast Asia by using computers and their radio equipment. Packet radio bulletin board systems, with similar features as their phone-based counterparts, continue to proliferate. And there is at least one satellite-based packet BBS, launched by Japanese radio amateurs and orbiting the earth several times a day.

Packet BBS hurdles national boundaries to link friends across continents



Packet radio

Packet radio is best explained by comparing it to the most common means of computer communications, which is through the telephone system.

Phone-based computer communications involve two computers, each equipped with a modem and connected to a telephone. With a phone connection established between the two modems, the computers can exchange data, normally in the form of text and binary files.

Substitute radio equipment for the telephone and "terminal node controllers" (TNCs) for the modems and you have packet radio. The two computers are each connected to a TNC which in turn controls a radio transceiver, operating either in the high frequency (HF), very high frequency (VHF), or ultra high frequency (UHF) band. The TNC is connected to the computer through the same serial port used to connect a modem. The TNC even looks very similar to an external modem. When the communication link is established, the two computers can likewise exchange text and binary files.

Packet radio differs from phone-based computer communications in several important ways, however.

The TNC is much more "intelligent" than an average modem. A TNC accepts data from a sending computer, and adds information of its own,i ncluding the sender's and the receiver's identification and a check sum used for error detection. The receiving TNC, on its own, recognizes if a message it picks from the air is addressed to it. It will also determine if the data contains errors, in which case the receiving TNC will send a request for the data to be sent again, until it is received error-free.

In addition, the TNC will monitor the frequency the radio is using and send its own signals only if no one else is using the frequency. It is usual for several two-way communications to be going on in the same frequency, and yet everything goes through with no problem, with everyone receiving only the messages meant for them. In fact, it is also possible to use the TNC to conduct a three-way, four-way or multi-way conference on the air, something that can be done with phone modems only if one is using a commercial conferencing system.

The term "packet radio" comes from the fact that the TNC sends data in"packets." The TNC, in fact, is more accurately called a "packet as-

assembler/dissembler".

Fortunately, standards governing amateur packet radio operations were established early on. The standard is known as AX.25, and is based on the CCITT X.25 standards adopted for amateur use. Because of these standards, it is unlikely that computer users scattered throughout the world will meet serious compatibiity problems.

Like their phone-based counterparts, radio amateurs quickly adopted computer communication for networking. Bulletin board system (BBS) software was developed and soon after, packet bulletin boards sprang up all over the world.

A packet radio BBS is similar to a phone-BBS. It is comprised of a computer, usually unattended and operating 24 hours a day, which is connected to a TNC and a radio transceiver and is running a BBS software program. One can read or leave messages, download or upload binary files. Because the sender's identification accompanies each message, a packet BBS can immediately inform a user of messages waiting as soon as the users establishes a connection.

VHF- and UHF-based packet BBS normally handle local traffic only, but HF-based packet bulletin boards can be accessed from a thousand miles away, depending on radiowave conditions. A Philippine radio amateur, Eddie Manalo, DU1UJ, runs his computer with four ports, each connected to an HF BBS, a VHF BBS, a UHF BBS, and a phone-based BBS!

While amateurs are into computer communications as a hobby, many devote considerable time to public service and are eager to introduce others into amateur radio.

In areas were telephone services are inadequate and computer networking by phone has to wait for the necessary communications infrastructure to develop, packet radio may be the quickest way to get into the rapidly growing network of computer users who use their machines to exchange messages and data with like-minded counterparts throughout the world.

In most parts of the world, however, radio communications are much more tightly controlled by governments than phone communications. In addition, amateurs have their own code of ethics which restrict third-party communications.

NGOs wanting to use this technology will have to cope with some special problems in addition to the technical ones.

But when one sees what amateurs are able to do with their computer and radio equipment, one cannot help but marvel at the potential this method of computer communication offers.

("Contact-0", No. 6, September 1988, p.4,5).

Focus on Africa

The development of networking in Africa has not been as significant as it has been in Latin America and Asia in the last few years. One reason for this is the continent's lack of an adequate telecommunications infrastructure. In fact, there are still major difficulties in traveling in Africa and the region's postal systems are woefully inadequate. This seriously limits innovation and development of networking among NGOs as well as their participation in international experiences such as INTERDOC.

In the last few years, ANTENNA (the organization serving as Interdoc's technical consultant) and IDOC (the Rome-based documentation and research center) together with INTERDOC members LERC (Labour Research in South Africa) and EDICESA (Central Ecumenical Documentation and Communication Center in Africa) organized a series of workshops on documenta-

tion and communication in Zimbabwe and South Africa. The workshops were primarily for NGOs working in Eastern and Southern Africa.

These workshops marked a decisive step forward in the region's networking efforts as well as the creation of several joint projects. For example, Africa Information Afrique (AIA), based in Harare, currently maintains an on-line electronic network for its regional correspondents in Mozambique, Lesotho, South Africa, Angola, Bostwana, Zimbabwe and Namibia. At the same time, at least 15 NGOs in the region are now part of POPTEL-GeoNet, the electronic E-Mail system used by INTERDOC.

In Zimbabwe, AIA, EDICESA and SADRC (Southern African Documentation and Research Center) have set up a common electronic BBS.

WORKNET in South Africa

WORKNET began to function in Johannesburg, South Africa in 1987 as a network serving NGOs through the installation of an efficient E-Mail program which used microcomputers.

An impressive number of progressive South African organizations actively participate in WORKNET, including trade unions such as COSATU, media such as the New Nation and the Weekly Mail, documentation centers, churches and the national Catholic bishops' conference. To date, some 60 NGOs use the system to exchange articles, information, messages and documentation.

This network is linked to PeaceNet in San Francisco and POPTEL-GeoNet in London. At the same time, some of its South African members are able to link directly to GEO2. This experience shows that E-Mail has come to be an essential channel for the exchange of messages without the restrictions of a country where the telephone, telex and fax are all inadequate because they are strictly monitored by the security forces.

Efforts in East Africa

A series of attempts have taken place through support organizations such as ALTERNET in Canada and GRASSROOTS in the United States with the objective of creating reliable on-line links with countries such as Eritrea, Ethiopia and Kenya. Nevertheless, most of these communication links take place by making long-distance phone calls.

An important part of the campaign against hunger in East Africa was coordinated by E-mail, but this effort rested with "Westerners" who work in the region.

Improvements in infrastructure

From 1988 onward, more and more African countries have access to international networks transmitting data. For example, Senegal, Zimbabwe, South Africa, Ivory Coast, Gabon, Guinea, Mauritania and Tunisia all have link-ups through protocol X.25 with international networks of data transmission. It has become commonplace that every few months word comes that several more countries are using these systems.

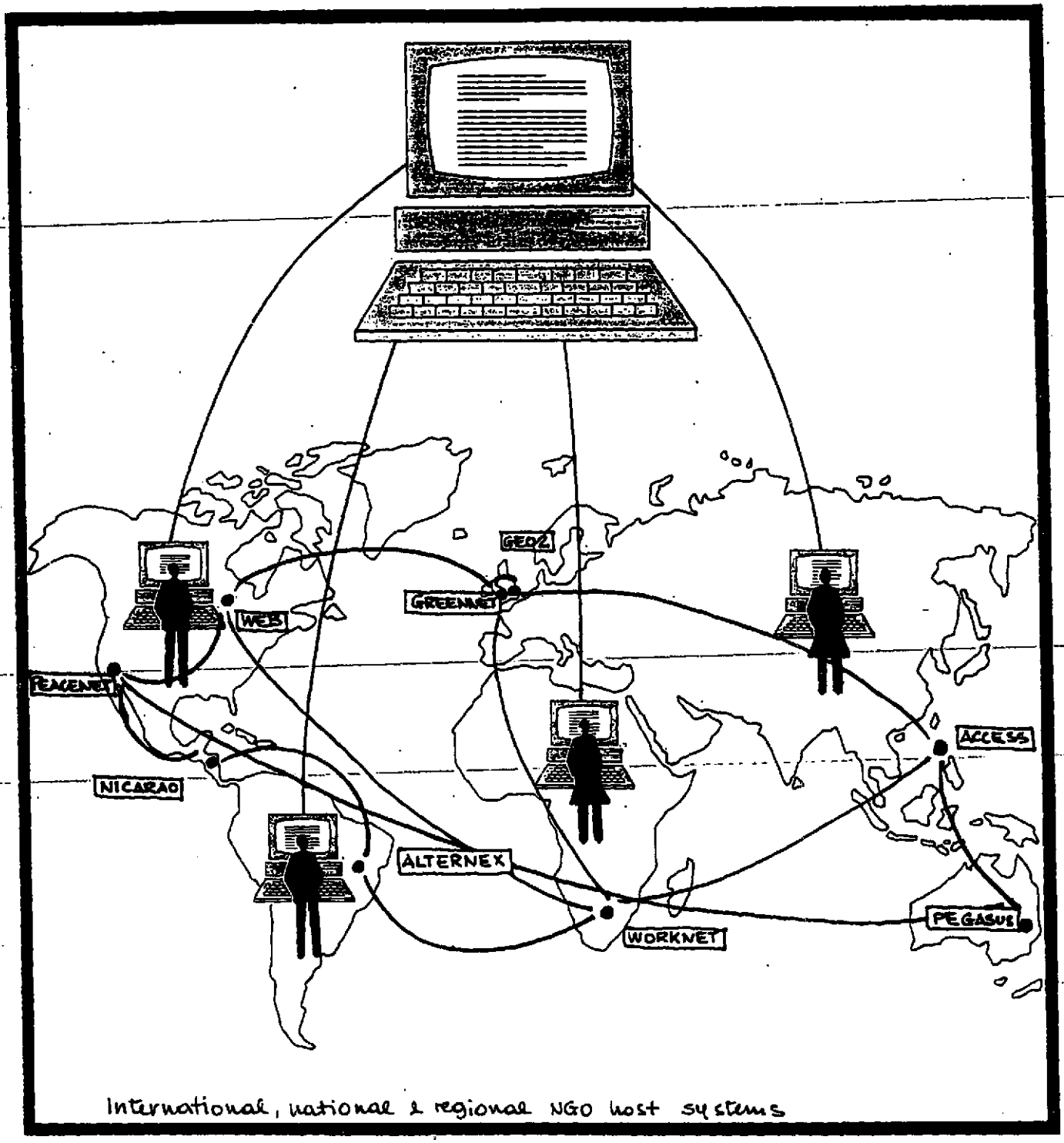
Because of this, CODESRIA and REDI, two NGOs in Senegal, managed to become part of GeoNet and then were able to initiate a National Network of Data Transmission in 1989. As a result, CODESRIA held a seminar for African NGOs in December 1989 on documentation and communication where, as in 1987, ANTENNA was one of the facilitators. At the same time, the International Development Research Center (IDRC) of Canada began funding a project to try to set up a network based on "Packet Radio" in Lesotho and determine how appropriate it might be for other African countries.

From a different angle, the Institute for Global Communication (IGC) finds itself searching for counterparts to help in the task of installing regional nodes such as ALTERNEX in Brazil and NICARAO in Nicaragua (initiatives of IBASE and CRIES, respectively). Currently IGC is in contact with members of INTERDOC in Kenya, Senegal, Zimbabwe and South Africa for this purpose.

The expansion of personal computers among African NGOs is bogged down by problems linked to the insufficiency of telephone infrastructure, the unreliable flow of electricity, problems of maintenance, humidity, dust, and the lack of training and support. Despite all these problems, however, more and more NGOs are in the process of buying computers and are beginning to participate in international networks. Interdoc will try, as it has in the past, to help this important development. This policy of accompaniment should stimulate and assist the African NGOs in the use of modern technology in order to participate in networks and facilitate their office work. Currently, too many projects are geared to the possibility of on-line data communication. Appropriate support for the development of networks on this continent must focus, in greater measure, on the needs of NGOs to cooperate and exchange relevant information, taking into account the many different approaches they have towards documentation and communication.

This article is taken from "Contact-0, July-August 1989, p. 6

Map of the NGO host systems



International, national & regional NGO host systems

INTERDOC: Report and evaluation of activities 1985/89

The original Velletri Agreement, prepared when INTERDOC was founded at the October 1984 meeting in Velletri, Italy, envisioned the objectives of INTERDOC as follows:

- Sharing technical knowledge on information handling through training workshops, internships and staff exchanges; and a technical advisory group.
- Sharing of information through a referral and clearing house services.
- Establishment of a task force to coordinate work on standardization of formats for information exchange
- Publication of a newsletter.
- Production of a series of technical guides.
- Establishment of a computer bulletin board for exchanging network news
- A pilot electronic mail project.

In 1985, the Secretariat of INTERDOC prepared a proposal for funding a two-year programme of INTERDOC work. The general objective of this proposal was "to facilitate regular, fast and reliable information transfer between the participating NGOs in the INTERDOC Network." Specifically, the programme set out to:

- Assist more effective sharing of information among network members on both manual and electronic data processing, computerization and other subjects of common interest
- Experiment with computer technology in communication
- Provide technical input through the production of guides by the Technical Advisory Group
- Provide in-service training in the use of modern communications technology
- Produce a newsletter documenting the experiences and evaluations of network members
- Channel information requests by members to the right sources
- Coordinate standardization of formats

In addition to the above goals, the INTERDOC Steering Group saw the following roles for INTERDOC:

- To work to improve global exchange of ideas between NGOs, encouraging an international perspective toward information on development problems and the interdisciplinary sharing of information;
- To promote the use of universal communications systems by non-governmental organizations in order to encourage efficient and non-hierarchical information exchange, activities such as training workshops, internships, staff exchanges, publications and direct technical assistance.

A single-sentence definition of INTERDOC was put forward in November 1987:

"An informal network of NGOs, established to facilitate the adoption and adaptation of appropriate information handling techniques in order to permit the better delivery of services to their constituents."

Evaluation

INTERDOC increasingly viewed itself as a network that could offer assistance in matters concerning new information technology--chiefly in the communications area. At its broadest, INTERDOC wanted to set up mechanisms for improving and encouraging international information exchange between documentation centers, and to standardize the way information was exchanged so that the process runs smoothly. It also wanted to provide mutual support for all areas of documentation, including information gathering, classification and storage.

To see what functions the network has assumed, and which areas it deliberately or inadvertently did not cover, this report and evaluation will first discuss the progress of INTERDOC activities in the categories defined in the original Velletri Agreement. It will then examine the structural development and problems of the network, and finally examine possible new roles and the future development of existing roles.

INTERDOC Programs

A. Sharing of Technical Knowledge

The desire for information on new information technology among NGOs has become very great in the past five years. Several individual NGOs have been set up around the world specifically to assist in this area. In this, the earliest INTERDOC discussions and the founding meeting in October 1984 was very well-timed and in many ways ahead of its time.

With this conceptual "head-start," INTERDOC's technical advisory group, secretariat and steering group members participated in a wide variety of meetings, seminars, conferences and demonstrations explaining the possible applications of information technology to development work. These included the following meetings:

AFRICA

Senegal: - May 1987: Antenna workshop for NGO staff

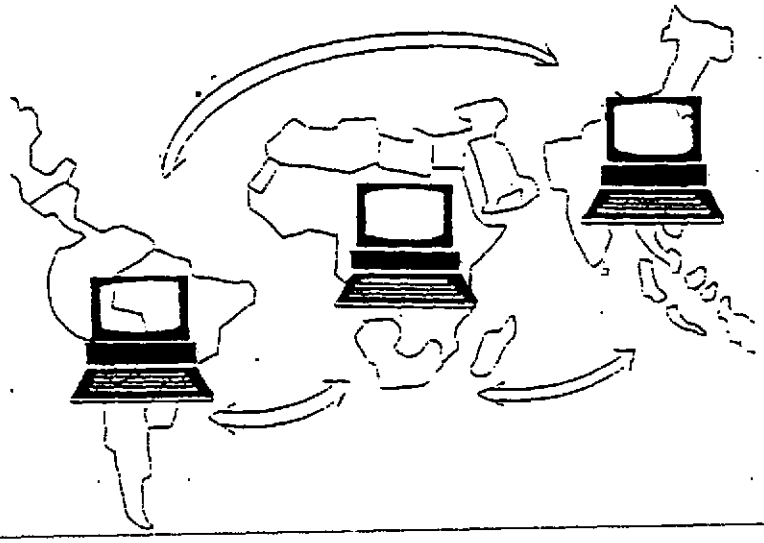
Zimbabwe - April 1988: Antenna and IDOC, three-weeks documentation and computer workshop with 30 participants from the region-
South Africa - May 1988: Antenna workshop for South African NGOs; Workshop for users of WORKNET
Zimbabwe - September 1988: three days workshop on electronic messaging for NGOs
Zimbabwe - April 1989: Antenna and IDOC, two-weeks follow-up workshop on networking, common thesaurus and computer communication for NGOs

ASIA
Hongkong - September 1986: Regional meeting "NGO Documentation Centers in the Age of New Information Technology"
Thailand - July 1987: NGO Training workshop
Philippines - 1987: NGO training workshop held by People's Access
Indonesia - November 1987: S.E. Asia Forum on Development Alternatives (SEAFDA). Demonstration of Poptel/Geonet use, databases, and communications.
Philippines - November 1988: Huridocs Training Course. INTERDOC demonstration of computer communications techniques

LATIN AMERICA
Brazil - August 1987: Antenna workshop for Brazilian NGOs
Bolivia - August 1987: Workshop for Bolivian NGOs
Peru - September 1987: Workshop for Andean NGO consultants and staff; training workshop for Peruvian NGOs
Nicaragua - October 1987: Workshop at CRIES for Central American NGOs
Peru - September 1988: Regional training conference

The efforts of some INTERDOC founder members enabled NGOs to seek information on issues of communication and documentation as a result of INTERDOC contacts and knowledge of the INTERDOC network. It is hard to assess whether or not INTERDOC developed the initial "head start" it had gained in knowledge on the subject. Early structural problems meant it could not develop skills as fast as it might have. It was the activities of Data Konsult, and later Antenna, that enhanced the network by conducting several workshops in Asia, Africa and Latin America as well as by sharing technical knowledge with NGOs throughout the Third World, Antenna-Netherlands served as a link between groups active in communications work around the world. Recognizing the de facto position of Antenna as the technical advisors to most network members, the group became the Technical Advisory Group at the INTERDOC Steering Group meeting in February 1987. There was definitely a strong demand for technical assistance.

A large quantity of information was exchanged within the network as part of INTERDOC's technical advisory work explained above. But beyond this the network has been used for more specific programme work. Human rights information concerning events in Chile, Malaysia, Brazil, South Africa, Singapore, China and other places has been circulated extensively within the structures set up by INTERDOC. An initial assumption, perhaps, was that most documentation centers put a high priority on the exchange of their resources internationally with other documentation centers. The hope was that any documentation



The Technical Advisory Group, the Secretariat and the Steering Group members have answered hundreds if not thousands of questions on the issue of information technology since INTERDOC began. These requests came through electronic mail, from office visitors, at meetings, or through the post. Answers to technical queries varied from verbal answers, 'hands-on' demonstrations, arrangement of small staff training sessions, field visits or referral to other technical advisors such as Poptel/Geonet. There remains a question as to whether this should be a role of the INTERDOC network in future, or if the national, regional or international NGOs set up for this specific purpose will be sufficient.

B. Clearinghouse function

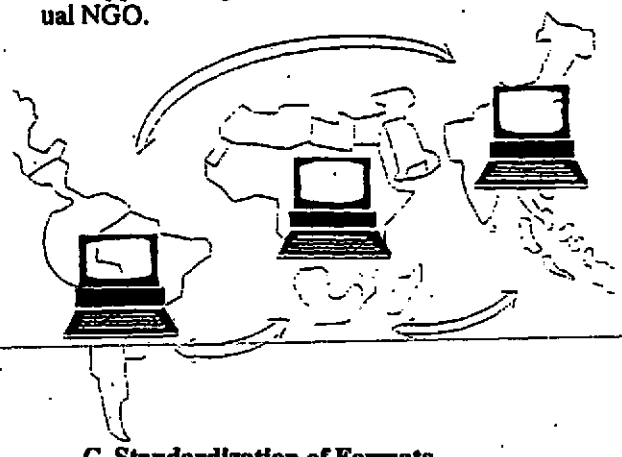
center receiving a request which they could not adequately answer themselves would scout for more information in other documentation centers around the world.

This does not seem to have developed to the level first envisioned. Whether this was an false assumption or marks a failure by INTERDOC to encourage such exchange is hard to gauge. What does appear more possible, and what actually seems to be happening more, is that entire information requests are passed on to other documentation centers or NGOs which might be able to help, and these deal directly with the original enquiry. Thus information requests rather than actual information are passed between documentation centers.

In this, INTERDOC has played

a useful role, and may continue to develop such a role as a network that brings together those with information to share, and acquaints NGO's with one another's information sources, assisting the development of a web of bilateral relationships. However, information requests are ad-hoc and unpredictable.

The very existence of the networks means that members often know one another, and the specialties of each group. This raises questions about whether or not the formalization of some kind of regular exchange or 'clearinghouse' function of a network is really necessary. A possible role for INTERDOC in the future could be to "document the documentation centers" and also physically distribute information requests. However, if it were to do this, it might need an infrastructure approaching that of an individual NGO.



C. Standardization of Formats

As a result of the pioneering work on Standard Formats done by Huridocs, an INTERDOC member network, INTERDOC has generally de-emphasized such work, and refers members and enquiries directly to Huridocs. Similarly, Huridocs staff have indicated that they would like to be able to refer those concerned with computer communication to INTERDOC. This problem of standardization of information has been the subject of much debate among NGOs active in new information technology - on line, at conferences and bilaterally.

The argument in favour of standardization runs as follows: Increasingly, NGOs need guidance in documentation methods, and that standardization of the way they organize information will assist new NGOs in organizing their resource systems, and encourage information sharing on a fast and easily interpretable basis.

The critics of standardization argue that with in-house resource collections, the priority should lie with creating a customized resource and documentation system that best serves the information needs of the organization's constituents (which are seldom the network of fellow NGOs worldwide, but more often certain sectors of the grassroots and/or in-house researchers) Priority should also be given to creating a system which is easily adapted from the organization's existing, manual systems, and which is easily operated and understood by staff who have been operating any previous manual system.

Information centers serve a variety of national and sectorial constituencies with differing information needs in terms of both style and content.The types of information requests received by information centers require a wide range of answers: from a list of addresses of other groups, bibliographic references, a few newspaper clippings, an article, through to a specifically written report, document or pamphlet. Standardization of formats may be feasible in terms of bibliographical records, but the majority of communication between NGOs and their constituents take other forms, such as those mentioned above.

Questions have also been raised as to whether such standard systems would lead to the creation of hierarchies of experts, and a small number of specialized centers able to cope with the standard formats through which others would be forced to go. This creates particular difficulties for many small groups which can not afford a special data base manager, but need an information system which can easily be handled by the whole staff and by newcomers, given a considerable staff rotation in these groups.All of this makes the standardization of formats applicable in only a small number of cases of information exchange between NGOs, or between NGOs and their constituents, and placed the emphasis on communication methods.

D. Publication of Newsletter (Contact-0)

The initial group selected to produce the English-language Newsletter was not able to participate actively in the network because it was in located in an area that was plagued with severe technaical problems, but also because it was a rather larger NGO than most. They also complained of not receiving any input or articles from other INTERDOC members. For these and other reasons, the newsletter could not reflect the needs, news and interests of the INTERDOC network, and it was decided at the February 1987 steering group meeting to transfer production of the magazine to another group. However, the search for another group took some time, and hence the production of the newsletter was delayed. In the interim, the INTERDOC coordinator produced two issues of a network newsletter "INTERDOC Update". At the same time, the Spanish newsletter was produced regularly, efficiently and on time. All 12 issues of the Spanish edition were completed. A wide range of social and technical issues surrounding new technology as well as some news of INTERDOC members and developments were published.

However, some INTERDOC members have complained that the content did not reflect rigorously enough the areas of interest, feelings or opinions of INTERDOC as an alternative NGO communication network.

On the other hand, the Spanish edition of Contact-0 did succeed in being considered an important publication in the domain of electronic messaging for the Latin American subcontinent and the Spanish speaking world, far beyond the strict IN-

TERDOC network.

While the newsletters faced these different problems, the Steering Group became convinced of the value of a printed bulletin in establishing the identity of INTERDOC and publicizing the network. Such a publication serves an important role in extending news of our activities and opinions to other organizations and networks, some of which may not have the desire or the ability to use new information technology. As a printed document, a newsletter is used and thought of differently than stored information, and in some circumstances is a more convenient reference source.

E. Production of Guides

A number of short fact sheets and guides on technical and other matters were prepared during the year. However, the tremendous number of specific technical enquiries, and the pressing demand for demonstrations and attendance at conferences all over the world, delayed the completion of the technical guide, due for publication in September1989.

The following materials were prepared:

- Directory of NGO e-mail users (available on the Poptel/Geonet and Antenna Bulletin Boards)
- Brief guide to connecting your computer to the electronic mail system (English)
- Guide to computer communications (Spanish)
- INTERDOC: a brief introduction (English)

F. Network News Exchange -- Bulletin Board

As a bulletin board is really a function of electronic messaging, the INTERDOC Bulletin Board came into existence smoothly once INTERDOC members had identified a common messaging system to join (Poptel/Geonet) and once a certain number of members had connected to the system. The INTERDOC Bulletin Board quickly became one of the best used on the system, with messages from all parts of the world on many subjects were posted there. The most active subjects were:

Human rights violations
Environmental and tribal issues
Labour and trade union news
Solidarity campaign material
News updates
Requests for resource material
News of member's publications
Notices of NGO conferences, staff vacancies etc.

For some time, weekly news updates have been placed on the INTERDOC Bulletin Board from Peru and Southern Africa.

In addition, INTERDOC members participated in the exchange of technical advice on such bulletin boards as Antenna and Poptel- Exchange. Environmental information has been shared on the Green bulletin board, while labour information has been exchanged on the ITS (International Trade Secretariat's) bulletin board.

Because a bulletin board is not a real database which can be properly searched, the INTERDOC bulletin board quickly became filled up and difficult to scan. We therefore asked Poptel/Geonet to open separate bulletin boards for each Third World continent (Asia-Pacific, Latin America and Africa). Other INTERDOC members opened boards for the Third World Network features (TWN) and the environment (Lifelines-IOCU) and human rights (Human Rights). INTERDOC also encouraged people to put technical information on the specifically technical Bulletin Boards (Poptel-Exchange and Antenna). Labour movement information was posted on the International Trade Secretariat's board (ITS-BBS). INTERDOC also requested that a contingency bulletin board be ready for setting up quickly when serious events take place. This board was first opened when the situation became tense in China, and was widely used by the many Hong Kong organizations connected to the system and others to disseminate information following the Beijing Massacre. While we may expect further, specialized boards to appear (Women, Consumers etc.) INTERDOC members are already beginning to outgrow bulletin boards and are looking for more sophisticated on-line databases in which to present their information. Such ideas are elaborated in further sections of this report

G. Pilot Project -- Electronic Mail

This aspect of INTERDOC's work rapidly became the predominant focus of INTERDOC, attracting the most enthusiasm of members, and becoming, for many, the real heart of the network.

E-mail very soon stopped being seen in terms of a "pilot project", and was put to use in the ongoing programs, campaigns and other work of the member NGOs.

The use of electronic mail by NGOs would now undoubtedly continue whether INTERDOC existed or not. The initial project enabled a network of groups to develop who were familiar with E-mail and the idea spread. Poptel/Geonet was identified in 1986 as a suitable host for our e-mail communications. By the start of 1989, seventy-two INTERDOC members were on line within the INTERDOC user group, while hundreds of other NGOs, trade unions etc. were using Poptel/Geonet. Member NGOs have made increasing use of the links between Geonet and the USA-centered Econet-Peacenet-Greennet system to exchange messages with environmental and peace campaign groups.

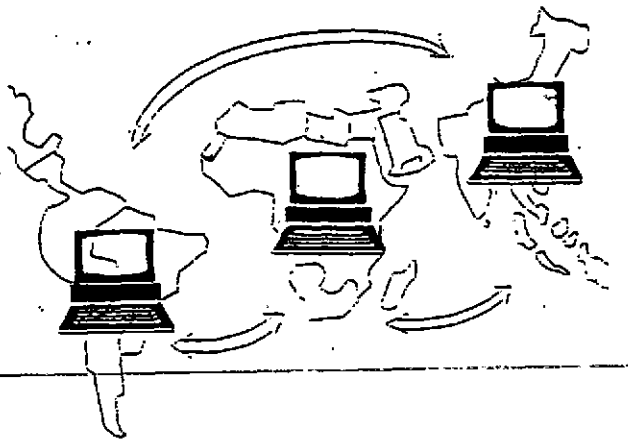
In Brazil, IBASE managed not only to launch its own host mailbox system for Brazilian NGOs, but also became accessible through links to the worldwide PSN system. Their system, ALTERNEX, is linked to Geonet and Peacenet.

In Central America, NGOs in the CRIES network have held a range of NGO workshops and technical meetings, and launched a Nicaragua-based mailbox system to stimulate regular on-line information exchange. Their system is also linked to Geonet and Peacenet.

In Southeast Asia, NGOs in the Philippines, Hongkong, Thailand, Indonesia and Malaysia have successfully exchanged messages using computer to computer telephone links and "Fidonet" software.

In Europe, INTERDOC members participated widely in the multilateral discussions presented on the bulletin boards on various international concerns. SATIS and HURIDOCS have established their own network on the host network. Bilateral linking among European INTERDOC members has been rather sporadic and occasional, except for members with the Technical Advisory Group Antenna.

In southern Africa, groups have experimented with various forms of



electronic messaging. In Zimbabwe, following workshops organized with the assistance of Antenna and IDOC, three centres formed a common bulletin board using one of their computers as a host system.

In South Africa, with the technical support of the Technical Advisory Group and some financial help, a successful national mailbox system called WORKNET was started in May 1987. At present, more than sixty NGOs covering most anti-apartheid and member groups of the mass democratic movement, trade unions, church-based networks and centres and the progressive media, use WORKNET on a daily basis. WORKNET is linked to Geonet and Peacenet. During the past year, several South African groups have applied for their own mail box in Geonet within the INTERDOC user group.

Communications Subsidy Program:

As the interest of membership in e-mail grew, the Steering Group decided in February 1987 to extend limited financial assistance to some NGOs to encourage them to try out electronic mail. The thought behind this was to enable members to judge the appropriateness of e-mail for their NGO activity without financial penalties.

Four organizations signed up for this scheme, but many more indicated interest. Despite the interest, problems existed with it. We were concerned that member NGOs should have a genuine interest in e-mail, and be willing to mobilize and commit their own funds to adopt it on a sustainable basis, and we were worried that a subsidy may make the process somewhat artificial. We did not have a clear decision-making process as to who should benefit from this scheme. Further, there was no budget item for this scheme in the original funding proposal.

Therefore money has had to be moved from redundant line items such as 'equipment' to pay for the programme. The scheme raised additional questions about INTERDOC's role as a secondary funding organization, and whether or not NGO interest in INTERDOC only extended to the financial discounts and benefits which the network has to offer. As a result, the subsidy scheme was dropped one year after its start, although we continued to honour existing commitments under the scheme.

The INTERDOC structure

Funding:

Since its founding in October 1984, INTERDOC has continued its work with financial support from IDRC, NORAD, NOVIB for the two year period 1986/1988, which had been prolonged until April 1989.The Velletri meeting in 1984 was possible through the substantial additional contributions by Evangelische Zentralstelle fuer Entwicklung (EZE) and Misereor.For the Ariccia meeting, INTERDOC got a special contribution from the Lutheran World Federation.Additional funds were raised for related but autonomous programs on a regional basis. In Latin America funds were found for a special computer on-line communications project. In Africa, IDOC has coordinated funding requests for a program on new information technology for NGOs in southern Africa. In Asia, Asia Monitor Resource Center launched a project to introduce NGOs from at least eight Asian countries to Poptel/Geonet within the INTERDOC group.

Membership:

The embargo on new members was lifted in 1986. We now have a membership of more than 100 NGOs from all continents. INTERDOC Coordination:

The Secretariat of INTERDOC was moved from IDOC, Rome, to Asia Monitor Resource Center, Hongkong in April 1987. John Sayer became the Coordinator. Problems with a network such as INTERDOC:

Perhaps the biggest problem with the INTERDOC network is the low level of commitment members are able or willing to make. Even those most active and enthusiastic members who wish to put a great deal of energy into building on the original idea, have found it hard to set aside time, to contribute, to comment promptly on reports, to provide material and news for the newsletters despite repeated requests, etc. The majority of members seem to be overwhelmed by other priorities.

This raises questions about how much the INTERDOC network is viewed as the priority by any member group, and therefore about its real role. Is the INTERDOC network too vague in the definition of its activities, thereby making it hard for meaningful commitment by members? Or is the network seen purely as a type of service organization by the membership, and therefore viewed only in terms of what they can get out of it for the benefit of their existing programs?

Such an attitude leaves a few active groups who work to build the network, believing that the whole idea of better international links is a good one. They can use the fact that other groups are members (for whatever motives) to legitimize the group, and raise further funds for network activities, thus offering more incentives for other members to join. In this way, the network is in danger of becoming a sort of self-sustaining secondary funding organization, with NGO members in control, but with a life of its own. We must ask ourselves if this is a useful activity in itself, or whether we should have an entirely different role, and that we should insist that groups become involved with the network for its own sake, because the idea of better international links is a good one in itself and deserves an input of energy and support.

Coordination of this network has been much more than just a half-time occupation. Just to deal with essential matters of finance, correspondence, and answering technical and other queries regarding the electronic mail system has taken a lot of work. This has left the half-time coordinator with little time to do adequate network building, membership development, publicity, or forward-looking fundraising etc.

If the Steering Group feels that the network should grow, then provision must be made for a full-time coordinator, within a NGO member of the network that has extra resources and infrastructural support to back the network.

As knowledge of computer communication spreads, there becomes less need for a network specifically geared towards such work, and more need for networks on issues of change.

Evaluation

After discussions between the Secretariat and the major funder, IDRC, it was decided that the original proposal for GRESEA of Belgium to undertake an evaluation was inappropriate because they had not participated in INTERDOC's activities. It was decided that the Secretariat should prepare a draft evaluation, and that this should be supplemented by reports from some active members.

Future of INTERDOC

INTERDOC has built a name and reputation as a center and source of information on new technology for NGOs. It is on this good reputation as an approachable and experienced source of technical help and advice that we wish to build. This reputation has been enhanced by the perception that INTERDOC has neverprojected an empire-building approach to networking; instead it has remained the sum of the inputs of active members rather than a growing independent entity, capitalizing on the names of its membership. As such, it is not seen as a threatening or predatory institution.

General objectives for the future will be to strengthen, expand and consolidate the INTERDOC Network as a useful and constructive forum, information center, and clearing house for discussion and action on new information technology for grassroots organizations. The level to which this can be done without some form of institutiona- lization will have to be decided at the forthcoming INTERDOC Conference.

Possible areas for future development include:

- Assisting the development and training of more facilitators and computer assistance NGOs at national and regional level.

- Turning the General Assembly into a regular triennial international NGO information technology fair

- Strengthening the newsletter Contact-0 as a forum for discussion of grassroots applications of computers and information technology through increased membership participation in the writing and editing of the newsletter, and the introduction of a French language edition.

- Experimenting with inexpensive alternatives to packet switching such as fido and packet radio.

- Becoming skilled at on-line database access appropriate to NGOs, and disseminating information and offering training on this resource

- Coordinating the development of an international NGO on-line database.

- Consolidating our diverse experience with training workshops and seminars into a comprehensive series of training programs, kits and materials which are basically transportable from one situation and location to another, and easily translated from one language to another.

- Ensuring the regular and consistent exchange of messages, mail and bulletin files between the fast growing number of NGO-based mailbox systems.

- Stimulating NGO-users of e-mail and modem telecommunications technology to be aware of their rights and position while using all these new services. INTERDOC could play a possible role in the formation of an international telecom users group analogous to consumers groups.

- Encouraging and fostering the introduction of e-mail and information technology in general to NGOs in those parts of the developing world which remain unaware of the possible applications of these new tools.

INTERDOC-ANTENNA Workshop: Epe, Netherlands, Sept. 18-23, 1989

Report on the meeting:

About 50 participants from all continents (except Antarctica) met at an intercontinental workshop in Epe, Netherlands in September 1989. Participants could be classified into three specific categories:

- representatives of electronic networks such as Peacenet, Alternet, Web, Alternex, Pegasus, Carnet, Greennet, Geonet, Worknet, Access;

- representatives of NGOs that have pioneered in data basing and e-mailing;

- groups with a potential for promoting and facilitating networking in the future.

The aim of the workshop was to take inventory of the present potential for electronic information exchange for effecting social change.

For that purpose, participants were asked to present their experiences either in data basing or in networking. Several databases were presented: CADR (Computer aided document retrieval) by Access; CDS/ISIS by Alternet; Bibsys by Huridocs; Cardbox+ by Desco; Superfile by IDOC; Nigel by Antenna.

Several international NGO networks spoke about their experiences within an electronic mail host system: IOCU, Satis, Interdoc, Huridocs, Cries, Tie, PAN, Carnet.

An entire afternoon was set aside for the demonstration of packet radio for electronic messaging. FORO in Colombia and INEDER in Bolivia have been working to bring computer communication to small NGOs in rural areas where telephone does not exist or is inadequate for E-mail. Alternet has conducted many pioneering experiments with packet radio in African countries.

In contrast to the large international mailbox hosts, the Epe workshop served to give space to national bulletin board systems-- small PC-based nodes that link many small NGOs nationally and make possible central access to international networks. Access (Philippines), CCAN (Thailand), Worknet (South Africa), Alternex (Brazil), Chasque (Uruguay), Nicarao (Nicaragua) and Pegasus (Australia) have made great progress in this field. Their work will be discussed at greater length at the INTERDOC Conference in May, 1990.

The cohesiveness of the user group forced the international host systems to define more clearly their strategy of mutual accessibility, the possibilities of gateways or of dedicated lines between them.

The ACP net [Peacenet/Econet (USA), Web (Canada), Greennet (U.K.)] and Poptel-Geonet (U.K.) will greatly intensify their collaboration and mutually adapt their services to their respective NGO user families.

Toward a common NGO database

Much time and discussion was given to considering the possibility of establishing a common NGO database.

Commercial databases are still very expensive, biassed towards everything "big," slow to update and not action oriented.

A common NGO data base needs constant input and updating; a simple record-keeping structure; and a comprehensive software program that supports several database programmes (d-base, full text, etc.). ANTENNA has worked out such a programme called NIGEL. There was great interest to experiment with such a database programme. NIGEL has been installed on Geo2 for an experimental purpose.

Upcoming INTERDOC Conference

INTERDOC was referred to during the workshop as a very important association of network users and facilitators. The association could perform the following services:

- represent the interests of NGOs at the level of the UN systems;

- represent NGO interests in the face of commercial data banks and data base systems;

- promote data basing, information exchange and computer messaging among NGOs and among the groups in the most "remote" areas;

- coordinate training resources for NGOs in these fields.

In all these respects, the INTERDOC Conference planned for May 1990 was seen as extremely important. One key point on agenda should be technical exchange, which should include some kind of verification of what has been discussed and decided during this September workshop. Specific topics have been assigned to the following groups for the May conference:

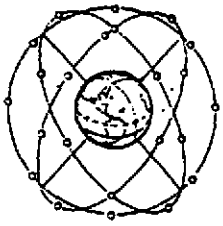
- Gateways between electronic host systems: ALTERNET
- NGO database: Worknet, Third World Resources, IDOC
- Case studies on NGOs using electronic messaging: Chasque/Terceiro Mundo
- Packet Radio/Distnet: ALTERNET
- APC network coordination: IGC
- APC - Geonet gate: Poptel and Greennet
- Small PC-based national BBS: ACCESS
- Training: CARNET
- Funding: ANTENNA

E-mail networks: A sampling

E-mail is truly a revolution in communications. Anything that can be written down, of whatever length, can be sent over any distance--from one village to the next, from one end of the earth to the other--via E-mail. And that message can be received almost as soon as it is sent.

E-mail users simply connect their computers to an ordinary telephone and transmit text to, or receive from, a central "sorting office" computer. Received messages and documents can be printed on paper or edited on a word processor before being sent on to other E-mail users. And this way of communicating is not only faster--it is also cheaper. The following is an overview of several key E-mail networks used by INTERDOC members.

POPTEL / GEO2



Poptel is a computer communications service that specializes exclusively in responding to the needs of individuals and organizations working in such non-commercial sectors as:

- trade unions and international labor organizations;
- development and aid agencies;
- documentation and research centers;
- educational and community organizations;
- campaigning organizations.

Poptel has extensive experience in supplying precisely the kind of on-line information and communications facilities required by such non-commercial sectors as those listed. These on-line facilities include:

Instant E-mail service. Documents of any length can be received as soon as sent--inland and international--plus Instant Mailouts--as cheaply as sending a single letter by post. Poptel members can make full use of the GeoNet network which has host computers all over Europe and in the USA. Compared with other E- Mail services (such as Telecom Gold), Poptel is not only cheaper but has more facilities and is far easier to use. Poptel E-mail brings together users with similar needs in one network, while still offering the facility to communicate with almost any other E-mail or telex user in the world.

Electronic publishing and Bulletin Board facilities. Your bulletins, publications and databases can be put 'on line'-- making it possible for important and urgent information to be promulgated--to all concerned--instantly--just about anywhere.

Full Telex. Send and receive telexes quickly and cheaply using your word processer--no special lines--no trained operators.

News Services. Fast access to the news ahead of the newspapers, via such services as UPI, Associated Press, World Reporter, BBC and the Washington Post.

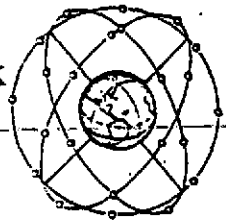
Access to Specialized Databases. A continuously expanding range covering such subject categories as legal, financial and information technology.

Other Special Services. Fast on-line translation, low cost teleconferencing and specialized database searching are also available.

Poptel is run by Soft Solution--a computer software cooperative based in London. Working closely with organizations such as INTERDOC and Antenna, Soft Solution is committed to spreading the use of computer communications technology as a tool for the non- commercial sector in Britain and throughout the world.

Poptel offers a package deal that includes all the software and hardware a user needs to go on-line, plus comprehensive training and continuing back-up service and advice.

For more information:
Poptel
25 Downham Road
London N1 5AA, UK



GreenNet

GreenNet is a computer-based communications system helping the environment and peace movements throughout the world to communicate more effectively. Based in London, with a large minicomputer connected to GeoNet, GreenNet users can communicate globally, usually by using a local phone call.

GreenNet is part of a global federation of progressive networks, giving GreenNet users access to the facilities and users of PeaceNet (US), EcoNet (US), Interdoc, Poptel (UK) and APOC (D). GreenNet is compatible with virtually any personal computer or computer terminal with a modem. If you do not have a modem, we can supply one at low cost.

It costs nothing to join GreenNet, but donations are accepted to help defray operating costs. There is a minimum monthly charge of five pounds and connect time costs 8.2 pence per minute. To date GreenNet has been funded by its founder and supported by grants and gifts. Ultimately fees from users will support the system.

Hundreds of groups and individuals are using GreenNet, including Greenpeace, Nuclear Freeze Campaign, the Green Party and Survival International as well as journalists from *The Guardian* and the *New Internationalist.*

GreenNet is a non-profit, independent organization. Staff have extensive experience and contacts in the international peace and environ-

ment movements, coupled with expertise in information technology and its applications.

How Eco/Peace groups are using GreenNet:

Electronic mail. With GreenNet's E-mail system, groups can send messages to each other instantly for less than the cost of using the post.

Computer conferences. Conferences allow any number of individuals to "meet" to present papers, collaborate on research, writing, or planning events—without the expense of traveling. Anyone can join a conference at any time.

Databases. GreenNet gives users quick access to databases with vast amounts of information on environment and peace issues.

Audio conferencing. Audio conferencing enables individuals or organizations anywhere in the world to hold a discussion. The 1986 Hiroshima Day Conference linked 12 countries and the proceedings ere broadcast live on five radio stations.

GreenNet's unique services:

Inexpensive computers. Many environment and peace groups feel they cannot afford to buy a computer. GreenNet can help. With good contacts in the industry, it can buy computers at very low prices. It also offers back-up support to many groups.

Media monitoring. GreenNet's media monitoring provides information about newspaper, radio and TV news stories of the day--often before they have been broadcast or appear in print.

Automatic E-mailing. This service allows users--with just a press of the button, to send information instantly to targeted groups such as news releases to environment correspondents, briefings to peace groups, etc.

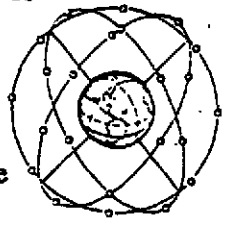
Office facilities. GreenNet usually has desk space available in the office on a short or medium term basis with access to facilities such as fax copying, computers and communications.

Desktop publishing. With its Apple Macintosh, GreenNet can offer users a desktop publishing service. This allows groups to design their own leaflets, texts, graphics, etc.

International Information Service. GreenNet selects information of interest to European groups from sources in the U.S. and elsewhere. The information is made available via the E-mail service, through which replies to these sources can then be made.

For more information:
GreenNet
26 Underwood Street
London N1 7JQ

PeaceNet:



PeaceNet is a computer-based communication system helping the peace movement throughout the world communicate and cooperate more effectively and efficiently. With a large minicomputer based in northern California connected to Telenet (a common carrier), PeaceNet users can communicate globally, usually through a local phone call. PeaceNet is compatible with virtually any personal computer or computer terminal outfitted with a 300 or 1200 baud modem.

PeaceNet "gateways" with several other international systems such as Dialcom, Genie, The Source, UUCP, BitNet and EIES.

Nearly two thousand people are using PeaceNet, including members of the American Peace Test, Beyond War, Coalition for a New Foreign Policy, Internews, National Freeze, North American Congress on Latin America (NACLA), Nuclear Times, the Christic Institute, and Parliamentarians Global Action.

Costs: With a $10 sign-up fee, you get a user's manual and a free hour of off-peak computer time. Then you pay a monthly charge of $10, which gets you another hour o off-peak computer time each month. Every additional peak hou is $10 and every additional off-peal hour is $5. Discounts are available

PeaceNet is a nonprofit project of the Tides Foundation, a San Francisco-based public charity. PeaceNet is managed by three nonprofit national peace organizations with a combined membership of over 10,000; the Center for Innovative Diplomacy, Community Data Processing, and the Foundation for the Arts of Peace. PeaceNet has been funded primarily through grants and gifts. Soon, however, fees from users will support the system.

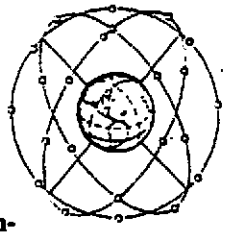
PeaceNet's main features:

E-mail. PeaceNet's E-mail system allows users to send and receiv private messages to and from some 2,000 PeaceNet subscribers, Telex users and many other networks around the world.

Conferences. Conferences are just like specialized bulletin boards. They ease group communications by structuring messages so that it is easy to see who has contributed what, when. By using these conference tools a geographically distributed group can carry on frequent and responsive communications. PeaceNet's conferences are used to distribute timely information about a number of discrete subjects. Some organizations are using them tro facilitate group decision-making and task-sharing processes. Conferences can be set up in a private fashion for a small group of users or they can be established as a public resource.

Databases. PeaceNet's databases provide easy access to large quantities of information and allow for custom searching and output (printing) formats. Among the dati bases PeaceNet is working on are: lists of peace groups, speakers, fou dations as well as bibliographic, legislative, and project information.
For more information:
PeaceNet
3228 Sacramento Street
San Francisco, CA. 94115

Econet



Econet is a fast low cost and efficient means of communications for use by ecologically oriented organizations throughout the world. It uses perosnal computers and existing telephone lines to link together people workilng on a wide variety of projects at a regional, national or global scale. The system is accessible in more than 500 US cities and in more than 65 countries. All telephone connections are made with a local telephone call, except in small towns or remote areas witin the regions.

Econet is being used by organizations all over the world in issues ranging from environment protection, international development, health care, disaster relief to housing and community.

Communications over Econet can take a variety of forms including personal mail, bulletins, announcements, news clippings, conferences, surveys and mailing lists. Communications can be either private, linked to a controlled group or available to everyone on Econet. Private subnetworks can be established providing custom tailored environments to the users.

Fees are based on a monthly subscription rate of $15 per month with no additional charges for connect time, file storage, conferencing, use of bulletin boards or sending private mail.

For more information:
Econet
The Farrallones Institute
15290 Coleman Valley Road
Occidental, CA 95465

INTERDOC Conference

Information Exchange for Social Change

Epe, Netherlands 13-18 May 1989

The Conference will have several components:

1. Training Seminars: Designed for those with limited or no experience in computer information techniques.

2. Sectorial Discussions: Covering communications in areas of specific NGO concern, such as human rights, labour, women's issues, peace, the environment etc.

3. Regional Discussions: Concerning regional specificities and issues for participants from Latin America, Asia-Pacific, Africa and the 'North'.

4. Forums: Political and social debates, reflections, and policy discussions on new communication technologies and their implications for NGOs and NGO networks.

5. Networking Festival: Stalls, demonstrations, displays etc.; a 'marketplace' for NGOs to share and compare communications techniques, database designs, networking ideas, products and publications.

6. Interdoc Network Meeting: A meeting to consider INTERDOC business (membership, finance, structure), and assess its past, present and future programmes and role.

For most of the Conference, discussion groups and training workshops will be held in a parallel way. Some training workshops will be repeated. Each discussion within the debates' 'strand' will be briefly introduced by a speaker.

We are assuming a full conference of five days, each divided into three main two-hour sessions, with plenty of free time for meetings on specific subjects, or presentation of groups' work to be organized at the event.

Subjects for technical training, policy debates and sectorial discussions can all be adjusted up to and during the meeting, as the collective planning and participation progresses.

Provisional Conference Programme

SUNDAY 13 MAY

Transport from Amsterdam Schiphol Airport and train station to the Conference Centre. Arrival and registration of participants.

MONDAY 14 MAY

Final registration of participants

Session 1: Plenary

1. Opening address: "Information exchange for social change - the role of new technology."
2. Announcements. Presentation, explanation and discussion of the logic and structure of the programme and workshops.
3. Introduction: INTERDOC's role in the conference. INTERDOC's past, present and future.

Session 2: Simultaneous workshops

1. Forum: "North & South: Computer communications and the new international communication order." The political, cultural and economic impact of computer communications on developing countries. NGO strategies for maximizing benefits and minimizing disadvantages
2. Technical workshop: "Introduction to computer communications"(1)
3. Regional discussion: Latin America(1)
4. Regional discussion: Asia-Pacific (1)

TUESDAY 15 MAY

Session 3: Simultaneous workshops

1. Forum: "Telecom Business: The politics of data carriers and national telecommunications companies." (The structure and policies of the businesses and governments controlling communications. The implications of this for NGOs.)
2. Technical workshop: "Introduction to computer communications" (2)
3. Regional discussion: Africa (1)
4. Regional discussion: Europe and North America (1)

Session 4: Simultaneous workshops

1. Forum: Open (issue to be decided by participants)
2. Technical workshop: "New developments in electronic networking"
3. Regional discussion: Africa (2)
4. Regional discussion: Latin America (2)

Session 5: Simultaneous workshops

1. Forum: "Secrecy and security: The problem of secure information and communication."
2. Technical workshop: "Alternatives to PSN: FIDONET, Packet radio
3. Regional discussion: Europe and North America (2)
4. Regional discussion: Asia-Pacific (2)

WEDNESDAY 16 MAY

Session 6: Simultaneous workshops

1. Forum: "People-oriented e-mail services: POPTEL and Peacenet an independent national networks (Brazil, South Africa, Philippines.)" Commercial messaging systems and NGO-based systems. Their uses for improved information exchange
2. Technical workshop: "In-house database for NGO documentation."
3. Sectorial discussion: Human rights organizations.
4. Sectorial discussion: Labour organizations.

Session 7: Simultaneous workshops

1. Forum: "Donor agency policies on computer communications and NGO networks." Funders' communications policies for networks, counterpart NGOs, and their own organizations.
2. Technical workshop: "The uses of commercial and academic databases for NGOs"
3. Sectorial discussion: Documentation centres.
4. Sectorial discussion: Environmental groups.

Session 8: Simultaneous workshops

1. Forum: "Building an international NGO on-line database". Plans, obstacles and hopes for a database of grassroots NGO materials
2. Technical workshop: "Electronic Publishing and Distribution: an introduction"
3. Sectorial discussion: Consumer organizations.
4. Sectorial discussion: The women's movement.

THURSDAY 17 MAY

Session 9: Simultaneous workshops

1. Forum: "The bridge between information exchange and grassroots action." The use of improved information sharing for concrete political change; theoretical and practical questions.
2. Technical workshop: "Clinic: technical question-and-answer session"
3. Sectorial discussion: Peace and disarmament groups.
4. Sectorial discussion: Indigenous peoples' groups.

Session 10: Plenary

Summary of issues and opportunities from workshops

FRIDAY 18 MAY

Session 11: Plenary

Evaluation of the Velletri Agreement: Five years of networking.

Session 12: Plenary

Links, programmes and networks. Closer contact: The future role of the INTERDOC network

Session 13: Drafting, follow-up and planning sessions (structure to be defined during preceding sessions.)

Session 14: End of conference: Final address.

SATURDAY 19 MAY

Departure and check-out of participants. Transport to train station and Airport Amsterdam Schiphol.

GEO2 INTERDOC Members On Line

MAILBOX	ORGANIZATION	LOCATION
AABN	Netherlands Anti-Apartheid	Amsterdam, Netherlands
ACCESS	People's Access	Quezon City, Philippines
AIA	Africa Information Afrique	Harare, Zimbabwe
ALTERNET	Alternet	Ottawa, Ontario, Canada
AMRC	Asia Monitor Resource Centre	Kowloon, Hong Kong
AMRC-NL	Asia Monitor Resource Centre/NL	Netherlands
ANDY.GIBB	Andy Gibb (CCN)	London, UK
ANTENNA-NL	Antenna International	Nijmegen, Netherlands
ARCE	Carlos Arce, CRIES Rep	San José, Costa Rica
ARENA	Asian Regional Exch. for New Altern	Kowloon, Hong Kong
BOTHENDS	Both Ends, Env. Dev. Cen. for NGOs	Amsterdam, Netherlands
CAITS	Caits	London, UK
CAP	Consumers Association of Penang	Penang, Malaysia
CCAN	Computer Comms Access for NGOs	Bangkok, Thailand
CEDEP	Centro Estudios para el Desarrollo,	Lima, Peru
CEDI	Centro Ecumenico de Doc.e Info	Rio de J., Brazil
CENPROPEO	Centre for the Progress of Peoples	Kowloon, Hong Kong
CEPES	Centro Peruano de Estudios Sociales	Lima, Peru
CHASQUE	Uruguayan NGOs (INTERDOC-BBS)	Uruguay
CIC	HK Christian Ind. Committee	Kowloon, Hong Kong
CIDIAG	C'tro Info Desarr e Investig Autogest	Lima, Peru
CIDOB	Centro Invest Doc.	Barcelona, Spain
CIED	C'tro de Investig y Ed para el Desarr	Lima, Peru
CIIR	Catholic Institute Int. Relations	London, UK
CIIR-DR	Catholic Inststute Int. Relations	Dominican Republic
CIIR-HON	Catholic Institute Int. Relations	Honduras
CIIR-PERU	Catholic Institute Int. Relations	Peru
CIPAF	C'tro de Invest. para Accion Feminina	Santa Dom., Dom. Rep.
CIPCA	C'tro Inv y Prom de Campesinado	Piura, Peru
CISJD	Cat. Inst. for Study Just. & Dev	Seoul, S.Korea
CODESRIA	C'll Dev Econ + Soc Res. in Africa	Dakar, Senegal
CRIES	Co-ord Reg de Info Econ y Soc	Managua, Nicaragua
DCC	Development Comms. Centre	Vancouver BC, Canada
DESCO	Ctr Estud & Promo del Desarrollo	Lima, Peru
ECUCENTRE	Ecumen. Resource Centre	Durban, S.Africa
EDRC	Env. & Dev. Resource Centre	Brussels, Belgium
EYFA	EYFA	Sittard, Netherlands
FACS	Fundacion Agusto C. Sandino	Managua, Nicaragua
FLORA	C'tro de la Mujer Per. Flora Tristan	Lima, Peru
FORO	Foro Nacional	Bogotà, Columbia
GRAIN		
HAI-EUROPE	Health Action International Network	Amsterdam, Netherlands
HKCA	Hong Kong Conservancy Association	Kowloon, Hong Kong
HURIDOCS	Human Rights Documentation Centre	Oslo, Norway
IBASE	Inst Brasil de Analys Soc e Econ	Rio de J. Brazil
IBON	IBON Databank	Manila, Philippines
ICDA	International Coalition Dev. Action	Brussels, Belgium
ICDA-SEEDS	Int Coalit. Dev Action (Seeds Proj)	Catalonia, Spain
IDOC	Int. Doc. and Communication Centre	Rome, Italy
ILET	Inst LatinAm de Estud Transnac.	Santiago, Chile
ILR	International Labour Reports	Barnsley, UK

INDIA-LINK	Indian NGOs Gateway	Bombay, India
INSAN	Insan	Jakarta, Indonesia
INTERDOC-ADMIN	Interdoc Administration	Kowloon, Hong Kong
INTERDOC-C89	Interdoc Conference 1989 Admin	Nijmegen, Netherlands
INTERDOC-DEMO	Interdoc Demonstration	
IOCU	Int. Organization of Consumer Unions	Penang, Malaysia
IOCU-CO	Int. Organization of Consumer Unions	Den Haag, Netherlands
IOCU-LAC	Int. Organization of Consumer Unions	Montevideo, Uruguay
ISIS	ISIS	Roma, Italy
JW-ACDI	Apost. for Com'ties Dev. by Indust'on	Davao City, Philippines
OMCT	Org. Mondiale Contre le Torture	Geneva, Switzerland
PARC	Pacific Asia Resource Centre	Tokyo, Japan
PDP-CRES	Inforedes	Tlaloc, Mexico
PET	Programa de Economia y Trabajo	Santiago, Chile
POPTEL-ADMIN	POPTEL Contact/Admin/Help	London, UK
PRC	Philippine Resource Centre	London, UK
R.BAMBACH	Rudolf Bambach	Koln, W.Germany
RDC-BAGUIO	Regional Development Center	Baguio, Philippines
RUDOC	Rural Development Doc Centre	Bangkok, Thailand
SACBC	South'n Africa Cath. Bishopp' Conf.	Pretoria, S. Africa
SATIS	Global Union Techs for Sust'able Dev	Utrecht, Netherlands
SEDES	Inst Sedes Sapientae	Sao Paulo, Brazil
SIYU	Chinese Information Centre	Manchester, UK
SOMO	Found. Research on Multinat Corps	Amsterdam, Netherlands
TELE-INFOTECH	Tele-Infotech	Den Bosch, Netherlands
TICL	Transnational Info. Centre London	London, UK
TIE	Transnational Information Exchange	Amsterdam, Netherlands
TIE-BRAZIL	Transnational Info Exch. Brazil	Sao Paulo, Brazil
TWNE	Third World Network - Europe	London, UK
WALHI	Walhi	Jakarta, Indonesia
WORKNET	NGO and Labour oriented BBS	Johannesburg, S. Africa

Some key resources

• **Contact-O** (Spanish edition), Gabriel Rodriquez, editor, ILET, Casilla 16637, Santiago 9, Chile. Contact-O's Rodriguez has also published two small guides to help groups to get online: **"Como diseñar Redes de Comunicacion"** (1987, 16 pp.), **"Redes de Comunicacion en America Latina: Acceso y Costos"**, (1989, 16 pp.) Both brochures are targeted to beginners and contain many graphs and practical information. Available from ILET.

• **"Electronic Mail - Commununication for beginners"** This cartoon-like pamplet provides succinct information on how to get online. It is meant for those who are otherwise afraid to read "computereese" and makes for enjoyable reading. **TWIN, Third World Information Network**, 345 Goswell Road, London EC1V 7JT, U.K, E-mail: GEO2:TWIN

• **British Telecom** offers free of charge a user guide: **"International Data Services"** (83pp.) This guide gives an excellent overview of the more technical aspects of international data transmission systems, tarriffs and other charges, as well as explaining how to set up data terminal equipment, a modem, communication software, etc. A glossary of terms and an index make it a very useful manual. British Telecom Holborn Centre 120 Holborn London EC1N 2TE Phone: +44 278 792101; TX: 21601 BTI; FAX: +44 1 831 9959 ECHO offers a diskette free of charge that allows one to simulate online sessions and get introduced into the Common Command Language (CCL) for searches in online data bases. ECHO P.O. Box 2373 L-1023 Luxembourg Phone: +352 488041; TX: 2181; FAX +352 488040

NGO Networks: A partial listing

Poptel/GeoNet
25 Downham Road
London N1 5AA, UK
(01) 249 2940

GreenNet
26 Underwood Street
London N1 7JQ, UK
Tel. O1 490-1510
E-mail: GEO:GREEN-ADMIN
Telex: 933524
Fax: 01 251 2613

PeaceNet
3228 Sacramento Street
San Francisco, CA 94115

EcoNet
The Farrallones Institute
15290 Coleman Valley Road
Occidental, CA 95465

Alternex
IBASE
Rua Vicente de Sousa, 29 - Botafogo
22251-Rio de Janeiro, Brazil
Tel. (021) 286-0348
Fax (021) 286-0348
Telex 2136466 BASE BR
Geonet Geo2:IBASE
Peacenet IBASE E1ES 165
Access via PSS to Alternex node
in Brazil: 12120479
outside: (724) 12120479

Nicarao
CEDOC/CRIES
AP.C163
Managua, Nicaragua
Telex 2296 (IHCA)
1331 (RECORP)
E-mail: ni:criesdejec

Worknet
c/o LERC
Contact person: Taffy Adler
Jeppestreet
Johannesburg, South Africa
E-mail: Geo2:LERC.
Geo2:WORKNET

Pegasus Networks
PO Box 201
Byron Bay 2481
Australia
Tel. +61 (66) 85 7285
GEO2:GN/peg:support

Alternet
Box 2206
Station D
Ottawa K1P 5K0
Canada
Geo2:ALTERNET
Peacenet (CDP:) ALTERNET

The WEB
456 Spadina Ave., Foor 2
Toronto, Ont. M5T 2G8
Canada
Tel. (416) 929 0346
Fax (416) 461 2886
GEO2: GN/web:spider

Ecunet
Church Computer Users Network
c/o The Church Council of Greater Seattle
4759 15th Ave., Northeast
Seattle, WA 98105
Tel. (206) 525-1213
Dasnet Code (DCZNWI)

BBC
British Council of Churches
Church Computer Project
Inter-Church House 35-41 Lower Marsh
London SE1 7RL
Tel. (01) 620-4444
E-mail: Dialcom (Telecom Gold) 81:CEL001
Dasnet Code (DCDIAL)

EchoNet
European Commission Host Organization
Echo Customers Service
B.P. 2373
L-1023 Luxembourg
Tel. (352) 488041
Telex 2181.
Fax 352-488040
E-mail: NUA: 0270448112;
Public password:DEANEM

People's Access
c/o Roberto Verzola
PO Box 9129
MCS Mailing Center Pasong Tamo, Makati
Metro Manila, Philippines
People in Communication
c/o Ibarra M. Gonzalez, SJ
3/F Sonolux Asia Bldg., Ateneo de Manila
University Campus, Loyola Heights
1108 Quezon City, Philippines

People in Communication
c/o Ibarra M. Gonzalez, SJ
3/F Sonolux Asia Bldg., Ateneo de Manila
University Campus, Loyola Heights
1108 Quezon City, Philippines

INTERDOC Steering Group

Conference Coordinator:

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Antenna / Data Konsult
P.O. Box 1513
NL-6501 BM Nijmegen, Netherlands
Phone: +31+80+235372;
FAX: +31+80+236798; TX: 0402+6105903 GMA LU
E-mail: Geonet (Geo2:)Interdoc-90; Greennet (GN:)Antenna
Peacenet (CDP:)Interdoc; Alternex (AX:)Antenna

Regional Coordinators:

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CODESRIA
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E-mail: Geo2:CODESRIA

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444, Nathan Road
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E-mail: Geo2:Interdoc-Admin

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IDOC
c/o Heinz Hunke
Via S. Maria dell'Anima, 30
00186 Roma / Italy
Phone +39+6+6868332
E-mail: Geo2: IDOC;

North America:

Third World Resources
c/o Tom Fenton
464 19th Street
Oakland, CA 94612, USA
E-mail: Peacenet (CDP:)TFENTON

Latin America:

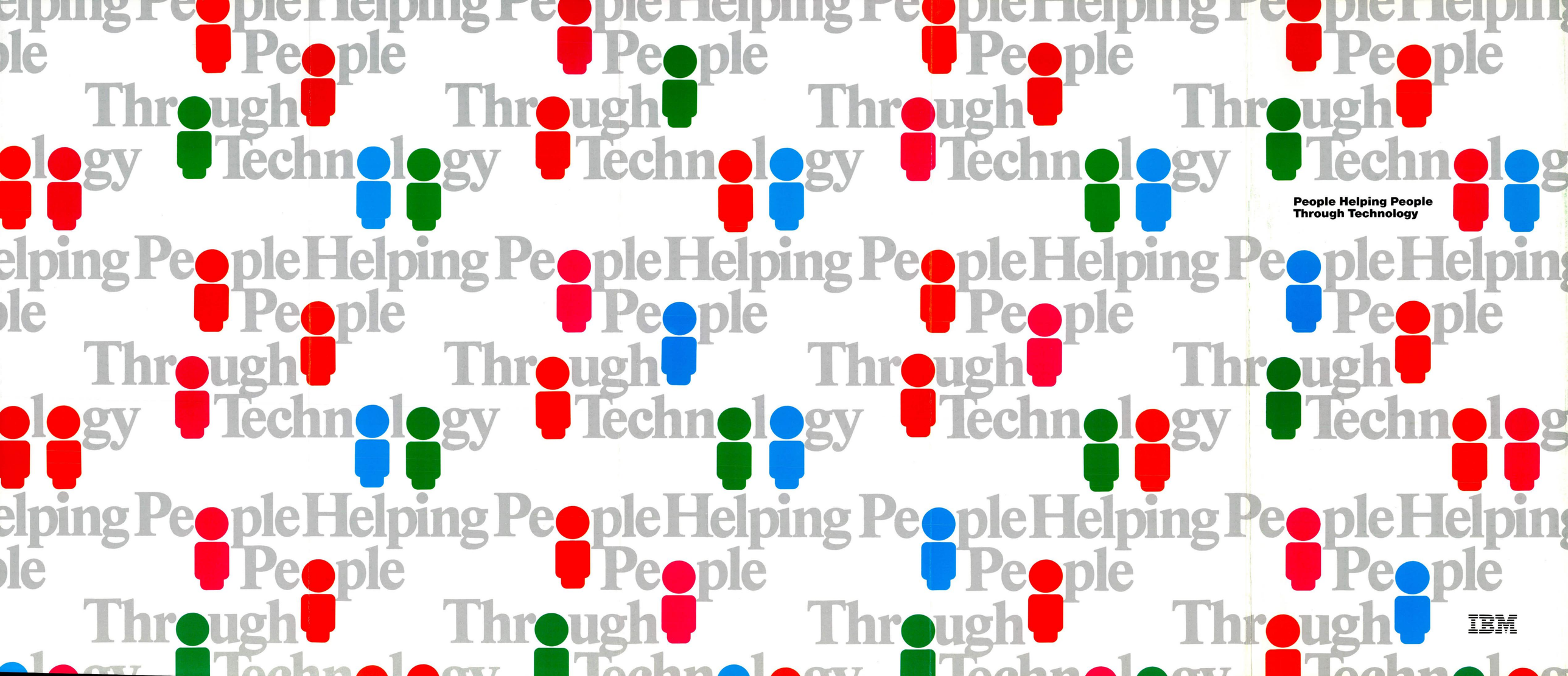
DESCO
c/o Mario Padron
Leon de la Fuente, 110
Lima 17, Perú
E-mail: Geo2:DESCO

TIMOTHY GUCK INFORMATION BZ 6525

→ Information Public Trust
→ Earth Island Inst.

TAKE CASTRO (1111

→ Common property resource management - thru electronic democracy -
→ Toxic Waste Clean Up -
→ David Kimitzer anthropology -
→ Bay Delta State Water board data base -


People Helping People
Through Technology
IBM

What's Possible?

For most people technology makes things easier. For the disabled, technology makes things possible.

IBM's National Support Center for Persons with Disabilities was created to help professionals and others learn how computers can enhance the work and life styles of people with disabilities.

The Atlanta center also is designed to assist IBM's research teams in understanding more about the needs of the disabled, and where technology can meet those needs...in the school, home and workplace.

What has Changed?

In recent years the accelerating pace of technological innovations has significantly improved the capability of adapting computer technology to meet the needs of the disabled.

Specifically, the introduction of the Personal Computer — bringing substantial computing power right to the individual — signals a new era of opportunity for disabled people.

The Personal Computer can be the window to much of the world for the blind and others with vision problems. It offers new hope, as well, to the deaf, the voiceless, slow learners, the mentally retarded, to people with brain injuries, and — most dramatically — to those contending with severe mobility problems.

People who have control of only an eyelid or a toe, for example, can communicate with virtually anyone with little or no assistance, when the appropriate equipment is attached to a Personal Computer.

What is Available?

A wide array of products already exists to aid the disabled. And thanks to technological advances, other products are being developed.

Today, there are systems that talk, listen, teach, communicate and translate for the user. Equipment includes speech synthesizers, voice recognition devices, keyboard emulators, "talking terminals", Braille computer printers and attachments that enlarge information on a computer screen up to 16 times normal size.

Programs tying these various products to a Personal Computer are being introduced rapidly. Employers are discovering that adapting work-related equipment to accommodate disabled workers is neither difficult nor expensive. More importantly, these workplace accommodations inevitably result in greater personal dignity and independence for employees.

What About Schools and the Home?

Technology already is starting to revolutionize educational methods. Its impact will be especially felt by youngsters with mental and/or physical disabilities.

Educators realize computers can enhance the learning process for those with special educational needs. Personal computers are easy to use and they are patient and non-judgmental. Rote instruction becomes practical, with each student learning at his or her own pace.

The same productivity tools that aid the disabled in the workplace can add enrichment to the lives of disabled people in their homes. An IBM Personal Computer with a modem can link a formerly isolated home to the world.

What Needs to be Done?

The rapid pace of technology is creating new opportunities for the disabled on a daily basis. The challenge is to stay informed of new developments. Health care leaders, policy makers, public officials, directors and staffs of groups that work with the disabled — all can benefit by understanding the capabilities of computerized systems, and how computers can improve the quality of life for the disabled.

To visit the Center or for more information, write or call the IBM National Support Center for Persons with Disabilities, P. O. Box 2150, Atlanta, GA 30055.

Telephone numbers:
1-800-426-2133 (Voice)
1-800-284-9482 (TDD)

IBM

Printed in USA

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IBM Offering for Persons with Disabilities

In conjunction with IBM-selected community service organizations, IBM offers a program that makes it easier for persons with disabilities to purchase computers for rehabilitative and therapeutic purposes.

Under the program, eligible individuals may purchase IBM Personal System/2 computer products at a **33 to 50 percent discount** and may receive individual assistance from local affiliates of the community service organizations when selecting, ordering and installing equipment.

These organizations:

- Verify a person's eligibility for this offering
- Provide general assistance, including technical advice, guidance or consulting
- Determine a suitable configuration, including recommending the appropriate adaptive device/aid or adaptive software
- Help complete the Agreement for IBM Offering for Persons with Disabilities and place the order with IBM
- Advise of warranty options and future maintenance agreement alternatives
- Collect payment for products ordered, including applicable taxes, at the time of order
- Provide hardware set-up assistance and any initial training needed
- Offer telephone support for questions after initial training and installation

Call the organization nearest you for current pricing information. If there is no community service organization listed in your state, contact the site nearest you or the National Easter Seal Society, headquartered in Chicago, or the United Cerebral Palsy Association, headquartered in Washington, D.C.

The participating national and regional community service organizations are the following:

NATIONAL

The National Easter Seal Society is a nonprofit, community-based health agency dedicated to increasing the independence of people with disabilities. Easter Seal organizations make a difference in the lives of disabled adults, children and their families by offering a wide range of support services and research programs. The Easter Seal Society is in the forefront of advocacy efforts on behalf of people with disabilities. Through 200 affiliates nationwide, more than a million people receive services each year.

United Cerebral Palsy Associations (UCPA) represent a national network of community service agencies consisting of 183 affiliates in 44 states. UCPA's affiliate network provides services to children and adults with physical and mental disabilities. Services provided at a local level include preschool and eductional programs, vocational training and placement, housing opportunities, computer access training, plus a full array of assistive technology services.

REGIONAL

Courage Center is a nonprofit organization in Minnesota that provides rehabilitation and independent living services for children and adults with physical and sensory impairments.

HandiSoft is an information services firm in Pennsylvania that hires persons with disabilities as programmers and word processors and for other data services positions. HandiSoft is an affiliate of The Center for Information Resources, a multifaceted data processing training and rehabilitation agency. With The Center For Information Resources, HandiSoft offers comprehensive technical and employment services for persons with disabilities.

Human Resources Center is the National Center on Employment and Disability, a non-profit facility in New York whose mission is to enhance the lives of children and adults with disabilities. The Center provides services and develops programs to increase the ability of persons with disabilities to participate fully in education, employment and social opportunities. Activities include diagnostic, training and rehabilitative services, as well as education, research and demonstration programs. Rehabilitation technology services are provided through the Center's Research and Training Institute.

Rancho Los Amigos Medical Center is a 735-bed, acute general hospital providing comprehensive, interdisciplinary care for persons with disabling conditions. It is owned and operated by the County of Los Angeles and is a teaching hospital of the Univeristy of Southern California Medical School. The Center offers a program of assistive technology, including augmentative communication, computer access, environmental control and worksite modification.

Rose Medical Center is a 420-bed not-for-profit acute care general teaching hospital in Colorado with an emphasis on providing specialty and tertiary care. The hospital operates a 20-bed full-service rehabilitation unit with assistive technology. Services include computer access, seating and positioning, environmental control access, augmentative communication and cognitive rehabilitation.

Here are the organizations listed by state:

State AL
UCPA of Birmingham
Dr. Gary Edwards
2430 11th Avenue North
Birmingham, AL 35234
☎(205) 251-0165

State AR
Arkansas Easter Seal Society
Ms. Nancy Dunn
2801 Lee Avenue
Little Rock, AR 72225
☎(501) 663-8331

State CA
Rancho Los Amigos Medical Center
Mr. Kevin Caves
Applied Rehabilitation Technology
7601 E. Imperial Highway
Downey, CA 90242
☎(213) 940-6800

State CA
UCPA of San Diego County (North)
Ms. Mary Krieger
750 N. Citracado Pkwy. - Suite D
Escondido, CA 92025
☎(619) 743-1050

State CA
UCPA of San Diego County
Ms. Joy Cole
3821 Calle Fortunada - Suite C
San Diego, CA 92123
☎(619) 571-7803

State CO
Rose Medical Center
Ms. Karen Mergendahl
Rehabilitation Department
4567 East 9th Ave.
Denver, CO 80220
☎(303) 320-2140

State CO
Colorado Easter Seal Society
Mr. David Schmitt
5755 West Alameda
Lakewood, CO 80226
☎(303) 233-1666

State CT
Easter Seal Rehab Center of SW Connecticut
Ms. Debra Nemchek
26 Palmer's Hill Rd.
Stamford, CT 06902
☎(203) 325-1544

State DC
United Cerebral Palsy Assoc. (Nat'l HQ)
Mr. Jim Hollahan
1522 K St. NW - Suite 1112
Washington, DC 20005
☎(202) 842-1266 (800) 872-5827

State GA
Atlanta Easter Seal Society
Ms. Beth Yager
3035 N. Druid Hills Rd.
Atlanta, GA 30329
☎(404) 633-9609

State IL
Easter Seal Society (Nat'l HQ)
Dr. William Salyers
5120 S. Hyde Park Blvd. - Suite 100
Chicago, IL 60615
☎(312) 667-8400

State IL
UCPA Land of Lincoln
Ms. Brenda Yarnell
130 North 16th St.
Springfield, IL 62703
☎(217) 525-6522

State IN
Central Indiana Easter Seal Society
Mr. Tom Blackman
Crossroads Rehabilitation Center
3242 Sutherland Ave.
Indianapolis, IN 46205
☎(317) 924-3251

State KS
Cerebral Palsy Research Foundation of Kansas
Ms. Leah Rosf
2021 North Old Manor
Wichita, KS 67208
☎(316) 688-1888

State MA
Massachusetts Easter Seal Society
Ms. Nancy Kellogg
484 Main St. - 6th floor
Worcester, MA 01608
☎(508) 757-2756 (800) 922-8290

State MN
Courage Center
Mr. Denis Meyer
3915 Golden Valley Rd.
Golden Valley, MN 55422
☎(612) 520-0566

State MO
Missouri Easter Seal Society
Ms. Sue Uknes
5025 Northrup
St. Louis, MO 63110
☎(800) 888-2142 (314) 776-1996

State NJ
UCPA of New Jersey
Ms. Willie Gunther
354 South Broad St.
Trenton, NJ 08608
☎(609) 392-4004

State NY
UCP of Capital District
Ms. Helen Lasher
Center for Disabled
314 S. Manning Blvd.
Albany, NY 12208
☎(518) 489-8336

State NY
Human Resources Center
Ms. Francine Tishman
201 I.U. Willets Rd. West
Albertson, NY 11507
☎(516) 747-5400

State NY
UCPA of New York City
Mr. Frank Hardeman
120 East 23rd St. - 5th floor
New York, NY 10010
☎(212) 979-9700 Ext. 263

State NY
UCP of Nassau County
Ms. Rose Nuzzi
380 Washington Ave.
Roosevelt, NY 11575
☎(516) 378-2000

State NY
UCPA of Syracuse - "Enable"
Ms. Carol Tytler
1603 Court St.
Syracuse, NY 13208
☎(315) 455-7591

State PA
UCP of the Capital Area
Ms. Janet Armstrong
925 Linda Lane
Camp Hill, PA 17011
☎(717) 737-3477

State PA
HandiSoft Inc.
Ms. Jean Anderson
Center for Information Resources
3025 Walnut St.
Philadelphia, PA 19104
☎(215) 898-8108

State RI
Easter Seal Society of Rhode Island
Mr. Dick Lytton
Meeting Street School
667 Waterman Ave.
East Providence, RI 02914
☎(401) 438-9500

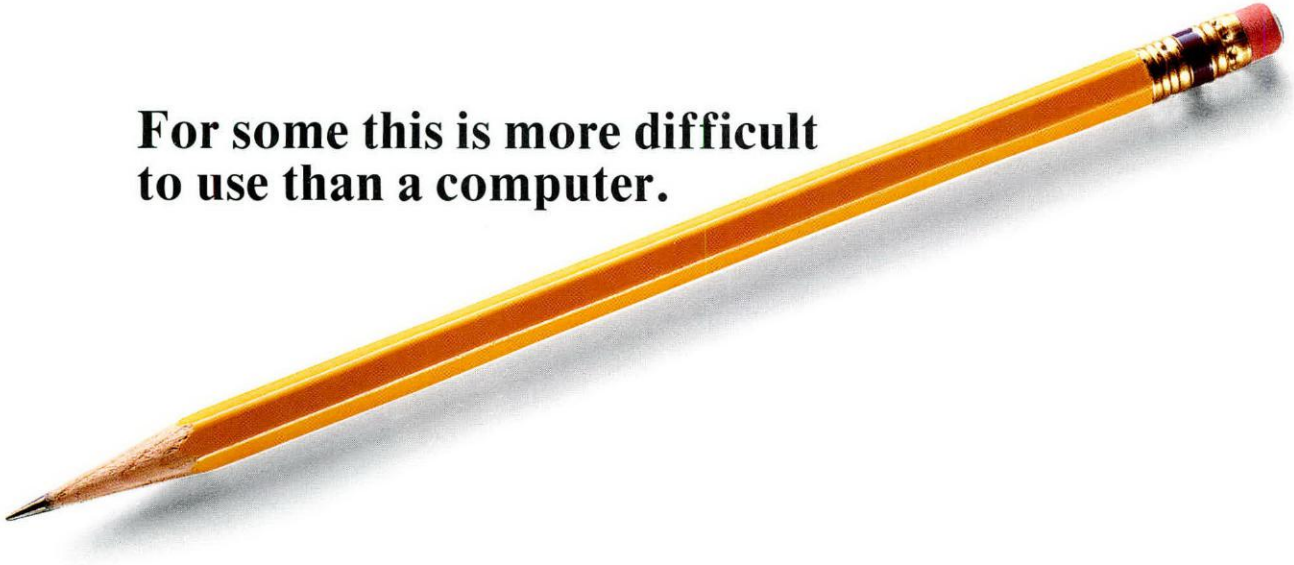
State TX
Tarrant County Easter Seal Society
Ms. Molly Shannon
617 Seventh Ave.
Fort Worth, TX 76104
☎(817) 336-8693

State UT
Utah Easter Seal Society
Ms. Leslie Heywood
331 S. Rio Grande St. - Suite 206
Salt Lake City, UT 84101
☎(801) 531-0522

State VA
Easter Seal Society of Virginia
Mr. Jeff White
4841 Williamson Rd.
P.O. Box 5496
Roanoke, VA 24012
☎(800) 365-1656 (703) 362-1656

State VT
UCP of Vermont
Ms. Lee Viets
73 Main St. - room 402
Montpelier, VT 05602
☎(802) 223-5161

IBM Offering for Persons with Disabilities



For some this is more difficult to use than a computer.

Picking up a pencil is simple for most people. For people with disabilities, it can be a complicated, if not impossible, task. Yet, when the right equipment is attached to a personal computer they can communicate with virtually anyone.

People Helping People Through Technology

The IBM Offering for Persons with Disabilities allows for the purchase of IBM Personal System/2's and related equipment at substantial discounts for eligible individuals.

IBM

IBM is continuing its commitment to the disabled community by making personal computers more affordable through the IBM Offering for Persons with Disabilities. This offering is designed to enable persons with disabilities to purchase selected IBM personal computer products at a significant savings off list price and also receive personalized assistance before and after the purchase.

IBM realizes that technology can be a great equalizer for persons with disabilities, but that a computer is only part of the solution. Therefore, IBM has set up this offering in conjunction with participating community service organizations (CSO). CSOs include national rehabilitation organizations and their affiliates and independent regional and local rehabilitation organizations. These organizations are well known in the rehabilitation community and have knowledge of specific disabilities and adaptive devices that are available.

IBM products eligible under the offering:

The IBM Personal System/2® family of computers and selected associated features, input/output equipment, accessories and operating systems software.

Services provided by a CSO:

- Demonstrate and give guidance in choosing a suitable IBM product configuration
- Suggest appropriate adaptive devices or adaptive software
- Help in the ordering process, i.e., order agreement, payment
- Receive, install and test eligible IBM products prior to your receipt from the CSO
- Advise of standard warranty coverage, additional warranty options available beyond the standard warranty and future maintenance service alternatives
- Provide hardware set-up assistance and reasonable operations orientation, if needed, on a system unit. Additional training may be negotiated separately with some CSOs
- Offer limited telephone support for a reasonable period for questions after initial orientation

IBM Offering at a glance:

DESCRIPTION	Significant savings off list price on IBM eligible systems and selected IBM products for persons with disabilities
ELIGIBLE SYSTEMS	IBM PS/2 family and selected IBM products
MINIMUM REQUIREMENTS	Physician's certification of disability
PARTICIPATING ORGANIZATIONS	Offered through national and regional rehabilitation community service organizations

Eligibility for the IBM offering:

Certification of your disability must be provided in writing by a licensed physician stating that you:

- Are a person with a visual, auditory, physical, neurological, learning, developmental disability or with a communicative disorder; and/or with a similar disability or disorder and
- Will receive therapeutic or rehabilitative benefit through the use of one or more of the products available under this offering

Requirements for purchase of IBM eligible products:

- Payment by cash, certified check or credit card at the time of order including applicable taxes
- The order and title must be in the name of the eligible end-user purchasing the equipment
- Products available are intended for the personal use of the eligible disabled person (end-user) in the United States or Puerto Rico and are not intended for remarketing
- An end user may not remarket products acquired under this offering for a period of one year from date of receipt
- An eligible end-user may purchase one system unit in a 12 month period

Who to contact:

For current pricing information, configuration alternatives and order requirements, contact the CSO location in your state or the state nearest you. You may also contact the National HQ of Easter Seal Society in Chicago, Illinois, or United Cerebral Palsy HQ in Washington, D. C.

This offering is sponsored by the IBM National Support Center for Persons with Disabilities, a center created to help professionals and others learn how technology can improve the quality of life for persons with disabilities. The Center serves as a clearinghouse for information on technological advances that offer greater opportunity and independence for disabled people in the home, school and workplace.

Additional information:

For more information on products and resource guides for persons with disabilities, call:

(800) 426-2133 (USA-Voice)
(800) 284-9482 (USA-TDD)

or write:

IBM National Support Center for Persons with Disabilities
P. O. Box 2150
Atlanta, GA 30301-2150

IBM®

NATIONAL SUPPORT CENTER FOR PERSONS WITH DISABILITIES

IBM's National Support Center for Persons with Disabilities serves to help health care leaders, agency directors, policy makers, employers, educators, public officials and individuals learn how computers can enhance the quality of life for the disabled person in the school, home and workplace.

While the Center is unable to prescribe an assistive device or software, it does provide information on what technology is available. Resource guides on disabilities affecting hearing, learning, speech and language, mobility and vision are provided; they list vendor and support group names, addresses and descriptions. A demonstration center is maintained with equipment featuring this new technology.

IBM offers a program in conjunction with participating community service organizations to make it easier for eligible persons with disabilities to purchase selected IBM Personal System/2 products at a discount. This program is described in the IBM Offering for Persons with Disabilities.

The Center participates in conferences to promote awareness and to raise the level of understanding about disability issues. Marketing and technical support representatives in the Center support the three IBM Independence Series of products for persons with special needs: IBM's Screen Reader, PhoneCommunicator and Personal System/2 SpeechViewer.

The Center's 800 number, maintained 24 hours a day, provides general information and accepts requests for information.

IBM National Support Center for Persons with Disabilities
P.O. Box 2150
Atlanta, GA 30301-2150

(800) 426-2133 (USA Voice) (800) 284-9482 (USA TDD)

People Helping People Through Technology

Houston, Cheyenne and Laguna Niguel, Calif.. Even more dramatic variations were found in situations where the IRS physically seized the property of a delinquent taxpayer. For the taxpayers in serious trouble who lived in the Baltimore, Nashville and Denver districts, only 1 out of every 1,000 had their property seized. But in Des Moines, Sacramento and Ft. Lauderdale, the IRS seized the property of 23 out of every 1,000 delinquent taxpayers.

- For both the Justice Department and IRS, *TRAC* analyses have identified *long term trends* that raise key policy questions. In 1980, 18% of all federal criminal cases were completed at trial. By mid 1987, this had dropped in half, to only 9%, suggesting a major — previously undetected — increase in plea bargaining. For many years, senior IRS officials and leading political figures have repeatedly asserted that the proportion of Americans who underpay their taxes was soaring. A *TRAC* study of the IRS's own data, however, shows that during the last 15 years there has been little, if any, change in the non compliance rate.

TRAC'S SERVICES

TRAC offers a variety of services. (1) For those with access to mainframe computers, very large, documented data bases are available on computer tapes. (2) *TRAC* provides extracts from the data bases that focus on specific geographic areas, time periods or topics. Depending on the size and complexity of these extracts, they can be provided on tape or diskettes. (3) *TRAC* prepares analytic reports presenting statistical material on selected subjects. The information supporting these special reports also can be provided on diskette. (4) In addition, because few reporters, editors, Congressional staff members and public interest people have the computer and statistical skills to extract transactional information from the government, organize it in usable formats and then draw valid observations from the data, *TRAC* offers open-ended consulting services. Fees vary according to the time and service required. (5) Finally, *TRAC* is currently developing special training seminars for reporters and editors to assist them in utilizing these information sources.

TRAC's co-directors are Susan Long and David Burnham. Burnham recently completed an investigative book about the IRS, A Law Unto Itself: Power, Politics and the IRS. A former reporter with The New York Times, who for many years specialized in examining the performance of such agencies as the New York Police Department, the Nuclear Regulatory Commission and the National Security Agency, Burnham heads *TRAC's* Washington Office, and is an Associate Research Professor in the S.I. Newhouse School of Public Communications at Syracuse University.

Susan Long, *TRAC's* other co-director, heads *TRAC's* research and computer work at Syracuse. Long, an applied statistician and sociologist, is an Associate Professor of Quantitative Methods in the School of Management at Syracuse University. During the last 15 years Long has written numerous scholarly papers and articles about the tax administration and the criminal justice system, as well as on various statistical topics. In the course of her research which required access to internal government files, she has won twelve federal court cases on public access to government records. One of these suits established leading case law requiring public disclosure of computer records under the Freedom of Information Act.

TRAC is a tax exempt, non-profit clearinghouse at Syracuse University. It now is supported by grants from nine foundations, contributions from Syracuse University and fees paid for documented data sets, individual research projects and other products. The eight person staff of *TRAC* is working to meet the consulting needs and inquiries of clients, to continually enlarge the number of available data bases and report series, and to enhance the completeness and accuracy of these data. *TRAC* has offices in Washington, D.C. and Syracuse, N.Y.

For further information please contact:

Miranda Maroney, *TRAC* Administrator, at
(315) 443-3563 or by fax at (315) 443-3196.

Create File: TRAC (Transactional Records Access Clearinghouse)

TRAC

Transactional Records Access Clearinghouse
SYRACUSE UNIVERSITY

The Transactional Records Access Clearinghouse seeks to improve the ability of Congress, journalists, academics, and public interest groups to conduct effective oversight of federal enforcement agencies.

To accomplish this important mission, *TRAC* uses the Freedom of Information Act and our detailed knowledge of the federal government to obtain comprehensive computerized data about the day-to-day activities of the agencies. Then, applying our technical skills, we transform the raw data into easy-to-use formats never before available to reporters, House and Senate Committees, scholars, and others on a routine basis.

TRAC already has acquired hundreds of computer tapes containing detailed records about the millions of investigative and enforcement actions taken by the Justice Department, the Nuclear Regulatory Commission, the Internal Revenue Service and the Environmental Enforcement Agency. These data cover varying periods from the early 1970's through this year. In addition to enforcement tapes, *TRAC* also has acquired other kinds of data from the Census Bureau, the Office of Personnel Management, the Federal Courts, the Federal Bureau of Investigation, and the Environmental Protection Agency to provide a picture of the demographic, economic and environmental context in which the agencies operate. How many people, for example, live in the geographic area served by each U.S. Attorney? What are the economic and racial characteristics of the areas? What are the levels of reported crime? How many federal prosecutors and Drug Enforcement Agency personnel are assigned to each district?

TRAC'S PURPOSE

Considered together, this informaation gives citizens a unique way to judge the performance of their government. Are the various regions and districts of the United States, for example, subject to different levels of criminal enforcement, nuclear safety, or tax collection efforts beyond that which might be explained by differences in population density, reported crime rates and other variables? Taking these variables into account, how have federal enforcement agencies performed over time? Have presidents actually delivered on campaign promises to crack down on certain kinds of violators? Or, through unannounced policy decisions not to enforce the law, have presidents allowed serious social problems to fester and grow? Alternatively, does the agency data indicate that Congress and the White House have established impossible enforcement goals?

No longer need citizens only rely on official rhetoric. Now the public can consider the hard performance data collected by the agencies for their own purposes.

Some of this information already has been shared with the Senate Finance Committee and the House and Senate Judiciary committees; with newspapers such as The New York Times, The Wall Street Journal, The Los Angeles Times, The Boston Globe, and Newsday; magazines like Newsweek; public interest groups and the academic community. Other data have served as the foundation for special *TRAC* reports on a variety of federal enforcement issues. Among the highlights of recent studies are the following:

- Considering only the offices of eleven "big city" United States Attorneys, *TRAC* data show substantial variation in the allocation of prosecutorial resources. One of the eleven districts, for example, had five times more assistant U.S. attorneys in relation to its population than another. The data also shows wide differences in enforcement policies. While federal prosecutors on Long Island brought twice the proportion of drug indictments as those in Los Angeles, the U.S. Attorney's office in San Francisco initiated nine times more civil cases than its counterpart in Philadelphia on a per capita basis.

- *TRAC's* analysis of 1989 IRS data also discovered a large number of hard to explain anomalies in tax enforcement. While 5 out of every 1,000 taxpayers were audited in Philadelphia, Greensboro, N.C. and Portland, Ore., 11 out of 1,000 were audited in

(over)

Introducing the
INFO LINE Taxonomy of Human Services

- *Developed specifically for information and referral use by the nation's largest information and referral service*
- *Features a versatile structure to facilitate adaptation by a wide variety of users*
- *Organized in a five level structure featuring 10 basic service categories plus target groups*
- *Provides a unique alpha-numeric identification system to ensure consistent indexing and retrieval*
- *Contains more than 2,700 preferred service terms with standard definitions*
- *Offers an alphabetical display containing preferred terms and definitions and 1,000 "use" references, as well as a permuted display of key word searches among multi-word terms*
- *Has an expandable framework permitting additions as new services become available in the community*
- *Provides enough service detail to facilitate the indexing of complex services*
- *Permits retrieval of broad or narrow services, or selection of more specific services by combining term*
- *Includes input from experts in many service disciplines*
- *Field tested by professionals for more than two years*
- *Contains more than 370 pages in a single, softbound volume*

The most comprehensive human services indexing and retrieval system available

The First Place to Look for the Last Word in Human Services...

Dozens of taxonomies, dictionaries and thesauruses are published each year to create better ways of indexing and retrieving information. Many have terms, but no definitions. Others focus on a single specialty. Some mix types of recipients with types of services. None are as useful to information and referral programs, or as versatile and comprehensive as the new INFO LINE Taxonomy of Human Services.

Five years in development, the Taxonomy sets a new standard for defining and indexing the wide variety of human services provided to the community. Offering 2,700 preferred service terms and 1,000 "use" references, the Taxonomy is the most comprehensive document of its kind. Created by the Information and Referral Federation of Los Angeles County, Inc. for its own use, it is suitable for organizations nationwide.

...The INFO LINE Taxonomy of Human Services

A Powerful Conceptual Framework

The Taxonomy provides a detailed, yet flexible structure for indexing and accessing information about human service providers. Ten basic categories and a target group section make up its first, and broadest level of services. These are:

- Basic Subsistence
- Consumer Service
- Criminal Justice and Legal Services
- Education
- Environmental Quality
- Health Care
- Income Security
- Individual and Family Life
- Mental Health Care and Counseling
- Organizational/Community Services
- Target Groups

Each concept is broken down into four additional levels of increasingly specific components. For example, "Individual and Family Life" can be broken into the following subsets:

Level I	P	Individual and Family Life
Level II	PH	Family Supplement Services
Level III	PH-16	Day Care
Level IV	PH-16.150	Child Care
Level V	PH-16.150-18	Extended Day Care

Every term has a logical niche within the hierarchy and a unique identification number illustrating the level of the term and where the term is located within the hierarchy's main categories.

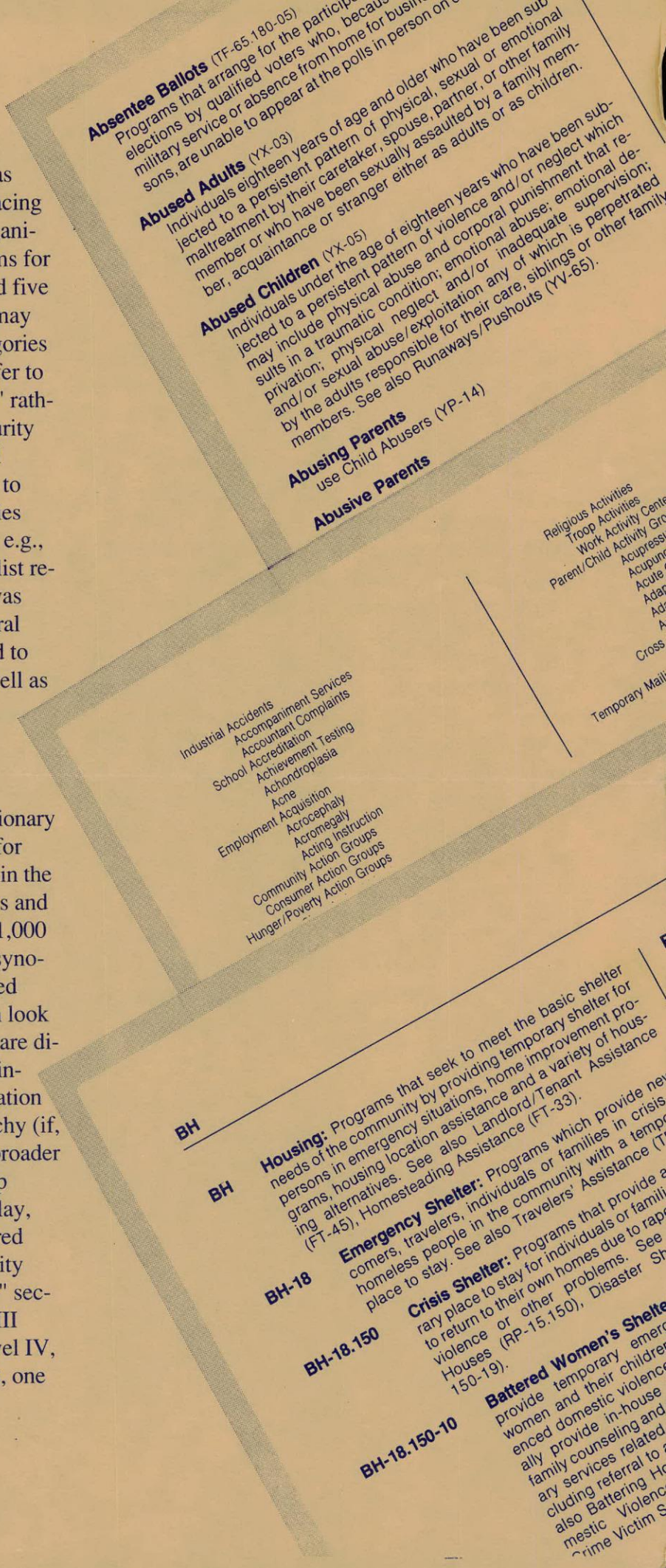
Each term is also defined. Standard definitions, when available, were quoted with permission. Other definitions were written with input from practitioners in the field. Many entries include "see also" cross-references which direct users to related terms in a different part of the hierarchy.

The Taxonomy is Versatile

Although the Taxonomy was designed to be as comprehensive as possible in order to avoid placing constraints on the inclusion criteria of other organizations, users can be selective in choosing terms for indexing or retrieval. Some users may not need five levels of detail to access available services, or may have resource files that omit some service categories altogether. For example, some users may prefer to utilize a broad term such as "Crime Prevention" rather than more specific terms like "Deadbolt/Security Locks", "Neighborhood Watch Programs" and "Security Evaluations". Other users may wish to use four or five levels of detail in most categories but may choose to eliminate an entire category e.g., "Environmental Quality", because they do not list resources in that area. Because the Taxonomy was developed for the largest information and referral program in the country, it can be easily adapted to support the needs of smaller communities as well as the changing needs of growing communities.

Accessing Information

The *alphabetical display* is valuable as a dictionary or thesaurus and can be used as a "road map" for finding the correct niche for a specific concept in the hierarchy. This display contains all of the terms and definitions that are in the hierarchy as well as 1,000 "use" references. These references are either synonyms for preferred terms or subsets of preferred terms not included in the hierarchy. Users can look up a concept using their own terminology and are directed to the appropriate preferred term to use instead. Users can then utilize the term identification number to locate the term's place in the hierarchy (if, for example, they are interested in reviewing broader or narrower related terms). A user can look up "Social Issue Groups" in the alphabetical display, for example, and will be referred to the preferred term through a "use" reference: "use Community Action Groups (TD-16)". Turning to the "TD" section of the hierarchy, the user finds the Level III term "Community Action Groups", and at Level IV, ten specific types of community action groups, one



of which is further broken down into eight Level V concepts.

In some instances, the key word in a term is not the first word, and the alphabetical display cannot help. The *permuted display*, however, offers a rotated, alphabetical index to service concepts by key words, regardless of their position in the term. A user looking for different types of counseling, for example, will find more than 60 terms containing that word. And although the key word is the second, third or fourth in the term, the permuted display preserves the appropriate word order and shows the term as it will appear in the alphabetical display. The user can move from the permuted display to the alphabetical display, pick up the identification number and then locate the desired type of counseling in the hierarchical display.

Since some users are accustomed to finding terms organized by target groups, the Taxonomy includes a *target group appendix*. Service concepts from all parts of the hierarchy which are typically associated with children and youth, disabled people and senior citizens are included in the first edition of the Taxonomy. Similar appendices for other target groups will be included as users request them.

Who Can Use the Taxonomy

The hierarchy, which can be accessed directly, or through the alphabetical or permuted displays or target group appendices , can be valuable to a number of user groups including:

Information and referral programs involved in computerizing their resource information systems, reorganizing manual files or preparing directories of human services will find the Taxonomy a useful indexing and retrieval tool. The Taxonomy structure promotes consistency in the use and understanding of terms. Definitions improve the user's understanding of the meaning of terms and help distinguish between terms that are similar, but distinct. Many individuals use the terms "Extended Day Care", "Before School Care", "After School Care" and "Latchkey Programs" interchangeably. "Extended Day Care" is the preferred term in the Taxonomy and the others are "use" references. The Taxonomy guides all users, regardless of their starting point, to "Extended Day Care", thus ensuring that all people consistently use the same preferred term. The clear advantage to programs that adopt the Taxonomy is increased accuracy through detailed and consistent indexing and retrieval. Organizations that already have a classification system but no definitions may be able to borrow from the Taxonomy to tighten their current structure and ensure greater consistency.

Foundations and other organizations responsible for planning human services or for making funding decisions can use the Taxonomy to become better acquainted with the range and interrelationship of services potentially available to the community and thus do a better job of establishing valid priorities for existing dollars. Standard definitions explain the type of service being proposed, while the hierarchy reveals what alternative or complementary services might be considered. A foundation reviewing the application for a grant from a community organization which is seeking funding for a food pantry, for example, may want to review the Taxonomy to see what other types of food resources typically exist in a community in order to better assess the need for this type of program.

University programs in sociology, public administration and other disciplines can use the Taxonomy as a dictionary of terms as well as a method for developing an academic understanding of the relationships among services in the community. Library and information science programs can study the hierarchy as an example of a classification structure for human service resource information systems as utilized by information and referral programs.

Libraries engaged in developing an indexing system for resource files or modifying their own indexing system may use the Taxonomy as a model. The structure of the hierarchy allows for nearly limitless expansion as new types of services become availa-

ble. Libraries that have a classification system in place may use the Taxonomy for its definitions.

Elected officials on the local, state and national level can gain a working knowledge of human service topics quickly prior to dealing with the media, addressing special interest groups or voting on issues.

Tested by professionals

During its development, an early working version of the Taxonomy was field tested by the INFO LINE resource staff to ensure that the hierarchy was viable as an indexing tool and that no vital terms were missing. Other copies of the pre-publication Taxonomy were used in the field for more than three years by organizations such as the Volunteer Center of Riverside and the San Bernardino County Department of Social Services. In the words of the Information and Referral Supervisor in Riverside, the Taxonomy "lets everybody speak the same language".

Designed for convenient, frequent use

The 374 page Taxonomy is contained in one attractive, softbound volume. Readable text, printed on tan stock, is easy on the eyes. All main entries are in boldface and "use" references are italicized for fast identification. Sufficient blank pages for personal notes are bound in the document as is a reply card for comments on both structure and content. Future editions of the Taxonomy will reflect user feedback.

Has enduring value

The Taxonomy has an expandable framework which will permit the addition of terms without altering the current structure. Users do not have to be concerned that the document they purchase today will be superseded by a new version tomorrow.

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About INFO LINE

In 1981, the Information and Referral Federation of Los Angeles County, Inc., popularly known as INFO LINE, was founded to improve public access to human service agencies countywide and to provide coordination among various specialized information and referral programs to reduce fragmentation and avoid duplication of effort. A private, non-profit corporation, the Federation is jointly funded by the United Way and the Los Angeles County Department of Public Social Services.

INFO LINE is a telephone information and referral service that operates 24 hours a day, seven days a week. Information and Referral Specialists respond to 1,200 calls a day from those requiring everything from emergency food and shelter to legal advice to mental health screening. Behind the scenes, Resource Specialists keep referral information accurate and complete by maintaining regular communication with the agencies in the resource file. In 1983, when the Federation began to explore the possibility of replacing its microfiche retrieval system with a computerized retrieval system, the need for a single method for classifying and defining services became obvious. Having developed the Taxonomy for its own use, INFO LINE is anxious to share its investment of time and expertise with others at a relatively modest price.

About the Developer

Georgia Sales joined INFO LINE as Resource Information Supervisor in 1981. Under her direction, the resource staff maintains current information on more than 6,000 human service agencies throughout Los Angeles County. Currently, Sales is working on specifications for a new computer system that will use the Taxonomy for on-line searches.

Prior to joining INFO LINE, she was in private practice as an Educational Consultant. Clients included the National Information Center for Special Educational Materials, where she participated in the development of a computerized database of materials pertaining to handicapped learners featuring a 2,500 term special education thesaurus; the California Regional Resource Center, where she produced two editions of a 1,000 page, two volume directory of services for handicapped children; and the Western Los Angeles Direction Service, for which she developed a service provider information base.

She earned an M.A. in Philosophy at the University of Warwick, England in 1968 and was in residency for the Ph.D. program in Philosophy at Warwick while attending graduate seminars at the University of London.

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Member Agency

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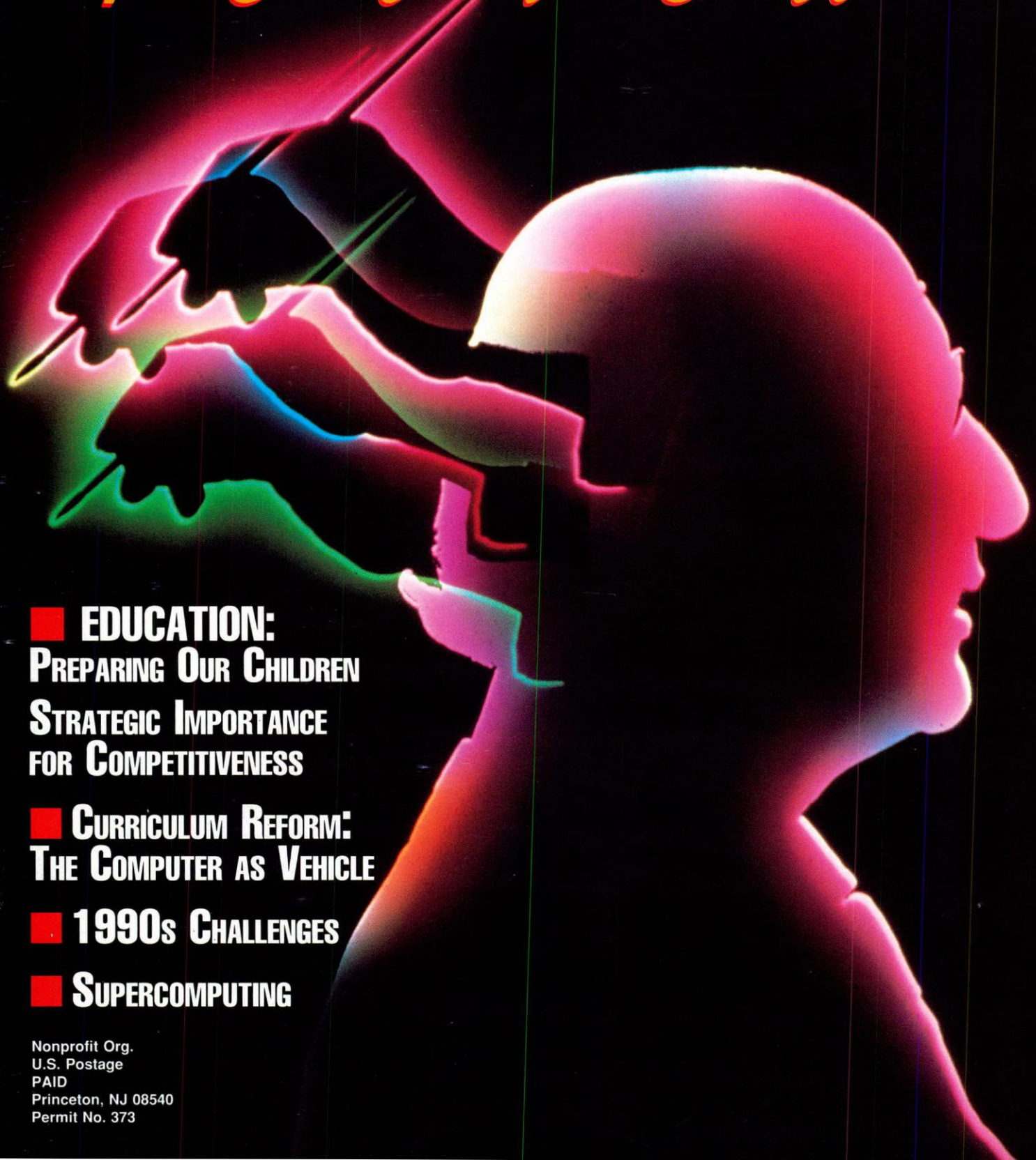
Introducing the INFO LINE Taxonomy of Human Services--
The First Place to Look for the Last Word in Human Services

VOL 24 NUMBER 1 SPRING 1989

COMPUTING AND COMMUNICATIONS IN COLLEGES AND UNIVERSITIES

EDUCOM review



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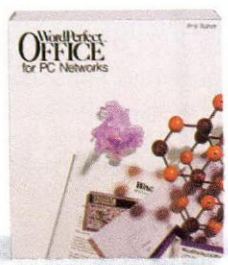

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Contents
Spring 1989

EDUCOM review

Volume 24, Number 1

FEATURES

COLUMNS

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Articles, letters to the editor, and news briefs on planning, management, and use of information technology in higher education and related areas from the U.S. and abroad are invited. Articles should not exceed 3,500 words and should be accompanied by a 100-200 word abstract and brief biography of the author(s). Hard copies should be double spaced; also welcome are submissions on disk and via BITNET to EDITOR@EDUCOM.

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Programs

EDUCOM, founded in 1964, facilitates introduction, use, and management of information technology. Through cooperative efforts and direct services, EDUCOM assists members and provides leadership for higher education.

EDUCOM is funded by dues from members and Corporate Associates; service fees; and grants from foundations, corporations, and government. Over 590 institutions and 120 corporations in the U.S. and abroad participate in these activities:

Conferences. With an attendance over 2,500, the annual fall conference is the preeminent meeting and demonstration of information technology in higher education. The spring conference in Washington focuses on the national higher education and research network (609 520-3340; via BITNET: CONF@EDUCOM).

Seminars are held in conjunction with conferences as well as on campuses, often in cooperation with other associations (609 520-3340; via BITNET: SEMINAR@EDUCOM).

Publications include monographs in the Strategies Series and the EDUCOM Software Initiative/Academic Computing Series; a *Directory of Member Programs and Projects*; *CCNEWS*, an electronic newsletter; brochures; and *EDUCOM Review* (609 520-3340; via BITNET: PUBS@EDUCOM).

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PLANNING THE NEW NATIONAL NETWORK

Remarks from the EDUCOM Networking and Telecommunications Task Force Workshop

The EDUCOM Networking and Telecommunications Task Force (NTTF), in concert with networking organizations and federal agencies, is working to create a high performance, high quality national educational and research network. This effort is proceeding on several levels through the work of NTTF Committees on Network Resources, Governmental Relations, Financing, and Policy.

On January 23 and 24, 1989, task force members, representatives from leading computer and communications companies, and Congressional and federal agency staff held a workshop to discuss a wide range of network issues, including goals, benefits, roles, management and financial structure, security, research in networking technology, and international networks.

In his opening remarks, Professor Lewis M. Branscomb outlines how a national network plays a key role in advancing research and education, and contributes to economic health and international competitiveness.

Success in forming the national network will require the energy, skills, and resources of all three sectors of the economy—education, industry, and government. Institutions and companies interested in playing an active role in the NTTF should contact EDUCOM Networking at 202 872-4200; or, via electronic mail, NTTF@EDUCOM.

By Lewis M. Branscomb

Professor Lewis M. Branscomb is director of the Science, Technology, and Public Policy program at the John F. Kennedy School of Government, Harvard University. He has also served as the director of the National Bureau of Standards, IBM Chief Scientist, and chairman of the National Science Board.

Policy researchers debate the merits of statistical measures of the contribution of national expenditures on research and development to economic competitiveness in trade. Some call attention to the fact that with $132 billions (in 1988) invested in research and development, the United States leads the world in research and development effort. Others note that the U.S. gross national expenditure on research and development (GNERD), as a percentage of gross national product (GNP), places the United States behind Japan in a position comparable to the leading European nations. When military R&D is removed from these figures, the U.S. civilian R&D/GNP ratio places this country in an inferior position.

Which is the more appropriate measure? Theorists tell us that if we had a perfect market for scientific in-

INVESTMENTS THAT IMPROVE THE 'MARKET' FOR INFORMATION EXPLOIT THE INHERENT U.S. ADVANTAGE: THE WORLD'S LARGEST RESEARCH EFFORT.

formation, all documented research outputs would be available quickly and at an appropriate price to all potential users. In this model of perfect sharing and marketing, it is the total research and development output that drives the economy, and the United States should expect to enjoy a strong high-tech economy.

But in the extreme of information market failure, each piece of research and development is relevant only to the applications to which it is linked. In this model GNERD/GNP would be the figure of technological merit for comparing our economy to that of competitor nations.

The truth surely lies somewhere in between these extremes. But the important lesson is that investments that improve the "market" for research information drive us toward the condition that best exploits the inherent U.S. advantage: the world's largest research effort.

In the case of preproprietary or basic research the force of this argument seems self-evident. Such knowledge is viewed by economists as a public good because of large externalities. Not only can one user access (at least in principle) the full body of public knowledge, but each element of useful knowledge can be used (also in principle) by all appliers of knowledge.

Thus the public interest is appropriately served by government investments that seek to make the information market more nearly "perfect"—that is, to increase information accessibility and diffusion rates.

Some might think that this argument only applies to basic or public knowledge, but it is even more valid for information on which a price, reflecting value, has been placed. If, in the absence of widely connected, easily accessible networks, potential customers for such information are discouraged or delayed from purchasing it, the incentive to invest in its creation or preparation for advantageous use is reduced. The economy is then deprived of the more immediate benefits that priced or proprietary information may bring.

This is the most important contribution that a robust, easily and universally applicable research information network can make to our technological economy. To be effective it clearly requires not only the efficient interconnection of researchers but equally efficient connections between the generators and appliers of knowledge.

Three very important benefits flow from effective research networks:

Enhanced research and development productivity. The United States faces a period of serious resource constraints accompanied by growing demands for scientific and engineering facilities, services, and research. While the primary thrust of public policy in the past has focused on the creation of new knowledge and on innovation, attention must now turn to the productivity of the research and development enterprise. National assets, such as supercomputers, radio telescopes, or particle accelerators, which are too expensive to duplicate must be more effectively shared. Networking services can also enhance the value derived from the work of individual investigators, provide access to sources of information, and facilitate the sharing of new knowledge.

Enhanced technology diffusion. A national research network supports the national policy of speeding the commercialization of new research, sharing industry's technical goals with the research community, and interconnecting research peers working in different sectors of the economy.

More equitable access to opportunity and to the fruits of technological advance. U.S. outputs in research and technology will increasingly require the full participation of all qualified citizens, as the work becomes more technologically intensive and the growth of the labor force, in the face of demographic trends, depends more and more upon women, minorities, and people in smaller institutions.

Important issues of equity also suggest the need for networking, through which smaller or remotely located institutions can overcome some of the disadvantages of isolation from stronger research centers. The notion of geographically distributed research collaboration is not a fanciful dream; it has already been realized through many informal networks of like-minded investigators. It is particularly common among computer scientists engaged in software projects.

This trend parallels the development of "distant learning," which embraces a range of educational processes in which instructors and students are separated electronically. As in research "telecollaboration," distant learning leverages economies of scale through the sharing of a valuable resource, increases productivity (by reducing both travel time and costs), and compensates for isolation.

Finally, a few features of the environment are worth keeping in mind:

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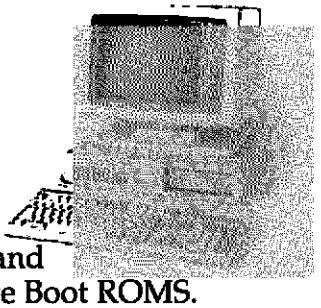

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THE GROWTH OF THE LABOR FORCE DEPENDS MORE AND MORE UPON WOMEN, MINORITIES, AND PEOPLE IN SMALLER INSTITUTIONS.

Participation by industrial research. The current concept for a national education and research network includes the active participation of professional people in industry as well as in academic institutions and government laboratories.

Only a few years ago this concept would have been viewed as controversial. Government's role in economic development was seen as supporting the not-for-profit academic sector and the government's own institutions, but would not have extended to the laboratories of industry. The diffusion of research results was imagined to happen efficiently with a minimum of federal stimulation. Research productivity was not an important concern in federal science policy.

Today we understand that a division of responsibility between public investment and private responsibility is still necessary. But this division is not a demarcation of sectors (academic vs. commercial); it belongs at the border line between the generation and sharing of knowledge and its competitive exploitation.

The primary thrust of recent legislation, at both state and federal levels, has been to seek to accelerate the commercialization of research by fostering voluntary collaboration across sectoral boundaries. The Cooperative Research Act of 1984, the Technology Transfer Act of 1986, and the Omnibus Trade Bill of 1988 are examples at the federal level. Thus American industry should be an active partner in the evolution of the national network concept.

The role of the states. The states must also be expected to play an important role, both because they are the appropriate loci of responsibility for intrastate and regional connectivity, and because they are taking the lead in exploring innovative ways to couple their intellectual resources to economic development.

Responsibility of gateway institutions. There are many questions of policy about the appropriate uses of the network. Many of these policy issues will have to be settled at the levels of government accountable for public investments and in the management institutions set up to establish the network and represent user and public interests. But it is essential that such policies not be overly prescriptive, for the network is not intended to carry out a technology policy defined by government, but to enable an innovative, highly individualistic community of creative individuals in all sectors to invent better ways to increase productivity and create economic opportunity.

The best way to address this issue is to recognize that the institutions within which individuals work, and which provide the gateways through which they can connect to the national network, will be financially responsible for local distribution and individual access. Accordingly, they should define and administer the policies for access and proper use within their own institutions. The resulting policies will not be uniform, nor should they be. These institutions can be expected to provide the primary source of application innovation.

Finally, America's education and research community draws on talent and resources from all over the globe. One-third of all the world's students who go abroad for study choose U.S. institutions. These students provide this country with the opportunity to build worldwide relationships of great potential value to our influence in the world and in furthering our economic interests internationally. American scientific institutions are often the focal point for international information exchange in specialized fields. International connectivity is not only a requirement for advancing U.S. economic interests, but is an expression of our citizens' rights to further their individual interests on a global scale.

The proper way to deal with any risks to national interests that follow from international connectivity is to place the responsibility for protecting those interests squarely where it belongs: on those who initiate the communication of information, who provide access to information in their charge, and who are responsible for setting up technical safeguards to preserve the integrity of information systems and their access control facilities. As noted above, the administration of these responsibilities lies within the participating institutions (the universities and laboratories), not with the managers of the network.

Given reasonable reciprocal arrangements between the national networks in the global system, in the end, Americans will find that they gain the same benefits on an international scale that they enjoy domestically from the national education and research network. ■

BEGINNING A SOFTWARE REVOLUTION: THE TRANSFORMATION OF LEARNING

The EDUCOM Software Initiative has been quietly defining a vision for technology that includes not only how people relate to people, but how people relate to ideas.

by Steven W. Gilbert

EDUCOM Vice President Steven W. Gilbert is responsible for the EDUCOM Software Initiative (ESI), Corporate Relations, and Fund-raising.

Colleges and universities are, at heart, conservative institutions that have evolved to preserve the knowledge and learning of the centuries while providing a home for its transmission and for generating new knowledge as well. These institutions have evolved slowly and powerfully, and are remarkably effective at resisting fundamental structural change.

Even the widely noted curricular changes of the 1960s had little impact on underlying structures of budget, space allocation, and institution-wide scheduling. Recently, however, budget allocations for activities related to academic computing have increased in most colleges and universities nationwide to between 1 and 5 percent of annual operating expenses. This institutional structural change suggests an important new beginning.

In other areas, too, things are changing. Pricing patterns that have prevented software from being widely disseminated are starting to shift. More colleges and universities are encouraging responsible behavior in their students and faculty, helping them understand the consequences of abusing the ease with which software can be copied. The amount of work necessary to develop educational software has been prohibitive for most faculty, but new development tools and systems are making it easier. Though career disincentives for those faculty who might develop and use computing for instructional purposes are still significant, some academic disciplines and some colleges are beginning to recognize such activity when making promotion and tenure decisions.

We are beginning to overcome the obstacles to widespread availability and use of high-quality software in support of teaching and learning in higher education.

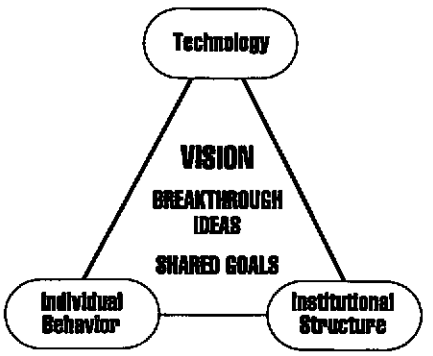
Components of a Technology Revolution

Rapid change in the power and price of information technology available from the commercial sector prompts many to anticipate correspondingly rapid and significant changes in education. Whether the "Information Technology Revolution" in education has begun, or whether it is well advanced, are questions that will be answered definitively only by future historians. However, we have reason to hope that the unfulfilled claims heard in the late 1960s for the impact of computers on education will not remain unfulfilled in the 1990s.

To achieve the full potential of the Information Technology Revolution in higher education, to successfully transform learning, it is first necessary to achieve an effective balance among three major components, all built on a shared foundation—a vision (see diagram).

The basis of any educational vision must be about how people relate to other people and how people relate to ideas. During the past three years more than 100 active participants in the EDUCOM Software Initiative (ESI) have been defining a vision through work on inter-institutional projects and through meetings and publications. The ESI vision includes providing more options to individual teachers and students and recognizing the legitimate variety in the needs and capabilities of all individuals. Our vision requires that information technology be widely available and provide new capabilities and power to its users.

Implicit in this vision is a commitment to avoid using information technology to control more rigidly or mechanize the lives of teachers and students. On the contrary, teaching and learning can become more enjoyable, as well as more cost-effective, through the uses of this new technology.



Components of a technology revolution.

The first component of the revolution is the technology itself, including software. Computer hardware, software, networks, databases, etc., and related services are developing with revolutionary pace and impact. Most colleges and universities join the information technology revolution in response to the technology.

The second component of the revolution is the behavior of individuals. As individuals, how do faculty, staff, students, administrators, and institutional leaders respond to the opportunities and problems suggested by the availability of the technology? How persuasive are the first enthusiasts in convincing others to use, integrate, and "institutionalize" the technology?

The third component of the rev-olution is the structure of the institution. Can the institution's basic organizational structure change to accept new modes of teaching and learning? How quickly? What are the most significant obstacles? How rapidly can budgets, space allocations,

and schedules accommodate the apparent potential of the new technology and the individuals who advocate its increased use? Can new support services be added or integrated?

One element of institutional structure that is uniquely essential to the information technology revolution is the need to develop new rules—customs, habits, laws, etc.—for processing and exchanging ideas. The need for these new rules is broader than (but includes) the issues related to "intellectual property rights" that have already begun to surface.

No clear picture has yet emerged of the institutional structures in higher education necessary to achieve the emerging ESI vision.

Breakthrough Ideas

Then there is the wild card. Whenever we talk about the revolutionary pace of change, we must recognize that especially in environments where information technology is beginning to permeate all activities, there is an enormous potential impact for "breakthrough ideas." A breakthrough idea can dramatically accelerate change in any one of the components—the technology itself, the individual behavior, or even institutional structure.

We cannot predict when the next major "breakthrough idea" for education will arrive, nor can we predict its source. It may not be from the technology developers, it may be from the faculty; perhaps it will be some new way of thinking about teaching and learning that will unleash the potential so many of us see and welcome in this technology.

The ESI is working on all major pieces of the infrastructure necessary to make higher education an especially fertile field for planting, nurturing, and disseminating breakthrough ideas when they finally do arrive. In the meanwhile, we are working with software and other aspects of the technology which may not be of "breakthrough" impact, but of which we are very proud; we have also begun projects addressing the need to support changes in individual behavior and institutional structure. We are making progress. And the pace is increasing.

But the wild acceleration associated with revolution is still in the future. As we continue our efforts to diminish some of the "damping factors" or obstacles we have identified, the pace of change will increase. We will move steadily—not really steadily, but at least without retreat—toward a new form of education, especially if we are guided by a shared vision. Information technology can be the excuse and the means for achieving it.

For more information about the EDUCOM Software Initiative, or to be added to the newsletter mailing list, see address this issue or send mail via BITNET to ESI@EDUCOM. ■

EDUCATING OUR CHILDREN

THE TEXAS BUSINESSMAN, THINKER, EDUCATOR, AND ENTREPRENEUR DELIVERS HIS OWN BRAND OF NO-NONSENSE PRAGMATISM IN DESCRIBING OUR EDUCATIONAL SYSTEM.

By H. Ross Perot

Perot Systems, Inc. founder H. Ross Perot was appointed head of the Select Commission on Public Education in Texas in 1983. He is one of only 10 Americans to receive the American Institute of Public Service Jefferson Award for public service by a private citizen.

It's stock-taking time. The election is over, and the nation wishes our next president the best of luck. He will need it.

We're at a critical time now in our country's history. We are busy spending our children's money in enormous amounts. Unless we stop doing this soon, there is a very serious possibility that we will be the first generation of Americans that fails to leave a better life to our children.

Let's look at where we are today: We rank at the bottom of the industrialized world in terms of academic achievement, but we're spending $328 billion a year on public education. We're paying more than any other nation on earth for educating our young people, and we have the least to show for it.

Other dubious distinctions: We are now the largest debtor nation in the history of man; 10 years ago we were the largest creditor nation. We're the most violent, crime-ridden nation in the industrialized world. We're also the biggest user of illegal drugs; we have 5 percent of the world's population, and we're using 50 percent of the world's annual output of cocaine. Nine out of 10 of the largest banks in the world are now Japanese; the 10th one

FOR THE NEXT CENTURY

is an American bank, but if you took the Third World loans out of it, it would be insolvent.

How did nine out of 10 of the biggest banks in the world come to be Japanese? It's very simple: the Japanese made the best products in the world. We bought their products. They got our money. Now it's in their banks. Sure, things are still going along fine but only as long as they still loan us the money that used to be ours. But if they ever shut us off, we'll be in real trouble—because 30 percent of our debt is now funded by our international competitors.

And we have a lot of debt to keep funded. Our savings-and-loan institutions have a $50- to $70-billion problem that gets worse every day we put off dealing with it. Personal and corporate debt in this country is $7.9 trillion, so on a personal basis we're mirroring our federal government's bad habits.

Our best and brightest are not going into the places where they will most help our country's future. Instead of designing and building new products or services, they go into law or consulting. Or they go to Wall Street, where they do a leveraged buy-out deal, collect a huge fee up front, and produce a debt-laden corporation that lays off tens of thousands of people.

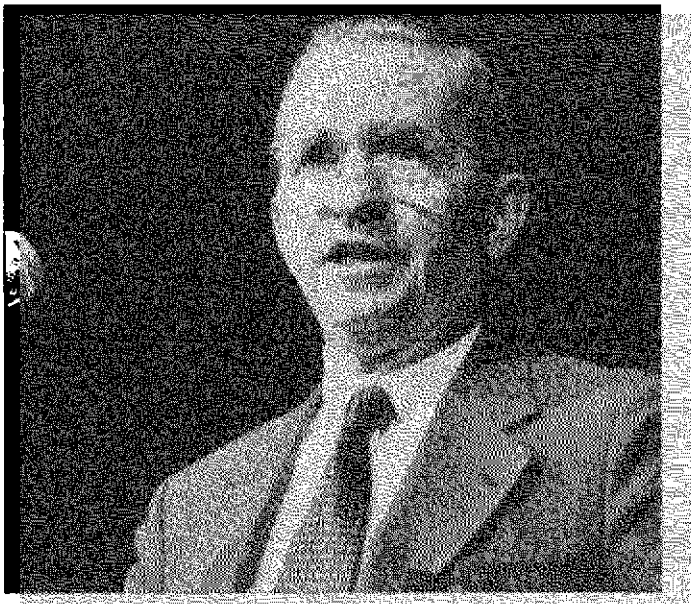
To many of us, it's hard to accept that Pittsburgh is no longer the steel capital of the world and that Toyota City, not Detroit, is now the automobile capital of the world. In 1960, we made 75 percent of all the cars in the world; today we make 25 percent. Some people say that the loss of manufacturing leadership is no problem, because our leading-edge high technology will bail us out. Not likely.

In 1974, we developed 70 percent of the world's advanced technology. By 1984, our share was down to 50 percent. By 1994, it will be down to 30 percent. The Japanese are filing more patents each year in our own patent office than we are.

Why am I spreading all this gloom and doom? Because in a democratic society the only way to effect revolutionary change—and in some areas that's what we need—is to start talking frankly about what needs to be done. And we certainly didn't hear that kind of talk from the presidential candidates and their "feel-good" media advisers.

Nowadays we treat our most serious domestic problems like a crazy aunt that we keep in the basement. Everybody knows she's there, but nobody talks about her. But one day she's going to get loose and kill a neighbor.

Let's take a look at one fundamental area where



WE'RE PAYING MORE THAN ANY OTHER NATION ON EARTH FOR EDUCATING OUR YOUNG PEOPLE, AND WE HAVE THE LEAST TO SHOW FOR IT.

sweeping change is needed—the public schools. Back in the 1940s when many of us were in public school, the top problems were talking, chewing gum, making noise in the classrooms, and running in the halls. That's what the really bad guys did. Now let's look at top problems of the 1980s: drug abuse, alcohol abuse, pregnancy, suicide, rape, robbery, and assault. You cannot have learning in that environment.

When I was a kid, we took geography in school. We lived at a time when you knew where everything was and couldn't afford to go there. Now everybody can afford to go there, and nobody knows where it is. In 1950, 84 percent of high school seniors knew that Manila was the capital of the Philippines; in 1984, despite all the news about the problems in the Philippines, only 22 percent knew that.

We have diverted our schools from places of learning to places of play at a time when our international competitors have been deadly serious in pursuing academic excellence in their public schools. The typical high school graduate in Japan is more knowledgeable than half of our college graduates. The typical Russian student studies physics and algebra for five years, chemistry and biology for four years, calculus for two years.

Just hearing that would give the typical U.S. high school student a No. 4 migraine headache. Most American high school students don't take physics or chemistry, and only 6 percent take calculus. In a recent worldwide algebra test we ranked 14th out of 15 nations tested. If it makes you feel any better, we beat Thailand.

Go to MIT, go to Cal Tech, go to any of the great engineering schools. Look at the people walking across the stage to get doctoral degrees and you see a disproportionate number of Asians. Now if these students were going to stay here and help us build better things, that would be terrific. But most of these folks are going back home.

How can we get back on our feet? Let me give you one example from my own experience in overhauling the school system in my home state of Texas. For a year and a half starting in 1983, I worked night and day as the head of a committee charged by the governor and state legislature with converting the Texas school system from one of the worst in the country to one of the best. The job's not done yet, but we've made a lot of progress.

When we started studying the situation, we found, as is usually the case in business, that the problems began at the top. We had no clearly stated objectives, no philosophy for managing a multibillion-dollar business. We had no accountability for academic achievement; we had no standard cost-accounting system. We didn't know what it cost to teach algebra; we didn't know what it cost to teach shop.

Now this is comparable to flying a 747 in the fog, through the mountains, at low altitude, without an instrument panel. Texas was spending $8 billion a year flying blind. And we ranked down in the 40s among the 50 states. Turning that around required making changes.

We found, for example, that 65 percent of our high school principals were coaches. And most of them had no earthly idea about what was happening in the classroom. Their mission in life was to win the district football trophy every year.

And we found that the money was going to all the wrong places. In one big city school system, we discovered—once we'd established a cost-accounting system—that 30 cents went for academic subjects, 30 cents went for soft electives, and 40 cents went for extracurricular activities and administration. So the most basic reform we made was to recapture the school day for academics. Instead of spending four hours a day on drill team or football practice and 15 minutes on homework, extracurricular activities now take place after school, on weekends, and homework is assigned and reviewed.

Vocational education was another bottomless pit of spending we discovered. We were training people on obsolete equipment for jobs that didn't exist, and we were trying to train them even though they couldn't read or write.

Textbooks were another big problem. Buy a set of McGuffey Readers. These are the readers mothers used in rural areas to teach children at home. They are still available. Compare them to the readers your child uses now. I can't tell you how "dumbed down" our textbooks have become—if I may use a Texan phrase. And we needed a better way to certify teachers. In Texas, the lowest 25 percent of students, based on college SAT scores, were in the schools of education. You could have a PhD from the best schools in our country, but if you didn't have a teacher's certificate—which has fewer requirements than getting a barber's-beautician's certificate in Texas—you couldn't teach in a Texas public school.

But the bloodiest fight we had—and we waged a campaign across the entire state to win it—was to fairly distribute the money available for our educational system. In Texas, we had school districts so rich they couldn't spend their money—and school districts so poor they

couldn't turn the lights on. It wasn't a pretty fight, but we had to find a way to get the money down to the children whose only chance is in the public schools.

Almost as hard was facing up to the fact that while Texas has a large and diverse population, our school system was essentially built on the assumption that the only people considered educable in our state were middle-income children whose mothers didn't work. In fact, we found that only one out of five children in the school system had Mom sitting there at home to do the tutoring that the schools weren't doing. We were writing off the rest of our young people.

Being a melting pot for diverse cultures and heritages has always been one of America's greatest strengths. We don't have time to waste fighting one another on the race issue. We should love one another. If we can't do that we should learn to get along with one another now. The few diehards remaining should recognize that we are stuck with one another. Let's link arms and form a winning team. It's time to recognize that our school system needs to adapt to make sure it develops the full potential of every child it now serves.

One thing we decided didn't belong in the Texas schools is the policy of "social promotion." Now, in our schools, you either earn promotion to the next grade or you don't get promoted. Interestingly enough, the minority parents in our state strongly support that. They now realize that social promotion is nothing but a cruel trick played on the young people, who end up economically segregated by their lack of skills and education.

School reforms have to start in the earliest grades. Children learn how to learn—or how to fail—at a very early age. Psychiatrists tell us that at two to three years of age, the child's ego gets pretty well shaped. Now, if you're a little street kid and hardly anyone ever hugs you and nobody ever tells you you're the greatest and everything that's happening to you out on the street while your mom's out working is really grim, you learn to think of yourself as a loser.

Probably the most important change we made in the Texas public-school system was establishing early-childhood development centers—tiny little schools right in the neighborhood. Frankly, when children are two or three years old, busing them to totally different neighborhoods is like taking them to Mars. You've got to teach these little children that they're the greatest. You've got to teach them that they're special. You've got to make school the very best part of their lives.

We had a raging debate about that in Texas. Can you make school the best part of a disadvantaged child's life? The answer to that is: Hell, yes. A little school right down the street—a school where people encourage you, tell you you're going to be somebody, teach you your numbers and letters—that school can make a very big difference to you, if you're a child from an impoverished family. By the time you're five, you can do all kinds of interesting stuff. By the time you're six, you can play the violin using the Suzuki method. People in the neighborhood think you're a genius, because you can play the violin. They should, and this builds your ego in healthy ways.

Instead, most school systems wait until the child is in the first grade, doesn't know his letters, doesn't know his numbers, doesn't know his last name, is wearing his older brother's hand-me-downs, and we ship him across town to a middle-class school. We put him next to kids who know their letters, know their numbers, probably speak a little Spanish or French. Maybe even been to Europe. At the end of the first day, this little guy just wants out. Who can blame him?

It would be wonderful if we had a strong family unit in every home to give each child the sense of confidence he or she needs to get a good start. But the fact is that we don't. And the only way to offset that is through the public schools.

Sure, this puts a lot of extra burdens on the public-school system. But one way to deal with that is to get rid of all the unnecessary things that schools now do. In Texas, the typical school had 40 clubs; each club raised money to support its activities by selling ribbons, candy, cookies, balloons, windbreakers and other items during the school day. We had drill teams traveling to Tokyo, entire bands and choirs in Europe missing several school days—but always returning in time for spring vacation. Now, why not just throw all that out and teach something instead?

Do we want our kids to win on Friday night on the football field, or do we want them to win all through their lives? That's what we have to start asking ourselves. The next question is: Are we prepared to make the sacrifices in our own lives that will make a winning future possible.■

OUR BEST AND BRIGHTEST ARE NOT GOING INTO THE PLACES WHERE THEY WILL MOST HELP OUR COUNTRY'S FUTURE.

THE STRATEGIC IMPORTANCE OF EDUCATION FOR AMERICA

SCIENTISTS AND ENGINEERS ARE AT THE HEART OF TODAY'S CONCERN ABOUT ECONOMIC COMPETITIVENESS.

As director of the National Science Foundation, Erich Bloch is charged with supporting basic research in colleges and universities and with improving science and engineering education nationwide. Formerly the chair of the Semiconductor Research Cooperative and vice president for Technical Personnel Development at IBM, he was awarded the National Medal of Technology by President Reagan in 1985.

Current information technologies have expanded dramatically the range of possibilities that scientists can explore—creating new products and processes, and changing how and what we communicate and think. Today, a microprocessor can calculate the orbit of Mars in about four seconds—a task that took Johannes Kepler four years. And a researcher can have on his or her desktop more data storage and computing capability than existed in a standard mainframe only ten years ago.

Modern electronic technologies have increased vastly our capacity to know and do things. Moreover, they allow us to transmit information quickly and widely, linking distant places and diverse areas of endeavor in productive new ways. These technologies make many things possible. But they don't make things happen. People and the contribution of human resources are critical to America's future.

The Global, Knowledge-Intensive Economy

Only 40 years ago, American products dominated world markets. Today, over two-thirds of the goods America produces compete with merchandise manufactured abroad. Our economic dominance has eroded. And several factors account for the change:

- A shift in our economy from a national to an international base.
- The industrial resurgence of Europe and the Pacific Basin after World War II.
- The development of communication and transportation technologies that make global industrial integration possible.

There is another, less obvious but more important reason: that is, the shift to a knowledge-based world economy. In modern global markets knowledge is the critical asset, replacing in importance access to natural resources and low-skilled labor.

We rely increasingly on knowledge-based industries—such as electronics, computers, biotechnology, designed materials—to provide the products we buy and sell. And even traditional manufacturing and service industries depend

IMPORTANCE COMPETITIVENESS

By Erich Bloch

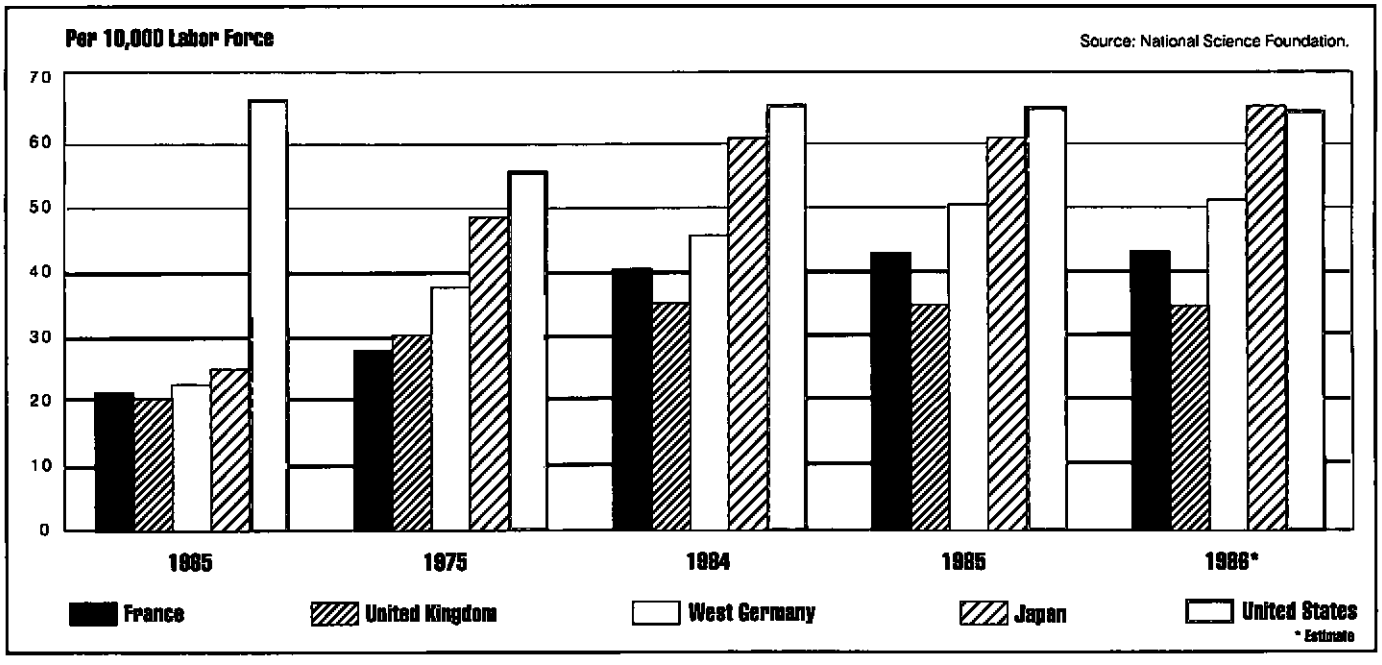


FIGURE 1 *Research and development scientists and engineers per 10,000 labor force population for selected countries.*

increasingly on computer-based processes that require technically trained workers.

Our major economic competitors have responded to this changed environment. America's once impressive lead in scientific and engineering personnel has disappeared (see Figure 1); Japan, with half our population, currently trains as many engineers as we do. And while no country spends a larger percentage of its GNP on *total* research and development than America, West Germany, France, and Japan each spend more *civilian* R&D. We are no longer undisputed leaders in scientific research.

The race to develop high-temperature superconductivity provides a good example. Major advances are as likely to come from Japan and Europe as from the United States.

It is clear that expanding information networks and rapid dissemination of research findings speed technology development, but the full impact of networking on research is less obvious. Still, the outlines are there: Networks are expanding the tools available to researchers. Remote supercomputers are now accessible to thousands of users across the country, and an enormous variety of databases are reachable through commercial dial-up networks. And while researchers have always collaborated with distant colleagues, the emergence of electronic mail and bulletin boards has given a new immediacy to collegiality.

Modern information technologies create the possibility of a truly global research community. But they also accentuate an atmosphere of international competitiveness—an urgency to be the first to know and to do. In this changed environment, no nation can remain competitive without investing both in new knowledge and in the people who can create and use it. Consequently, scientists and engineers, and the research they perform, are at the heart of today's concern about economic competitiveness.

Which leads to an obvious question: How well prepared are we to face the challenge of strong technological

competition from abroad? The answer to that question comes in two parts.

First—in some ways, we are very well prepared. We have the largest and most creative research system in the world. One of its greatest strengths is our academic research capacity. Universities and colleges perform over half the basic research in America.

By coupling research and graduate education, our academic institutions provide an unmatched opportunity for advanced training and learning by doing. The fact that our schools draw students and faculty from all over the globe and attract investment from foreign companies indicates that in a competitive educational market, our institutions deliver the best product. Nowhere in the world is there a substitute for the research environment available at American universities—an environment that encourages young scientists and engineers to explore new ideas and to challenge the work of more senior researchers, an environment that promotes intellectual freedom and stimulates creativity. Furthermore, American universities have led the exploration of new modes of research collaboration. They have pioneered the use of computer technologies—supercomputers and networks—to facilitate research and collaboration.

For example, the new NSFNET Backbone Network, on the air as of July 1988 with a 1.5 million bits per second capability, has been enthusiastically received. Traffic on the old NSFNET Network from September 1987 to September 1988 increased by a factor of four. And the number of academic, industrial, and government sites connected to NSFNET midlevel networks is up from 87 in June 1987 to over 200 last month.

Centers—like the NSF-supported engineering research and science and technology centers—are another new way to bring together researchers in different disciplines and various R&D supporters, including state and local governments and industry.

American universities excel at providing rich learning environments, developing research talent, and bringing out the best ideas. We have enormous potential in our hands—but other countries have had the same potential. For example, England, after the war, had a high quality, productive academic research effort ongoing in computer engineering and computer science. British industry, however, did not take advantage of it, nor did universities try to transfer their research findings to industry. Business and academia were separated by a wall of indifference, and

MINORITIES AND WOMEN ARE MAJOR SOURCES FOR THE TECHNICAL PERSONNEL WE NEED.

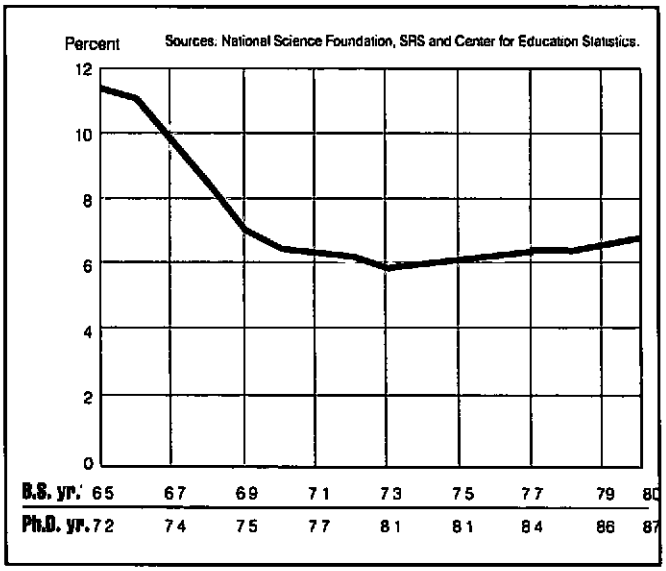


FIGURE 2 *Percentage of science and engineering baccalaureates attaining doctoral degree seven years later.*

you know the result. Today, the future of academic research in Britain is threatened by the economic problems of the country. There is a warning in all of this—that is, the well-being of the university system is inextricably linked to the economic progress of a nation. History shows us that potential is not enough—it needs to be exploited.

The second part of the answer to our question, "How well prepared is America to compete internationally?" is: Not as well as we could be.

Academic Research Funding

Until recently, the share of federal R&D support going to universities and colleges has been falling, even though the dollar amount has increased since 1980. One reason for this decline has been the shift away from civilian R&D. Since 1981, defense R&D has increased from 50 percent to 70percentof total federal support. In addition, defense basic and applied research has been declining as a percentage of the DOD total. Last year, DOD spent only 9 percent of its budget on research, down from 15 percent 10 years earlier. And only a fraction of that went to universities and colleges. In total, only about 1 percent of the defense R&D budget supported academic research in the 1987 fiscal year.

While civilian basic research spending has increased over the period, it has not compensated for the decline in DOD basic research and the shift toward greater defense spending. In other words, there is a serious imbalance in federal research support to the detriment of our academic research capabilities. What is more, even a temporary slackening in support can have long-term effects on the nation's supply of scientists and engineers. When the prospects for academic research funding drop off, promising students are discouraged from continuing the lengthy, financially uncertain educational process required for research careers.

Graduate Education

This perception is borne out by the data. Increasingly, American college graduates are not pursuing advanced degrees in the sciences and engineering—especially the PhD. If one looks at the ratio of baccalaureate to doctorate degrees seven years later, one sees a precipitous decline (Figure 2). The stabilization is only due to the rapid growth in the number of foreign citizens receiving U.S. degrees (Figure 3). While we can be proud that our universities attract so many foreign students, we should not be blind to the fact that, increasingly, American students are not pursuing careers in science and engineering. Depending on foreign students is a dubious substitute for growing our own. We need to encourage American students to pursue advanced degrees in the sciences and engineering. And we need to give them the financial support they need.

Undergraduate Education

Inadequate financial support for graduate study is only one part of the problem. At the bachelor's level, the proportion of degrees in the sciences and engineering has changed little since 1960. However, without the increase in computer science degrees, this would not be true (Figure 4). And there are signs that computer science is not the growth field it once was. Among entering college freshmen, the number planning to major in computer science has dropped by two-thirds since 1982 (Figure 5). And engineering, which increased during the late 1970s, has dropped by a quarter in the 1980s. Interest in other science majors and mathematics has been declining steadily. We need to reverse these trends and pay greater attention to undergraduate science and engineering education. Interested, well-trained undergraduates are needed to maintain America's strong research and graduate education programs.

But, more importantly, undergraduate education is the basis for a technologically literate population. For most of the technical labor force, including myself, the baccalaureate degree is the end of formal training. To adequately prepare students for employment as engineers and scientists, we need to train them in the kind of sophisticated computerized environment they are likely to find in industry. For example, computer-aided design techniques are increasingly standard in industry. Undergraduate engineers need experience in using powerful computer workstations, networked and coupled to a mainframe to analyze and solve practical problems.

In recognition of the importance of undergraduate education, NSF has established a new division of undergraduate science, engineering, and mathematics education this year.

Precollege Education

Improving the quality of undergraduate education will undoubtedly attract more students to the sciences and engineering, but again, it is not enough. One reason few freshmen are interested in technical fields is that their precollege preparation is inadequate.

Over 2,000 years ago, Plato said, "The direction in which education starts a man will determine his future life." His words ring even truer today. Knowledge is cumulative, especially in math, science, and engineering. Without basic skills, a student cannot advance his or her studies. But most American high school students are not developing these skills. According to a national assessment of educational progress study released last October, only 7 percent of the 17-year-olds tested were prepared for college-level science courses.

Last November, NSF and the White House hosted 104 junior high and high school teachers from across the

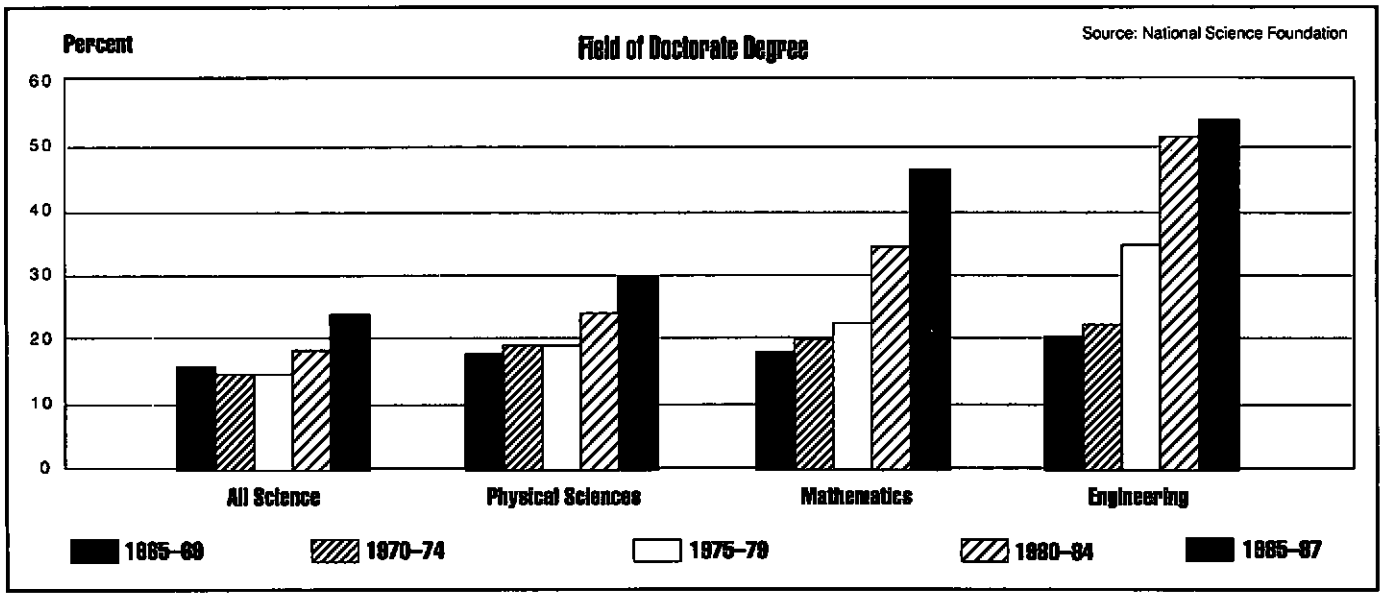


FIGURE 3 *Doctoral degrees awarded to foreign citizens by U.S. universities (1965–1987).*

country. They are recipients of the Presidential Awards for Excellence in Science and Mathematics Teaching. Perhaps more than any of us, they are the ones who will set the limits on the supply of American scientists and engineers in the years to come.

I was talking to one of those teachers, a high school math teacher in rural Nevada, who had conducted an informal follow-up survey of her advanced math students after they entered college. All of her best students had failed freshman calculus and dropped out of science and engineering programs. These students were not unintelligent; they were simply unprepared. To the teacher's credit, she was not defeated by her findings; instead, she used the information to convince her principal that the high school needed to provide a precalculus course. There are many dedicated precollege teachers in this country and they need our support.

ETA Systems provides an example of what industry can do. Their Superquest Competition attracted contestants from over 1,400 high schools across the country. The winners at Thomas Jefferson High School for Science and Technology in Virginia won an ETA10-P for their school.

Modern computer technologies provide us with valuable tools to improve the quality of precollege education. NSF is supporting a wide range of projects that use computers and networks in high school and grade school math and science instruction. But a lot remains to be done. And it is important that we start now.

The Pipeline: Women and Minorities

Employment of scientists and engineers has outpaced production (Figure 6); it has grown more than general and even professional employment. However, the number of college-age students has been dropping steadily and will

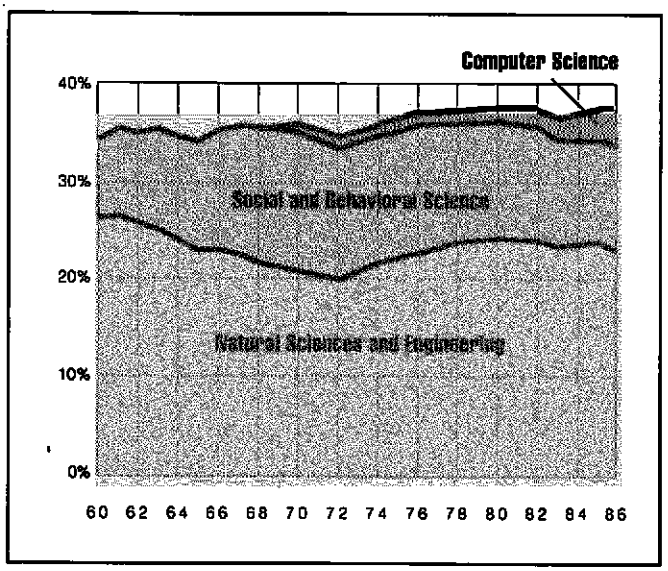


FIGURE 4 *Science and engineering BSs as percentage of total BS degrees.*

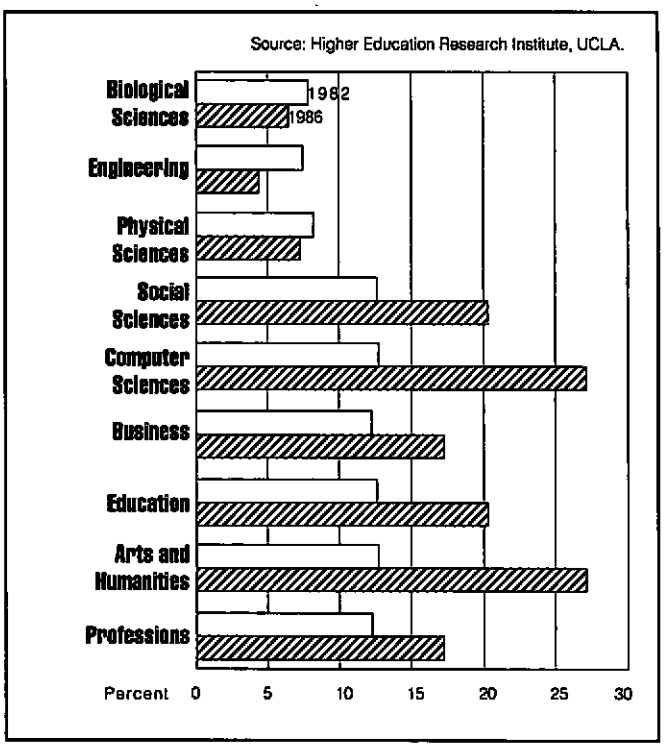


FIGURE 5 *Freshmen plans: 1982 and 1986.*

continue to do so. This means that unless a greater *proportion* of the student population is attracted to the sciences and engineering, the *number* of new scientists and engineers will decline in the future.

Furthermore, the composition of our population is changing. At the primary and secondary levels, minority students will constitute over 40 percent of the total in the year 2000, up from 30 percent today. At the beginning of the twenty-first century, 80 percent of the new labor force entrants will be minorities, women, and new immigrants. It only makes sense that we look to underrepresented minorities and women as major sources of the technical personnel we need. The prognosis is not encouraging. Minority participation in higher education, instead of increasing, is declining. It peaked in 1976 at 14 percent of the undergraduate population; since then it has fallen to 12 percent. At the graduate level, the situation is worse. Today, Blacks and Hispanics each earn only 2 percent of all science and engineering PhD degrees. Last year, only 16 Blacks received PhDs in the physical sciences and only 12 received doctorates in engineering. Among Hispanics, the figures were better—48 and 24, respectively—but still, distressingly low. Among women, despite significant increases in the number in graduate programs, they earn fewer than 15 percent of all technical degrees. Worse still, recent increases in numbers of women in science and engineering programs have leveled off at a low point.

The nation cannot afford to let this situation continue.

At NSF, we have created a series of special initiatives targeted to underrepresented groups, and we are encouraging women and minorities to participate in the regular

research and education programs of the foundation. One such activity—Comprehensive Regional Centers for Minorities—is using network technology to link NSF and the three existing centers in New York, Atlanta, and Puerto Rico. Through the network, the centers, which have been established to support talented minority high school students in pursuing studies in science and engineering, will be able to counsel one another and share information. In addition, NSF will be better able to monitor and collect data on the program's progress.

Cooperation

The challenge is before us—to educate the kind of technically skilled work force America needs to sustain economic prosperity and growth. We have to meet this challenge in our excellent universities and colleges. Modern information technologies are invaluable tools that allow us to effectively use these institutions to provide greater access and to improve the content and quality of technical education at all levels, including undergraduate and precollege.

To do so, however, requires cooperation. Responsibility for math, science, and engineering education in this country is widely shared. There are many active participants—in the academic and public sectors, and also in industry. According to the American Society for Training and Development, American firms spend over $30 billion on education and training each year. Collectively, they are the largest employer of technically trained manpower. American industry clearly has a stake in the kind and quality of science and engineering education students receive. That is why the business sector is becoming increasingly involved in educational reform at all levels.

Far-reaching and lasting solutions to the problems of science and engineering education in America will require agreement and cooperation among these many groups.

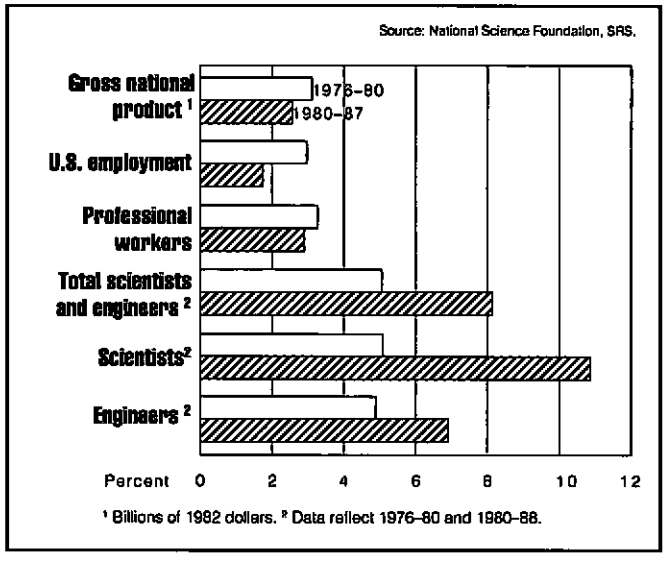


FIGURE 6 *Average annual growth in science and engineering employment and other manpower and economic variables.*

The federal government is only one participant. It can encourage cooperation and stimulate new programs to improve education, but it cannot be the main source of support. Education is first and foremost an activity of local communities, states, and the private sector.

Conclusion

In the last few years, the nation has come a long way toward reaching a consensus on the need to improve technical education to remain competitive in world markets. What remains is to develop and broadly implement the kinds of programs that will do the job.

- We need more programs at the grade school level to excite and sustain young children's native curiosity about science.
- We need better programs at the high school level to raise them to the standards of our international competitors and to prepare more students for upper-level studies in math and science.
- We need innovative programs at all levels to encourage, monitor, and support female and minority students who are considering careers in science and engineering.
- We need relevant, well-equipped science and engineering programs at the undergraduate level to give graduates the skills they will need in the work place.
- And we need well-financed programs at the graduate level to attract and support American students in study and research.

A new administration presents a rare opportunity to address America's unsolved issues. Public expectations that he will reduce the U.S. trade and budget deficits will allow the new President to try bold solutions to our economic and technological problems. It is important that while creating those solutions, the new President does not lose sight of the seriousness of America's human resource weaknesses.

America needs more and better trained technical manpower. To achieve this goal, the nation must do more than just increase spending on science and engineering education and research; we need to make a long-term commitment. There is no quick-fix solution to our human resource deficiencies. It takes time to see returns on investments in education. America must stay the course. Now, more than ever, we need to work together—academia, industry, the federal government, and the states—to ensure increased and sustained support for science and engineering research and education. Our success will help determine the economic future of America. ■

Curriculum Physics: The Computer

BILLIONS OF DOLLARS HAVE BEEN SPENT IN THE PAST DECADE PUTTING COMPUTERS INTO AMERICAN CLASSROOMS.

When experts are asked to speculate on the role of technology in the twenty-first century, they are apt to talk about computer-assisted diagnostic procedures in medicine, computer-controlled factories in agriculture, computers doing all sorts of things in the home—but all too often they are silent about the implications of the computer for education. Yet it is inconceivable that all the changes taking place will leave education untouched. Indeed, the educational effects of the computer are already beginning to appear. Billions of dollars have been spent in the past decade putting computers into American classrooms. In Prince Georges County, where the University of Maryland is located, a representative of the school system recently reported that every elementary school in the system has at least 40 microcomputers, and some have more than 150.

But putting a computer in the classroom doesn't guarantee a quality education any more than growing ivy on the building's walls guarantees that there will be a first-rate teacher inside. Expecting educational improvement from strewing computers everywhere reminds me of what one of my professors in college called the "manure-pile hypothesis of academic scholarship." If you pile it high enough, surely a flower will grow. But all the computers in the world won't help us if we don't plant the seed of appropriate intellectual content.

Edward F. Redish is the creator and principal investigator of M.U.P.P.E.T., the Maryland University Project, Physics and Educational Technology. A professor in the Department of Physics and Astronomy at the University of Maryland, College Park, he is the recipient of the Washington Academy of Sciences Leo Schubert Award for the Teaching of Science. This paper was adapted from Dr. Redish's EDUCOM'88 keynote address.

Visions of an Educational Future

Many of us would like to totally restructure the current educational system from the ground up. Since we can't do that, since each of us has influence over only a small piece of the system, we each have to decide what it is we want to do with our own little piece. As college teachers, we can't wait for the elementary and secondary schools to reform themselves completely before we start training our students for the next century. We have to decide what we can do with what we are getting now.

Let's consider two alternative (and extreme) visions of a future educational system. The first was described over

REFORM IN AS A VEHICLE

By Edward F. Redish

thirty years ago by Isaac Asimov in his science-fiction story "Profession." In his vision, education is provided to the student directly by computer input to the student's brain (Figure 1). The education takes place on two days: reading day at age 8 and education day at age 18. On the first, the student learns to read in 15 minutes. On the second, the student's profession is selected by the computer and transferred in a single stroke. The student immediately becomes a highly qualified professional.

The defect, obviously, is that the students do not acquire

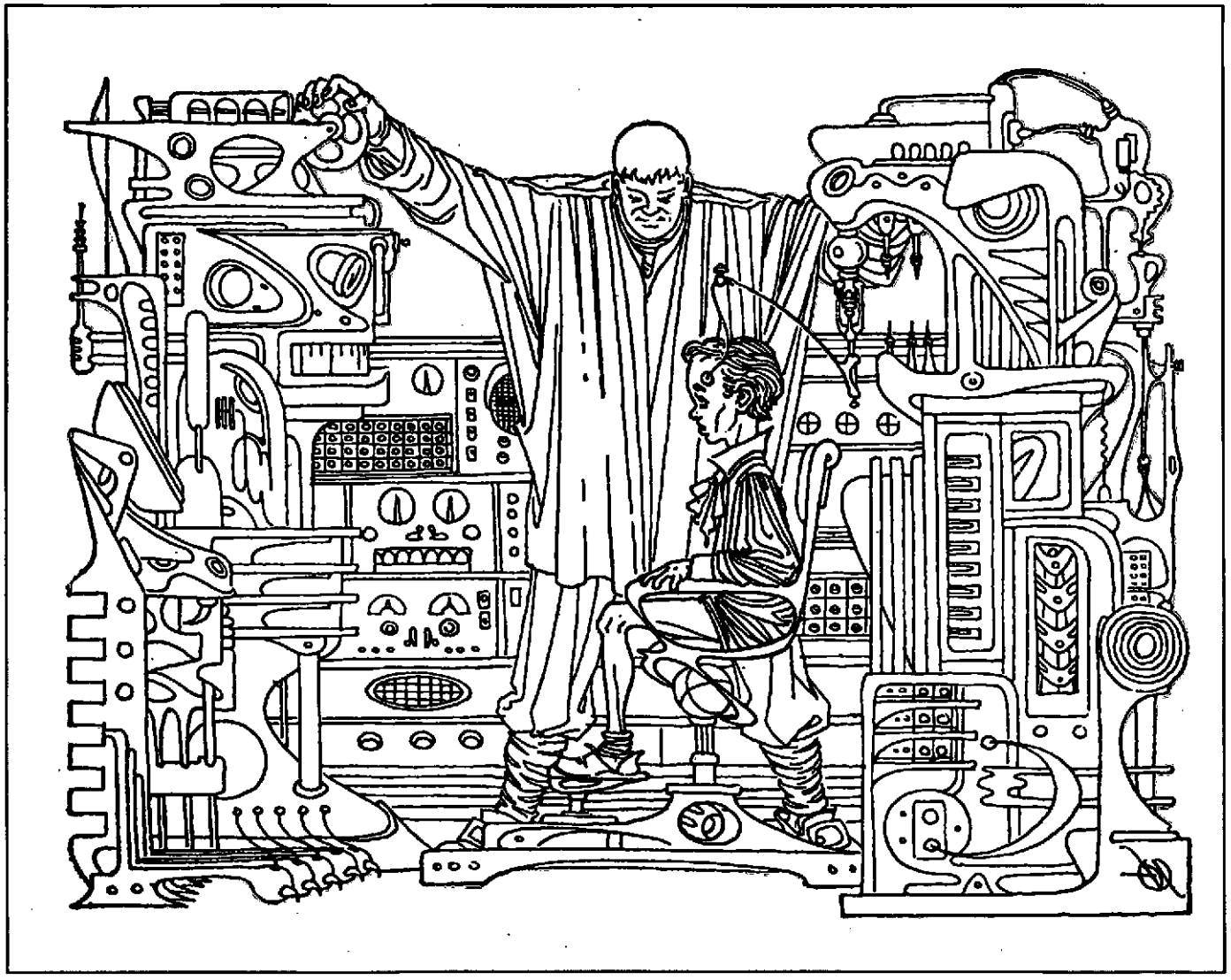


FIGURE 1 *Programming the student, by Frank Kelly Freas (from* Astounding Science Fiction, *July, 1957, with permission).*

OUR OVERALL OBJECTIVE IS TO RECONSIDER THE COLLEGE-LEVEL PHYSICS CURRICULUM FROM THE FRESHMAN YEAR ON.

To decide what we needed to teach our undergraduates in order for them to do modern research, I analyzed what skills I wanted my research students to have. I classify the skills needed into eight broad categories:

1. number awareness
2. analytic manipulation
3. estimation
4. approximation
5. numerical methods
6. physical intuition
7. approach to large problems
8. communication

These are just the classroom or theoretical skills. A physics student also needs to develop laboratory skills, but I won't discuss those here.

Number awareness means that the student understands that one can quantify the universe by assigning numbers to measurements, working with them, and so on. Analytic manipulation refers to such abilities as converting word problems into algebra.

Estimations are particularly important when one is working with a computer. Students have to be able to estimate the parameters needed to solve a problem numerically and have to have a good idea of how big the result should be. (This is even true when they use a hand calculator.) We often say that the defining characteristic of a good physicist is the ability to estimate anything to one significant digit on the back of a napkin.

Approximation is, in a sense, the opposite of estimation. The student must understand what approximations have been made in setting up a calculation. (Every calculation has some.) They then have to be able to tell how big an error those approximations produce, and they have to develop methods to correct for those errors.

Numerical methods are important because professionals often have to approach problems numerically. But an essential component of this skill is knowing when to choose to do a numerical calculation instead of an analytical one.

Of these eight skills, the traditional physics curriculum with its strong emphasis on analytic skills tends to ignore all but the first two. Physicists are among the most aggressive of professionals in seeking out new technology for their research. In many cases, physics researchers are at the forefront of the creation of new technology. But when you get these same researchers into the classroom, they are extremely conservative. The physics curriculum has remained nearly unchanged for more than 30 years. It is highly standardized at the introductory level. Almost all the commonly used texts are clones of each other, and undergraduates rarely see anything that remotely resembles research. It is possible for students to study physics for two years in high school, four years in college, and two years in graduate school and never see a problem that their teacher doesn't know how to solve. For a profession that prides itself on being at the forefront of the creation of new knowledge, this is shocking.

A first-year physics text may weigh eight pounds; it may have over a thousand pages and contain more than two thousand problems. Yet it develops very few of the skills on my list. Almost all the problems are solved by plugging numbers into already-given analytic solutions. These deal with only the first skill, number awareness. The rest may be aimed at developing the students' skills in devising their own analytic solutions—and those problems are often marked as "more difficult." It is almost impossible to find an estimation problem or an approximation problem in that inventory of two thousand problems. I call this the "fast-food" theory of education, because it provides the student with lots of proteins and carbohydrates (the first two skills), but not even traces of the vitamins and minerals that are needed for a balanced diet.

What Role Should the Computer Play? We come then to the third question: How can we best use the computer to teach our students the skills they need? My colleagues and I at the University of Maryland have devised some principles for integrating the computer into a reformed college-level physics curriculum.

The first principle is that the student must program the computer, not the other way round. We must have this if we are to develop independent and creative scientists—to avoid the Asimovian dystopia. Programming the computer rather than being programmed by it gives students the feeling of being in control. This is especially important for physicists, who are supposed to understand deeply the laws of nature that underlie all physical phenomena.

The second principle is that there should be no sacred cows. We can't simply accept the statement: "This is something that has to stay in the curriculum because it's always been there." We have to take our content back to zero and start from scratch.

The third principle is that we have to consider what we can do now that we couldn't do before. We shouldn't be satisfied with simply applying the computer to the same problems that we were doing without it. The computer frees us from many constraints, some of which we aren't

even aware of. We have to think about the new possibilities that the computer creates for us.

In M.U.P.P.E.T., we found that when we use the computer and apply these three principles to the calculus-based physics course we can introduce every one of the eight basic skills in the freshman year.

The Impact of the Computer on the Curriculum

When we analyze what we've done in M.U.P.P.E.T., we find that the changes in the curriculum can be classified into four categories: reordering, broadening, training intuition, and empowering the student.

Reordering. The ordering of the content in the physics curriculum—even within a single physics course—is currently tightly controlled by the mathematics that the student is expected to have had. This arises from the dominance of analytic methods, and it sometimes does violence to the physics. For example, the study of motion has traditionally begun with the study of uniformly accelerated motion—falling bodies. This is done in order to give the calculus course time to get through the concept of derivatives. Uniformly accelerated motion can be discussed by using algebra alone, without the need for derivatives. But that's not a sensible way to begin, because uniformly accelerated motion is a very peculiar and special case. A lot of the results that hold for that case are not generalizable. It also means that accelerated motion is described before force has been defined and before Newton's Laws of Motion have even been mentioned. Thus, it is both difficult and inappropriate to begin with the case of uniform acceleration and many students are confused by it.

A more appropriate starting point is to introduce the discrete form of Newton's Laws. This doesn't appear in the standard curriculum but it is needed when one solves for motion with a computer. It is simple enough to be included at the beginning of a first course, and it doesn't need the derivative concept directly. Uniformly accelerated motion can then be discussed as the special case it is. More sophisticated problems than those usually considered can also be done later in the course using the computer.

FIGURE 2 *Air-track experiment with the Tufts/TERC sonar position detector.*

Broadening. Our desire to broaden the content is a response to our feeling that there is too little of contemporary interest in the current physics curriculum. Most students taking an undergraduate major in physics will encounter very little that is less than 50 years old. Everything we teach now is "foundations." The basics are important, but unless we give our students some architectural overview, they won't have any idea what kind of building we're going to erect on those foundations. The computer allows us to introduce modern material at an early stage.

A topic that is related to both the order and the breadth of the curriculum is that of quantum mechanics. Most contemporary topics in physics rely on it, but its mathematical prerequisites are quite demanding, and so students do not usually study quantum mechanics until senior year or graduate school. If the computer is used in the freshman course for Newtonian mechanics as I've described above, it can then be used to solve the differential equations of quantum mechanics, allowing the subject to be introduced in the second semester of the freshman year. That in turn could unleash the rest of the curriculum.

Training Intuition. The development of a good physical intuition requires experience with a great many problems. The computer permits students to look at the solution of many problems in a short time, so it can be used to help them acquire intuition more quickly and reliably than they could otherwise. Of course, they must begin by solving the problems themselves, by hand, so they understand clearly what the computer is doing.

The computer can also be used in the laboratory to break down the incorrect "common sense" intuitions that students develop through their experiences with the world and replace them with a more scientific understanding. I will give an example of such a use shortly.

Empowering the Student. If students learn how to program the computer themselves, it can give them the power to undertake scientific activities far beyond those that are commonly found in introductory courses. In particular, we can seek out ways in which students can use the power of the computer to develop creativity, independence, and higher-order thinking skills at every educational level.

In my classes, every physics major must do an independent research project every semester. We try to provide an environment in which they can do that no matter what level of programming skills they have. If they have no knowledge of programming at all, we provide them with productivity tools that they can use to solve open-ended problems they formulate themselves. If they want to do some programming, we have utilities and sample programs that they can build on and modify. Some of our freshmen are better programmers than most of our graduate students. We have had students build a major program of their own from scratch.

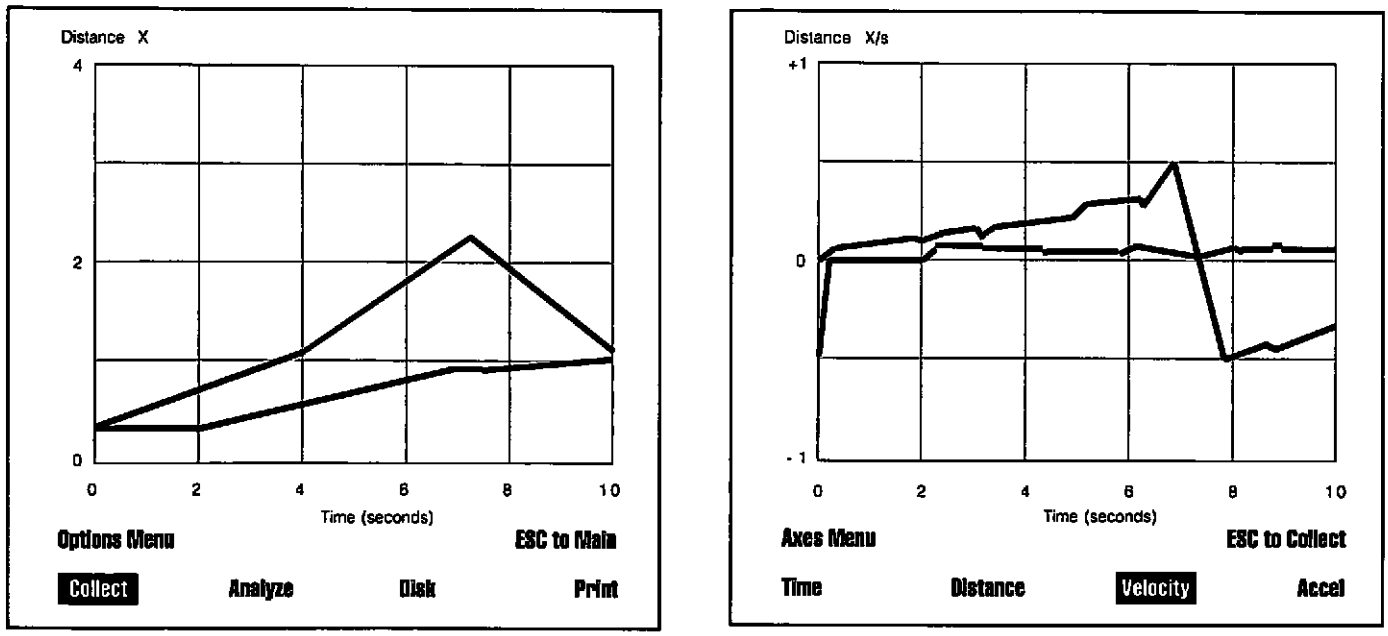


FIGURE 3 *Position and velocity of the cart as displayed by the detector on the screen of an Apple II (redrawn).*

THREE EXAMPLES

Let me now give some examples of innovative curriculum design using computers. In the first, the computer is used for immediate display of data, leading to changes in students' intuition of physical principles. In the second, the computer allows students to enlarge the class of physical models they can consider. The third example, which is not from physics, shows how students can be given an opportunity to deal constructively with a large and powerful data base.

1. A microcomputer-based laboratory. Helping students develop their physical intuition is one of the most difficult tasks that a physics teacher faces. Intuition is what lets the professional look at a problem and say, "I don't see the mistake, but that's got to be wrong." What we need to do is convert the concepts that we teach into an understanding of—a "feel" for—the structure and meaning of physical laws at a deep psychological level.

THE COMPUTER CAN BE USED TO HELP STUDENTS ACQUIRE INTUITION MORE QUICKLY AND RELIABLY THAN THEY COULD OTHERWISE.

What makes our task more difficult is that students often enter our classes with already well-formed but incorrect intuitions. One subject where this occurs is kinematics. The fundamental concepts of the theory of motion are position, velocity, and acceleration. Velocity and acceleration are relatively easy to define in mathematical terms, especially after a couple of weeks of calculus, but educational experiments have demonstrated that students, even honor students, have intuitions that are extremely strongly "position-dominated." As a result, they have a great deal of trouble developing an intuition for velocity and acceleration. They can usually draw a graph of the position of a moving object, but not of its velocity.

Robert Tinker at the Technical Education Research Center in Cambridge, Massachusetts, and Ronald Thornton at Tufts University have attacked this problem with a microcomputer-based laboratory experiment. They took a sonar detector, the sort found in autofocus cameras, and hooked it up to a computer. Then they wrote a program that allows students to use this device to observe an object and put a graph of its position, velocity, or acceleration up on the computer screen right away. Figure 2 shows a student applying the detector to an air track—a rail with a cart on it that blows air to levitate the cart slightly and thereby eliminate friction. The graph on the left side of Figure 3 shows the changing position of the cart as it slides down a slightly tilted track, bounces off a spring at the end, and slides back up part of the way. The graph on the right side of Figure 3 displays the successive velocities.

Another way the detector can be used is that the student's own body can serve as the moving object. The student sets up the detector to observe his or her own position and then walks back and forth. The computer shows a graph of the student's position and/or velocity on

the screen. The teacher can also have the student display a given velocity pattern on the screen and then try to move to match it. That turns out to be amazingly difficult. When I first tried to do it myself, I was astonished to see how position-dominated my intuition was even after 20 years of teaching physics.

Thornton has shown that students develop a better intuition by using this device than they do with the standard teaching methods. He gave students a series of qualitative questions that tested how well they understood the concept of velocity. The students first answered the questions after they had listened to the lectures, read the book, and done the homework assignments. On some of the most basic questions, 60 percent of the students still got them wrong. After two hours in the microcomputer laboratory, success rates on some of the questions improved by a factor of two or three (see Figure 4).

It is worth pointing out that two of the EDUCOM/NCRIPTAL software award winners this year are physics programs that concern the concept of velocity. One is David Trowbridge's *Graphs and Tracks*. This is also an intuition training program for the concept of velocity in which a student tries to match a graph of position, velocity, and acceleration with a ball rolling down a track. The other is Edwin Taylor's *Spacetime*, a more advanced program that permits the student to investigate how Einstein's special relativity changes the roles of space, time, velocity, and momentum. These are both excellent programs.

2. *Increased modeling power.* The case of air resistance. We all know the story of how Galileo is supposed to have dropped two objects of different mass from the top of the Leaning Tower of Pisa and observed that they both hit the ground at the same time. The story is probably apocryphal—most historians doubt that he really did it—but it is one of those stories that should be true, even if it isn't. It's easy to replicate Galileo's experiment in class, with, say, a wooden ball and a steel ball of the same size that differ in weight by a factor of ten. But we also know that there is more to the problem than that.

Suppose that, instead of a wooden ball, you used a styrofoam ball, which weighs only about one-fiftieth as much as a steel ball of the same size. If you dropped those two together from a height of, say, two meters, you would find that the steel ball hits first. (Actually, it's rather surprising how little difference there is, but try it with a crumpled-up piece of paper or a balloon instead of a styrofoam ball and the difference will be more noticeable.) Yet we tell our students that all objects fall with the same speed—always adding the qualifying phrase "ignoring air resistance."

Why should we ignore air resistance? Bringing it in has a number of advantages. First, it's really there, and the students know it's there, so including it allows us to consider more realistic problems. Second, it allows us to show how a powerful tool can be used to attack complex problems, the tool in this case being the numerical solution of differential equations with a computer. Third, using the computer gives us a chance to teach students something about approximations, and about the way in which one

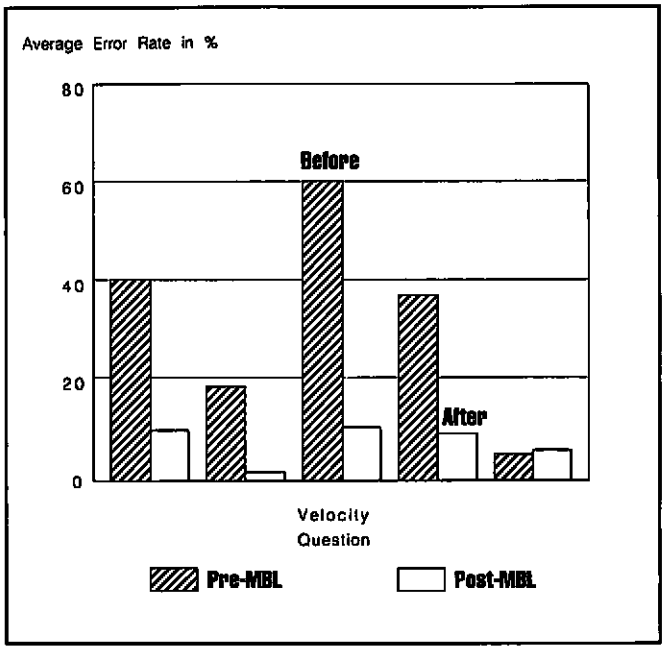


FIGURE 4 *Error rates on velocity intuition questions before and after using the sonar detector in the lab (from Thornton, with permission).*

extracts physics from computer output. Finally, considering this problem lets us show our students what it means to "think like a physicist."

One of our simple sample programs lets students solve the equations for the motion of an object under the influence of gravity and air resistance. It starts with a data-input screen for entering the parameters of the problem (Figure 5). There is a default set, so if the student just presses the "return" key, the program will plot the position and velocity of an object thrown straight up with a given speed in a vacuum (Figure 6A). Then the students can "add in" the air resistance by changing one number on the data screen. As they increase that number, the students find that the object doesn't go up as high, and the velocity curve becomes horizontal (Figure 6B). That is, after a while, the falling object falls at a constant speed (the terminal velocity), rather than continually increasing its speed as it would in a vacuum. And, we might point out to our students, that has some fortunate consequences. It is, for example, what allows sky-divers some time to maneuver. If they jumped out of an airplane at 16,000 feet and there were no air resistance, they'd hit the ground in 30 seconds.

But there are more important reasons for doing this problem than to show what it means for sky-divers. It lets us show students what physics is all about. If we are to include air resistance in our calculation, we have to have an equation for its force. The law for air resistance isn't in the standard textbooks, so we have to devise one. We can then talk with our students about how a physicist goes about inventing a force law.

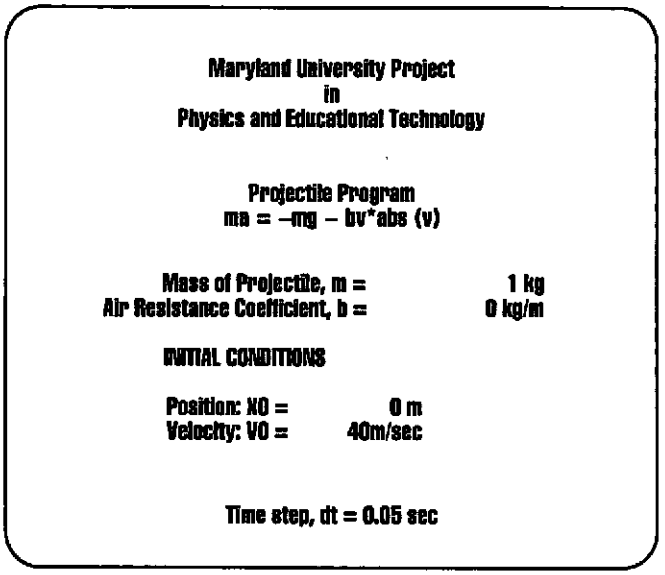


FIGURE 5 *Data screen from M.U.P.P.E.T. sample program Project 1.*

What are the parameters of the problem that the force of air resistance can depend on? We can assign numbers for the object's mass, position, velocity, and size. (Its shape will clearly be important too, since a flat sheet of paper and the same sheet crumpled into a ball will fall differently. For simplicity, we'll restrict our discussion to smooth spheres.) We know that gravity is operating; and since we are considering the force of air resistance, it stands to reason that the density of the air will be involved. Can we express the force of air resistance as a function of these six parameters, and if so, which ones?

It isn't physically plausible that air resistance depends on the position of the object (keeping everything else constant). The position of the object could be measured from the top of its fall or from the bottom. The number that describes the object's position would be different, but the force exerted on the object is not going to change just because the labeling scheme has been changed. So the force of air resistance can't depend on the object's position. (Another way to say this is that the air appears homogenous. There is no fixed point from which the force appears to come.) The force of air resistance doesn't depend directly on gravity, either, because air resistance, which is the same force we feel from a wind, is measured as the same whether it is felt horizontally or vertically. We know air resistance can be felt horizontally since that's what lets us sail on a sailboat. So gravity doesn't directly affect the force of air resistance (though of course it has to be included as a separate force and indirectly controls the density of the air).

The mass of the object cannot be relevant either. To see this, suppose I put myself in the place of the object. What force does a blowing wind exert on me? If a gale wind is blowing in my face, it is going to feel the same whether or not I have lead shoes on. My response to the wind may be different, because lead shoes could keep me from being blown away, but that won't change the force of the wind.

We are left with only three quantities: the size of the object, its velocity, and the density of the air. How will the force depend on these quantities? To determine this, we consider what kind of quantities these objects are in terms of what kinds of measurements we make to determine them. Our three basic kinds of measurements are mass (M), length (L), and time (T). A velocity, for example, is a length divided by a time (L/T). What matters is not what particular scales we use (e.g., meters or feet), but what kinds of measurements are involved (e.g., mass vs. time). Our three quantities must be combined to give a quantity of type ML/T2 — a force. A little algebra will show that the only way to combine a velocity (type L/T), an area (type L^2), and a density (type M/L^3) to get a force (type ML/T^2) is to take area times density times the square of the velocity. Since we haven't actually calculated the force, there may be a constant in there, too—a pi, or the square root of two, or something of that kind. So the force of air resistance can be expressed as $F = CDAv^2$, where C is some constant the value of which will have to be determined by doing experiments. (See Figure 7.) This is the only combination of the parameters we've chosen that will give us the right kind of quantity. We've invented a force law, and we find the law works very well, for the most part.

But if we extend our measurement to cover a wide range of velocities, it turns out something very interesting happens. The equation doesn't always hold. At low velocities, the air resistance seems to depend not on v^2 but just on one power of v—a linear law, not a quadratic one. This is serious because we used all the different measurements that were obvious to us and found that the only possibility we could have with these parameters was the v^2 result. What's going on? What this failure means to a physicist is that there must be some hidden scale—some parameter that depends on measurements that we can't easily see.

The "linear law" was discovered in about 1850 by George Gabriel Stokes. A while later, James Clerk Maxwell, of electromagnetism fame, became interested in the problem. He was developing some of the first molecular models. At that time, about 1860, molecules had been proposed but not entirely accepted. Maxwell showed that his molecular model predicted Stokes's linear law. But at the same time, the model gave a very counterintuitive result. The model predicted that the force of air resistance should be independent of the density of the air. How could that be? If the density of the air—the amount of air we had—

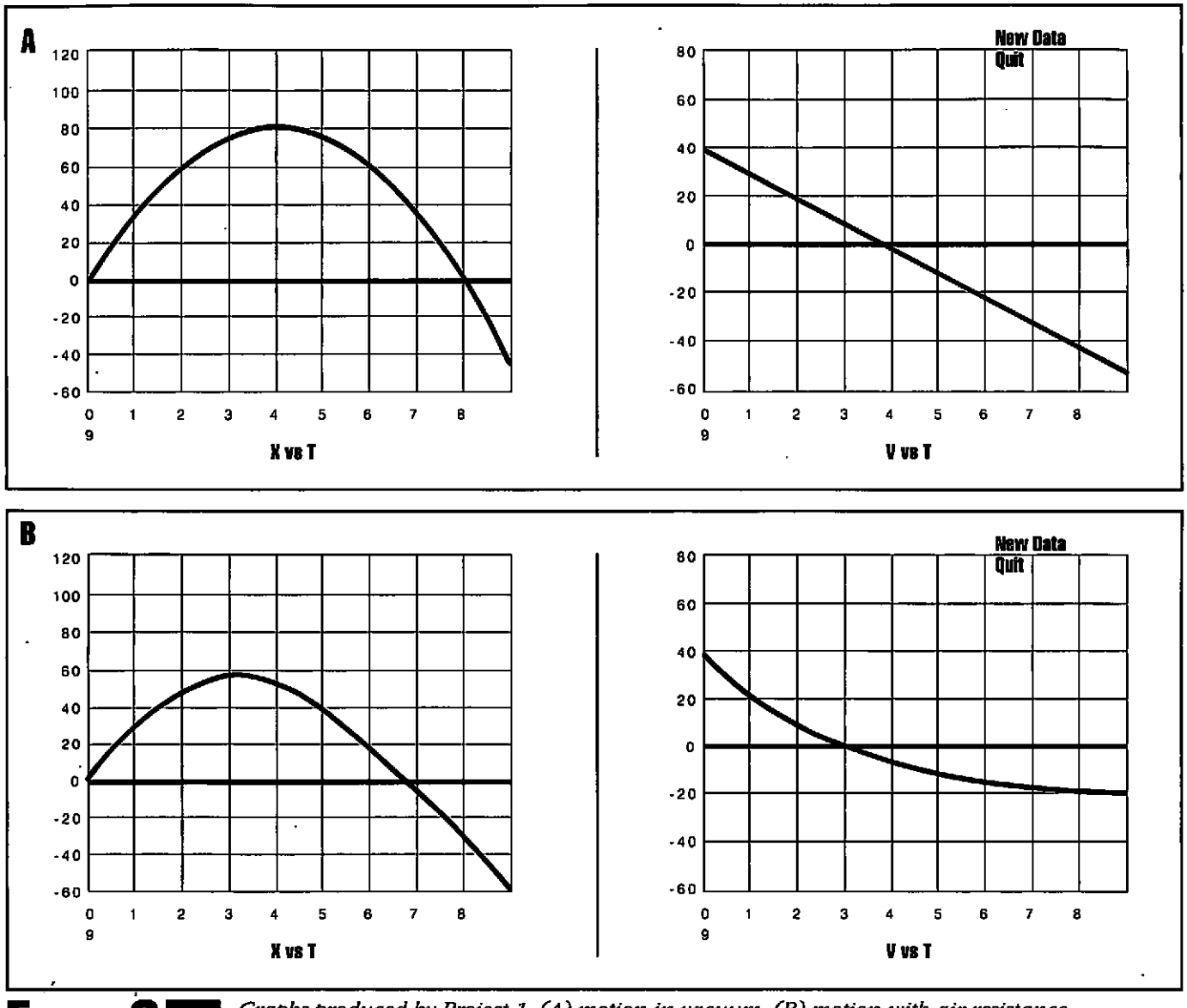


FIGURE 6 *Graphs produced by Project 1. (A) motion in vacuum; (B) motion with air resistance.*

were to go to zero, for example, there wouldn't be any air so there couldn't be any force of air resistance at all. Maxwell's model predicts a force of air resistance even in a vacuum! Nevertheless, when Maxwell performed experiments to test his model's prediction, he found that it worked. The density independence really held. What was happening was that at very low values of density, Maxwell's method of calculation broke down, so that he couldn't describe the approach to zero density. However, at low velocities the force of air resistance is in fact independent of density over a wide range of densities.

Surprisingly, then, the study of falling objects reveals something about the existence of molecules and about the distance molecules travel between collisions (for that is what the hidden parameter turned out to be). The density independence in Maxwell's prediction is really striking; nobody would have predicted it. Until Einstein's 1905 paper on Brownian motion, these and other findings by Maxwell were the most compelling proofs that molecules existed.

This is an example of how some real physics thinking can be built on the study of so mundane a phenomenon as air resistance. Note that the most interesting part of the analysis could have been done without the computer. But it was the work with the computer that stimulated us to think about the problem. Furthermore, although the force law of air resistance can be derived and discussed without the computer, at the introductory level students can't solve problems including air resistance without the help of a computer. If the discussion is coordinated with the use of the computer, we can help our students develop many important skills. It makes a coherent pedagogical package.

3. *Access to a large database.* The third example of innovative curriculum design using computers is another EDUCOM award winner, *The Great American History Machine*, developed by David Miller and his colleagues at Carnegie Mellon University. This is a program that lets students work with a vast amount of information on American history, including national election results by county back to about 1840, census data, railroads, topography, etc. With this program, students in a first-year history course can begin to develop the skills that are important for professional historians. Here is an example of the kind of questions that can be posed to students:

> In 1856 Millard Fillmore ran for President on the ticket of the American or Know-Nothing Party, which made a nativist appeal to the electorate stressing the dangers from immigrants. Examine the geographic distribution of Fillmore's vote. Were the Know-Nothing voters people who had been exposed to immigrants and didn't like them, or were they people isolated from immigrants who had perhaps heard that they were strange, or was there some other reason altogether?

What a terrific question for introductory-history students! It encourages them to formulate hypotheses and test them with real-life data. This strikes me as a case in which a field is having its standard of proof modified by technology and modified in such a way that even a beginning student can consider questions that a decade ago might have taken years of professional effort.

To conclude, the computer is clearly beginning to have a powerful impact on the way we can teach at the college level. But the most important aspect of bringing the computer in is not the computer itself. It is in our rethinking what the field means and what our students need to know. It is in the fact that the computer lets us include some exciting contemporary, maybe even unsolved problems. It is in the fact that the computer can help us take our students over cognitive roadblocks that they previously faced alone. And it is in the fact that the computer can help us find ways to instill more students with the creativity, intuition, and independence of thought to enable the future.

Construction of the force law for air resistance

Quantity	Symbol	Unit	Plausible?
position	x	L	no
velocity	v	L/T	yes
mass	m	M	no
face area	A	L^2	yes
gravity	g	L/T^2	no
air density	D	M/L^3	yes

from the plausible quantities we have to combine them to contruct an expression with the units of force

force	F	ML/T^2

the only way we can do this using only the plausible quantities is

$$F = CDAv^2$$

where C is a constant that has no units.

FIGURE 7 *Constructing a force law for air resistance using the parameters of the falling body problems. The kinds of units (mass = M, length = L, time = T) are indicated.*

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ACADEMIC COMPUTING: CHALLENGES OF THE 1990s

ACTING PRESIDENT AND FORMER MATH DEPARTMENT CHAIR AT THE UNIVERSITY OF MARYLAND PROVIDES A DUAL PERSPECTIVE ON COMPUTING IN THE ACADEMIC ENVIRONMENT.

By William E. Kirwan

The computing revolution in higher education forces many of us to wear two hats. In my case, one is as a mathematician who, on occasion, uses the computer in the classroom, and the other is as an administrator at a major research university who has become hooked on electronic mail as an essential communication and management tool.

For now, my observations about computing in higher education will be restricted to two issues that concern me a great deal: first, some of the major problems facing universities as we move to fully integrate the computer into our research and teaching programs; and second, how government, universities, and industry should work together to ensure that, as a nation, we maintain a position of leadership in computing and related disciplines.

I preface my remarks with a disclaimer. Because I have no special expertise in computing, my observations are from the perspective of a vitally interested administrator rather than those of a highly knowledgeable expert. In making this disclaimer, I am reminded of a story told about H. L. Mencken, the great Baltimore journalist and social commentator. At the famous 1924 Democratic Presidential Convention, it took 102 ballots to nominate a president. After the 101st ballot, Mencken sat down at his typewriter and sent off the following story to the *Baltimore Sun*: "Everything is uncertain in this convention but one thing: John W. Davis will never be nominated." A few seconds after he filed the story, he learned Davis had been nominated. Mencken was stunned, but quickly recovered and said, "I wonder if those idiots on the copy desk in Baltimore will have enough sense to strike out the negative."

Part educator, part administrator, and full-time computer user, William E. Kirwan is acting president of the University of Maryland, College Park. Former vice president for academic affairs and provost, he has also served as chair of the mathematics department.

CAN WE FIND INCREASES IN CAPABILITY WITHIN AN EVOLUTIONARY HARDWARE DEVELOPMENT STRATEGY?

There can be little doubt that the computer is the greatest instructional and research tool to come into education since the invention of the printing press. On my own campus, examples of highly creative uses of computing abound. Let me cite two. We are the host institution for an academic program, ICONS, that is based on an international diplomacy simulation. Through a network managed and developed by College Park, we are connected to universities in 20 locations around the world. Students at each university play the role of diplomats of a particular country. Political science students at one university send messages to students at other institutions, responding to political scenarios that the State Department has helped to prepare. The messages must be sent in the appropriate foreign language, and the incoming and outgoing texts are translated by students studying that particular language. The language students must be sensitive to all the subtleties and shadings of diplomatic language, often purposely ambiguous. This interaction affords a remarkable learning experience for our students. It would not be possible without computers and sophisticated networks.

My second example involves a collaborative research project between the University of California–Berkeley, the University of Illinois, and University of Maryland, College Park. These three institutions have created the Berkeley-Illinois-Maryland Array, or BIMA for short. It is the radio telescope of the future now being built in a place called Hat Creek, California. There are three radio telescopes presently in the array, and three more are under construction. When completed, this telescope will not only gather data 10 times faster, and do image analysis five times faster than it does now, but using computer technology and a sophisticated communication network, we in College Park will be able to operate the telescope as if it were right outside the front door of our Astronomy Department.

It is clear that because of the computer we are at the dawn of an era of incredible innovation and advance in higher education. But we can already see that formidable obstacles stand in the way of the full realization of this opportunity. And these obstacles may be very difficult and expensive to overcome.

Who among us fully anticipated the costs associated with distributing workstations around the campus? At College Park we estimate that each workstation carries with it an "overhead" cost that is more than two times the cost of the computer hardware. And that assumes we have the space for the computer. However, I suspect that for many universities, including my own, space, not overhead costs, will be the largest single impediment to creating a rich workstation environment. At College Park, our goal is to have one workstation for every 10 to 20 students and one for every faculty member. This will require at least 170,000 square feet of space dedicated to workstations. At current construction costs, this space is valued at $25 million. Of course, some of that space already exists on campus but not nearly enough. To overcome this deficiency we have added a new category of space to our building programs—computer labs. I urge all of you who have not done so to do the same. Our only chance of overcoming the space problem is to plan for networked computer labs in all new buildings and in existing facilities as they undergo major renovations.

Another problem we face is workstation replacement costs. The industry seems to be on a two- to three-year replacement cycle. Should we try to influence industry to change this to a four- to six-year cycle and reserve system replacement for truly major changes in computer capability such as the introduction of the NeXT Computer, the change from the IBM PC to the PS2, or from the Macintosh Plus to the Macintosh II? Can we, working together with industry, find ways of providing revolutionary increases in capability within an evolutionary hardware development strategy? Only through partnerships and cooperation with industry can we maintain state-of-the-art technology, while, on the one hand, technology changes and, on the other, our budgets remain relatively constant.

Related to this issue is the problem of connectivity and compatibility. It is sometimes easier to send electronic mail messages to someone in Europe than to someone down the hall. Until recently, whenever I wanted to send a message to the Vice President for Administrative Affairs in an office 100 yards from mine, the message had to go via New York City. Clearly, we have not spent enough time thinking about the ease of use and the compatibility of networking systems. Is industry really helping us resolve this issue? Are we organized properly within our own institutions to deal with this problem? I think the answer to both questions is a resounding *No*. Can EDUCOM help to bring some rationality to this subject? I urge EDUCOM to take on this issue—connectivity and compatibility—as a subject for study.

As a final example of problems we face, let me say a word for the frustrated faculty member who wants to participate in the exciting computer revolution but finds it

too difficult to get started. Quite naturally, software and user manuals are written by people for whom computing is second nature. Believe me, "user friendly" is a relative term. In my view we have not been sufficiently sensitive to the difficulty many highly intelligent people have in learning to use a computer or a network. The situation reminds me of a story about the brilliant mathematician Norbert Weiner. One day Weiner walked into class and a student asked a rather profound question. Weiner went to the board, wrote a few things down and erased them. He began to pace back and forth. He took off his coat. Sweat popped out of his brow. He then went to the back of the room and stared out the window for 20 minutes. Finally, just before the class ended, he leapt to his feet and exclaimed, "Ah, the solution is trivial!" My point is that what seems trivial to some can be inordinately complex to others. Experts should not decide what is "user friendly." If universities are going to take full advantage of this marvelous technology, we must invest more resources in interfaces and support mechanisms that will enable virtually everyone to participate.

Let us turn briefly to the issue of partnerships among government, universities, and industry. Fortunately, these three sectors share common interests. Each wants the United States to maintain a position of world leadership in science and technology. So there is reason for cooperation. Unfortunately, each is subject to competing forces. By its very nature, government must be sensitive to the shifting tides of public opinion and political influence. Universities must carry the torch for basic research, which requires long-term, stable funding. Industry must respond to pressure for profits. Can we find ways for these three sectors to work cooperatively toward their common goals, while respecting their individual needs? I think the answer to this question is *Yes*, but I believe it will require a much better understanding of each sector's needs. EDUCOM can and should assume leadership in promoting greater dialogue among industry, universities, and the federal government.

Let me cite two examples of what I believe are models of cooperation between sectors—models I believe we should try to replicate.

The first concerns the National Science Foundation's Engineering Research Center Program. Under Eric Bloch's leadership, the National Science Foundation established in 1986 this major new program aimed at forging stronger ties and collaboration between research universities and high technology industry. In this program, NSF provides significant multi-year funding to selected institutions in support of basic and applied research directed at areas of interest to technology-related industries. Incentives are built into the program to encourage support from industry.

The College Park campus is fortunate to have one of these centers. Not only has our center enabled us to recruit high quality faculty and graduate students, but also the industrial support is impressive. The private commitment is approaching $3 million and growing. Within this one program, the federal government is backing basic and applied research in an area of national need with strong industrial support.

My second example is the innovative programs introduced by IBM and Apple. A few years ago IBM invested $150 million of equipment, over a five-year period, in selected academic institutions for the purpose of helping those institutions, and higher education generally, begin the process of integrating the computer into the curriculum. IBM's only expectation was that funded projects be of high quality and show promise of true innovation.

Through this program, IBM provided great assistance to higher education. The resulting curriculum innovations have extended far beyond the original participating institutions. In addition to enhancing the quality of education, IBM has undoubtedly benefited from the greater use of computers nationwide.

In a similar vein, Apple formed a consortium of institutions to which it provides significant price discounts in return for long-term and mutually beneficial relationships on software development. As a result of this program, Apple is helping universities provide computers to students at low cost. In return, Apple is benefiting from software development and from the large number of students who are learning their computing on Apple equipment.

It seems to me that these examples embody a theme that we should nurture—education, government, and industry working together to build excellence. In a very real sense, the future well-being of our country depends upon our ability to discover new and creative ways for these three sectors to forge even stronger competitive links. ■

SHOULD WE CHANGE TO A FOUR- TO SIX-YEAR REPLACEMENT CYCLE AND RESERVE SYSTEM REPLACEMENT FOR TRULY MAJOR CHANGES IN COMPUTER CAPABILITY?

BEYOND CORNELL NATIONAL

CORNELL'S NATIONAL SUPERCOMPUTING FACILITY SUPPORTS MORE THAN 1700 RESEARCHERS FROM 115 INSTITUTIONS IN 40 STATES—AND UNDERGRADUATES, TOO.

By Lawrence A. Lee

The vision of one man—Ken Wilson—propelled Cornell into the supercomputing arena. While pursuing the research that would win him a Nobel Prize in physics, Ken recognized the growing importance of computational science in research as a natural bridge between experimental and theoretical science. He also recognized that forging this link would require rapid technological advance and widespread access for researchers across the nation.

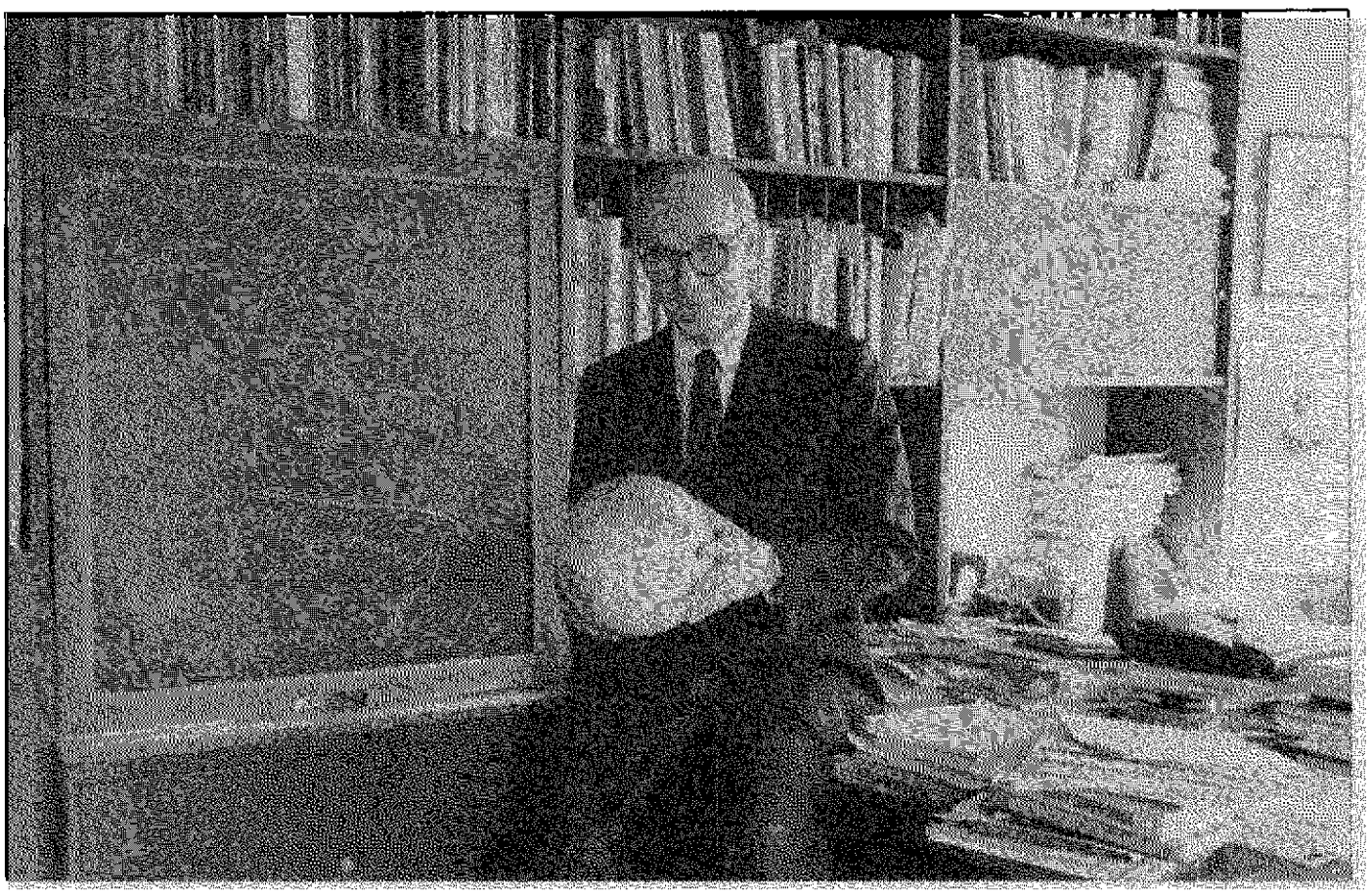
Ken established the Center for Theory and Simulation in Science and Engineering as a place where scientists and developers could learn from each other the most efficient use of current technology, and point the way to future refinements. In 1984, he sought National Science Foundation (NSF) funds for the center, and in 1985 the program was funded as one of NSF's five National Centers for Advanced Scientific Research.

Today, the Theory Center serves as the parent organization for a number of programs that support efficient use of the most powerful computational resources, while encouraging development of the next generations of supercomputing tools and technology (see Figure 1).

- The Advanced Computing and Networking project studies the development of massively parallel computing systems and supports communication links to our national user community.
- The Scientific and Algorithmic Research project supports interdisciplinary research groups working on the "grand challenges" of computational science, problems that will require major advances in supercomputing technology.
- Visualization Research develops advanced graphics techniques to assist in the analysis of complex data and make the results more meaningful to non-experts.
- The Cornell National Supercomputer Facility (CNSF),

As director of the Cornell National Supercomputer Facility, Lawrence A. Lee is responsible for overall planning and management of the Cornell Theory Center's primary supercomputing resource. He came to the Center from the National Science Foundation, where he was program director for Centers in the Office of Advanced Scientific Computing, and involved in setting up the NSF supercomputing initiative that established the five national advanced scientific computing centers.

MEGAFLOPS: THE SUPERCOMPUTER FACILITY



Utilizing CNSF, Nobel laureate Lawrence Klein of the University of Pennsylvania developed the LINK system to project economic scenarios such as a U.S. proposal for debt relief in developing countries.

my organization, is the primary supercomputer resource of the Theory Center. It is the only one of the five NSF supercomputer sites to provide production parallel supercomputing.

Also included under the Theory Center umbrella is the Corporate Research Institute (CRI). It provides an environment where corporations can sample leading-edge supercomputing technology and promotes collaboration between corporate and academic researchers.

CNSF is truly a national resource. We support more than 1,700 researchers from 115 institutions in 40 states. More than 60 percent of our scientific projects come from researchers not located at Cornell. Any researcher can have access to our facility. Small allocations are available on request; larger ones are granted after a peer review by the Theory Center's National Allocation Committee.

CNSF has a six-part mission:

- to advance computational research by providing access to supercomputer tools, both hardware and software;
- to provide training to attract, educate, and advance these users in effective employment of these tools;
- to influence education by incorporating supercomputer techniques into the graduate and undergraduate curricula;

- to nourish interdisciplinary research;
- to foster the exchange of knowledge among academic, corporate, and government organizations; and
- to work as partners with the computer industry to achieve technological advances.

The last point has been important since the beginning. We realized that meeting our other goals would require major advances in tools and technology, as well as a

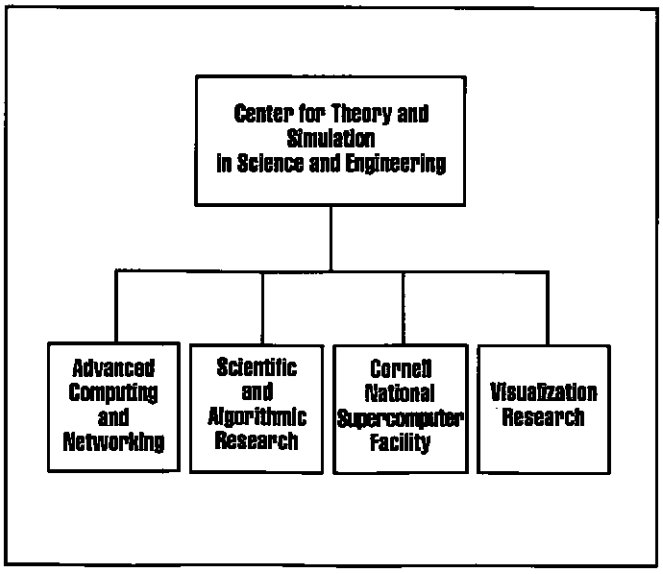


FIGURE 1 *Theory center organization chart.*

significant reduction in computational cost. This was beyond the resources of a single organization, even a major research university with NSF support. Cornell, therefore, teamed up with a leading industrial partner: IBM.

Partnership With IBM

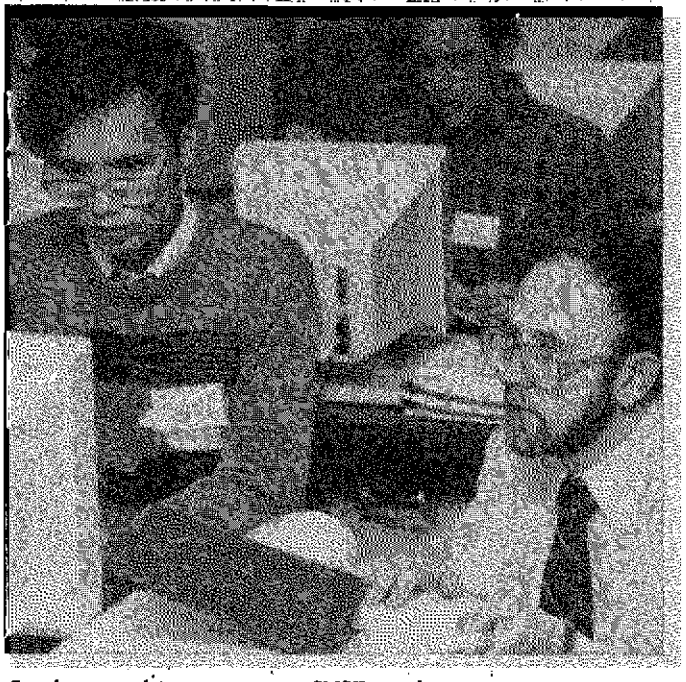
To those familiar with the other NSF supercomputer sites, our decision to work with IBM might have come as a surprise. Cray and Control Data, the suppliers for the other centers, have built reputations by specializing in high-performance scientific computation, while IBM's capabilities in the field have been overshadowed by its success in general-purpose computing. Nevertheless, Ken perceived that supercomputer development in this country would be enhanced by a greater commitment from IBM; fortunately, IBM already was planning an increased emphasis in the field.

The partnership offers benefits to each side. With IBM, we are working with an organization that is extremely responsive to user needs. There is an IBM team on campus, whose six members work as an integral part of the CNSF staff; they provide quick answers to our questions. The breadth and popularity of IBM's product line also is a plus, because compatibility across a wide range of machines gives us access to software developed on smaller processors. IBM, meanwhile, receives feedback from our broad, sophisticated user group which provides IBM development personnel with new insights into problems and potential solutions. They also gain a valuable testing ground.

More specifically, the partnership is an excellent match, because we share a strategic vision of supercomputer development. In the IBM 3090 Model 600E, CNSF has a machine that supports very large-scale computations using a combination of supercomputer techniques: parallel processing, vectorization, and virtual memory. These three factors are essential for many current projects, and we believe the evolution of these techniques will be crucial to meeting future challenges.

Our reasons for believing this have to do with the very nature of current computer architecture. Most computers—from desktops to mainframes—use a single processor. The speed and power of the design depend on the ability of the system to push data and applications through the processor, "single-file" as it were. While there have been major advances in the speed of single processors, it seems that further increases will become progressively harder to achieve.

In contrast, parallel computers function more like the human brain. Large-scale problems are divided into their components, each component being assigned to a separate processor. In this way performance on a single scientific application can be increased dramatically. In tests on the six-processor IBM 3090-600E at CNSF, we have achieved maximum speedups of more than 500 percent in the execution of various user codes.



Student and instructor at CNSF workstation.

MILLIONS OF FLOATING POINT OPERATIONS PER SECOND (MEGAFLOPS) ARE NECESSARY, BUT NOT SUFFICIENT, FOR A FULL SERVICE SUPERCOMPUPUTING CENTER

Some of the most pressing challenges to parallelism depend on software rather than hardware improvements. Most of our best computing tools, including advanced scientific languages and codes, are optimized for single-processor machines, and must be adapted. Also, methods must be found to design codes and problems in such a way that the component sections are truly independent; if the solution to one section is delayed waiting for the solution to another, the benefits of parallel processing will not be realized.

Working with IBM, our staff helped to define extensions of FORTRAN for the parallel environment. IBM then provided a prototype version of Parallel FORTRAN, now an IBM product for the 3090, to CNSF users nearly a year before the product was officially released; IBM has described this year of usage as critical to final development of the product. Parallel FORTRAN gives researchers a familiar environment for development of parallel software. It allows users to define parallel tasks and also features a compiler that automatically detects loops that can be parallelized and then compiles them.

We also have worked with Professor Kenneth Kennedy of Rice University as he developed PTOOL and other software analysis programs. PTOOL is particularly helpful to CNSF users, because it helps analyze their codes to find constructs that prevent parallelism.

As part of our preparation for the future, CNSF recently acquired a second IBM 3090-600E. The two 3090s will be connected by a high-speed link, giving us the ability to explore parallelism across all 12 processors; we are working very closely with IBM to assure that the coupled system will be an extension of the six-processor parallel FORTRAN approach, allowing us to move forward without retraining our users.

We also anticipate working very closely with Steve Chen, formerly of Cray Research, and his new organization, Supercomputer Systems Inc. SSI, with assistance from IBM, is concentrating on the development of a 64-processor parallel machine. We intend to be a partner in the development of this machine, helping to ensure a computing environment that permits the use of equipment from both SSI and IBM as a sophisticated resource. This will entail joint studies with both firms as the technology develops.

While parallelism is useful in many applications, some can also take advantage of another technique: vectorization. Each processor in CNSF's 3090 has a vector facility, similar to a coprocessor, that can manipulate as many as 128 vector elements at a time. Our staff has assisted many researchers in expressing their applications in terms of vectorizable calculations, permitting performance improvements of 300 percent or greater with this technique. The vector facilities at CNSF now receive extensive use, and the staff continues to identify researchers who could benefit from vectorization but have yet to employ it.

The virtual memory system of the 3090 also has proven extremely valuable to a number of researchers. Virtual memory is a technique for expanding the address space available beyond the limits of real memory for a user's codes and data. On a typical supercomputer system, if a program's size exceeds the available real memory, the researcher must shuttle individual program sections in and out, a difficult and time-consuming process. The 3090's virtual memory accomplishes this automatically, in a way that is completely transparent to the user, swapping codes and data between vast main memory, solid-state expanded storage, and disk as necessary.

Each application running on the 3090-600E with VM/XA has access to 125 megawords (a full gigabyte) of virtual memory. In contrast, the Cray X-MP 48 has a total of 8 megawords (64 megabytes) of memory, which must be divided into address spaces for all users. Typically, one or two major projects claim 50 percent of that, leaving other projects to share the remaining 50 percent. Total address space can be critical to many intensive scientific applications; for example, researchers using our 3090 for plasma physics applications were able to expand their simulations to three dimensions without significant recoding because of the virtual memory system.

Beyond these three techniques, we have expanded the activities of our visualization group. Visualization is a new and important aspect of supercomputing, one that is undergoing rapid change. The technology involves high-resolution color graphics, animation, and advanced workstations. Our goal is to integrate visualization, workstations, and supercomputer into a single interactive system. A scientist could sit at his familiar workstation, send his problem to the supercomputer for solution, then see the results displayed graphically in near real time.

An increasing number of researchers are taking advantage of visualization as a means of analyzing complex data. These techniques are being used in studies as diverse as simulations of the pacemaker region of the heart, the motion of plasma in magnetic fields, and the collapse of stars into black holes. We anticipate that the same techniques will make the results accessible to other scientists and the public at large in a meaningful form.

Research, Education, and Training

One of the major purposes of all of the advanced computing capability is realized through our Strategic User Program. CNSF reserves up to 50 percent of 3090-600E resources for projects with the potential for significant, near-term scientific progress. The researchers, who are selected after rigorous peer review by the Theory Center's Allocation Committee, are aided by staff consultants in both application and performance analysis.

We are very proud of the research that has been conducted using CNSF's supercomputer resources, both within and without the Strategic User Program. Dr. Lawrence Klein, Nobel Prize-winning economist from the University of Pennsylvania, used the system to build a global econometric model that has since been utilized by agencies of the United Nations. Dr. Alexander Wolszczan and colleagues discovered an unusual pulsar from analysis of data that had exceeded the capability of their computers at the Arecibo radiotelescope center in Puerto Rico. In all, research supported by CNSF has led to more than 600 publications in refereed journals in just three years.

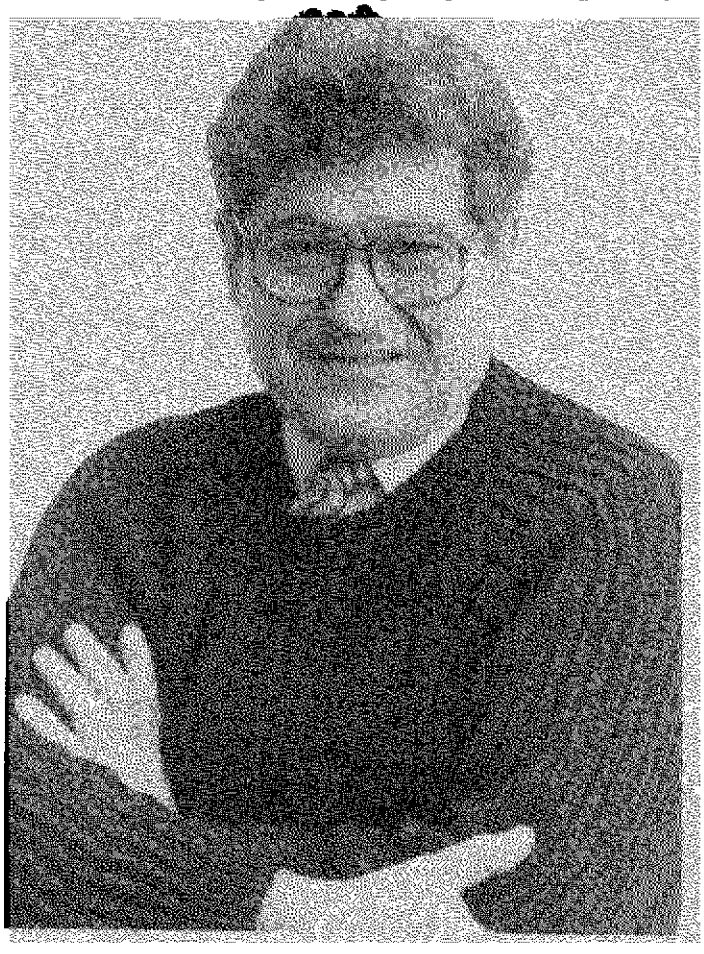
There has been an unexpected benefit to the interdisciplinary nature of these projects. As experts from various fields discussed their work, they found that techniques developed for solving one set of problems often were useful in research that seemed unrelated. For example, some of the algorithms used in the simulation of black holes proved applicable to long-term meteorological forecasting, plasma fusion studies, and aeronautical design.[1] This kind of breakthrough, reaching across many disciplines, is exactly the sort of result we intend to continue fostering here.

We believe these benefits will expand as supercomputer techniques make more of an impact in the undergraduate curriculum. To that end, we ran a Research Experiences for Undergraduate/Undergraduate Faculty Enhancement Program in the summer of 1988. Promising undergraduates and their faculty advisers were brought to campus and given time on the 3090 in order to pursue independent research projects. When they returned to their home institutions for the 1988–89 academic year, they used remote access to CNSF to continue the research, for which they will receive academic credit.

During the first two weeks of the program, the students were given specialized instruction on topics ranging from numerical analysis to supercomputing programming techniques. For the final two weeks, the academic advisers joined the students in residence for additional training. The program proved very successful: the NSF has agreed to provide funding for another summer session in 1989, and one student's project was accepted for publication in a refereed journal. While it is impractical to look for that level of achievement with every project, we do anticipate that this program will have an increasing impact as it continues.

Of course, these advanced tools will have no impact on education or research if they cannot be used efficiently. This was one of the conclusions of the Lax Report,[2] the impetus behind the establishment of NSF's five supercomputer facilities. More recently, the Raveché Report reinforced the point. It is worth quoting at some length:

"Effective use of advanced computers requires mastery of fundamental computational principles. . . . Regrettably,



Cornell Theory Center's new Director, Malvin H. Kalos, is committed to a strong emphasis on parallelism.

ENCOURAGING THE USE OF SUPERCOMPUTING IN THE UNDERGRADUATE CURRICULUM MAY BE A QUESTION OF EDUCATING THE EDUCATORS FIRST.

of the four recommendations of the Lax Report. Little progress, however, has been made."[3]

We are in complete agreement that training and support are crucial to the effective use of supercomputing technology. We have made major commitments in those areas, emphasizing computational methods, algorithm design, and numerical analysis, all of which are necessary to fully exploit the machine. Our programs support the full spectrum of students and researchers, from novices to strategic users. We are gratified that users and the NSF have been so complimentary about our training and support.

In order to provide these services, we have established an innovative program of naming Cornell postdoctoral researchers as Computational Research Associates (CRAs). The CRAs spend 50 percent of their time in their departments, pursuing their own research on the 3090 and teaching. The other 50 percent of their time is spent consulting for CNSF. The CRAs serve as liaisons between CNSF and their disciplines, letting their research peers know about supercomputing tools and techniques, and keeping us informed about the needs and concerns of the user communities. This program has been very well received.

We also have several outreach programs designed to promote remote use of CNSF. The Smart Node program, for example, currently includes 55 of the 115 universities across the country that have researchers using CNSF. We provide a week of intensive training for an on-site consultant named by the Smart Node university. This effectively extends the reach of our training, as these consultants can then train scientists and engineers on their home campuses. Each Smart Node institution also receives an allocation of CNSF time for startup, training, and education. Faculty representatives from the member schools become part of an advisory committee that meets at Cornell several times a year to recommend proposed directions for CNSF.

For users who need further training, or who are from universities not part of the Smart Node consortium, we offer training sessions on the Cornell campus. These workshops range from introductory courses to discipline-specific sessions, emphasizing hands-on lab work after the lectures to reinforce the ideas. Trainers are constantly available to provide help, and the labs are open at night for those who want to do more work.

Every year since 1986, CNSF has hosted a two- or three-week NSF Summer Institute. Twenty-five researchers, mainly, but not exclusively, graduate students, attend each year for training and use of CNSF. The Institute emphasizes the unique resources of CNSF—parallelism, vectorization, visualization—and permits the attendees to work on their own scientific projects. After the Institute, the researchers are encouraged to continue their work via remote access to CNSF.

Over the next five years, we will be working more closely with the Corporate Research Institute to involve more corporations in our work. This collaboration will help advance our efforts to find ways to transfer supercomputing expertise to the private sector. Strategically, this will serve the NSF goal of improving national competitiveness by making leading-edge computational technology available to U.S. corporations. In addition, we see CRI as a method of getting industry to make a commitment to scientific enterprise, encouraging interaction and collaborative interdisciplinary research among university and corporate scientists and engineers.

As our user community acquires increasing sophistication, we plan to continue to redirect our training. We'll be spending less time on "how to," and more time on considering topics of wider significance. Workshops might center on specific themes, such as computational methods for solving certain classes of partial differential equations, and would offer new ways of looking at a problem. There would be keynote speakers from industry and academia, talking about the state of the art in computational technology, and where the bottlenecks are. There would be, in short, a chance to consider direction as well as technique.

Encouraging the use of supercomputer techniques in the undergraduate curriculum may turn out to be a question of educating the educators first. We have found that the students are often well aware of what is possible, and are anxious for changes. We have to point out the possibilities to faculty by illustrating that there is nothing on the horizon likely to have a greater impact on curriculum development.

Finally, we think there will be value in introducing high school teachers to the supercomputer environment. The earlier students can be made comfortable using these tools and techniques, the farther they will be able to advance them in the future.

Future Prospects

An important step will involve connecting a greater number of UNIX-based workstations to the supercomputer resource. This will permit moving away from text-based tutorials to the realm of advanced graphics. By the mid-1990s these workstations might be our next-generation textbooks, where students can read text, then solve a complex problem in real time, taking advantage of three-dimensional, animated graphics. At Cornell, this approach is receiving support from the Dean of Engineering, and we are working with his staff to help it along.

UNIX is a key part of our future plans, reflecting another NSF goal. Already familiar to many scientists, UNIX has the potential to provide a uniform operating environment—a single system image—across the full range of processors, from workstations to supercomputers. This would offer researchers control of the supercomputer from a comfortable environment with good graphics, freeing users to concentrate on their work rather than on mastering new operating systems.

We have been working with IBM for several years now on requirements for UNIX, and we are confident that IBM's AIX/370 will be a UNIX for supercomputing. We expect to work together with IBM to evaluate and enhance AIX/370 in 1989.

Our efforts already have included a joint project with IBM, Wavefront Technologies, and Silicon Graphics on an exploratory port of the Wavefront rendering package to AIX/370. You may have seen members of our visualization group demonstrating the package at UNIX EXPO in November, 1988.

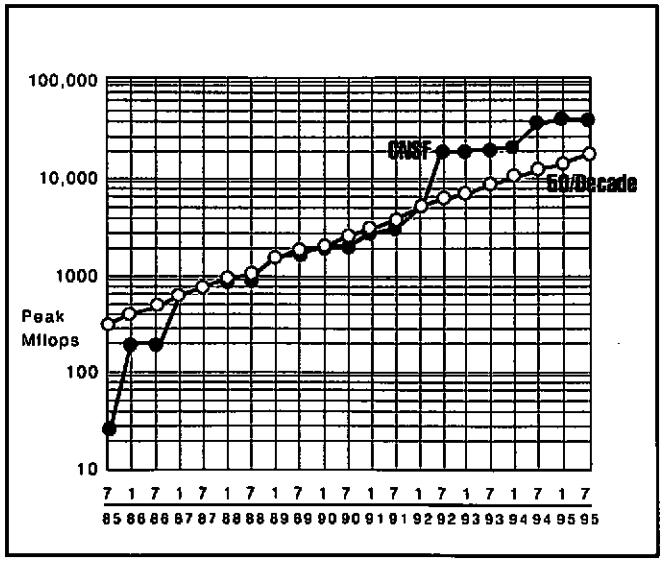


FIGURE 2 *Growth in peak capacity of CNSF systems.*

We believe that the synergy available through AIX's Transparent Computing Facility (TCF), patterned on the LOCUS model developed at UCLA,[4] will allow our two 3090s to operate together effectively with IBM workstations such as RT PCs and PS/2s. AIX/370 also will support other connected UNIX workstations. The combination of UNIX workstations with UNIX on the supercomputer could revolutionize the way scientific computing is done.

The final goal of all our expanding plans is simple to express but will be a challenge to attain. We intend to achieve a thousandfold-per-decade improvement in supercomputing performance on single applications. That degree of improvement will depend on boosting hardware performance by a factor of 50 while increasing software performance by a factor of 20. Figure 2 charts our achievements in hardware performance since 1985 and indicates our anticipated progress for the rest of our first decade.

We anticipate that our exploration of coupled 3090s over the next few years will lay the basis for further hardware improvements. Beyond that, we will continue to bring new processors online in the early 1990s as we continue to advance parallelism through coupled systems. Our evolving relationships with IBM and SSI and the continuing work of the Advanced Computing and Networking project will play major roles in this effort.

The development of Parallel FORTRAN and the work on AIX/370 already have provided powerful tools for improved software performance. We will be looking especially to the interdisciplinary efforts of the Scientific and Algorithmic Research project and CRI for further advances built with these tools.

In short, we believe that partnership—between academic, corporate, and government interests—will supply the answers to the "grand challenges" of supercomputing. The overall goal of the Theory Center and CNSF for the future can be summed up as a determination to foster that partnership.

I would like to acknowledge the assistance of James P. Hanrahan and David Francis in the preparation of this article.

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IBM Becomes the First EDUCOM Leadership Sponsor

IBM has responded to an EDUCOM request to its Corporate Associates for increased funding of its information technology programmatic efforts by electing to support these programs at the highest level—that of a corporate Leadership Sponsor. IBM, one of EDUCOM's first Corporate Associates, has thus become EDUCOM's first corporate Leadership Sponsor. Leadership Sponsors are corporations whose annual grant support reaches the level of $150,000. "With this generous act, IBM has set a standard for commitment to the goals of the higher education information technology community which I hope other corporations will follow," said Kenneth M. King, EDUCOM's president.

The fund-raising initiative to which IBM responded is aimed at securing stable long-term funding for EDUCOM's three major programmatic efforts. These efforts include:

—Information collection and dissemination. A set of activities with the goal of helping colleges and universities plan, organize, manage, and support the use of information technology.

—Instructional uses of technology. A set of projects with the goals of helping colleges and universities use information technology to improve teaching and learning, both through the use of current information technology and the assimilation of emerging and advanced technologies.

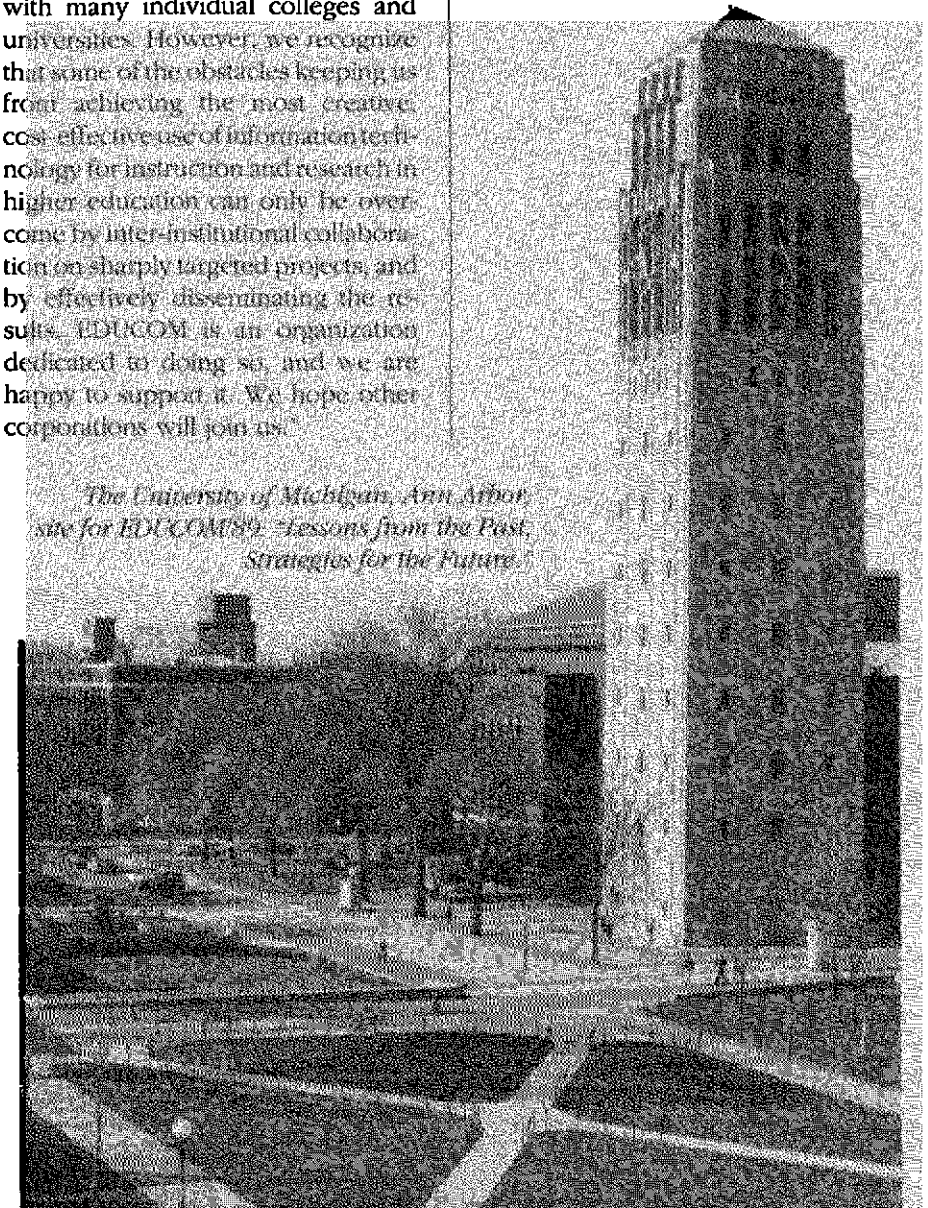
—Creation of a National Research and Instruction Network. A cooperative effort of higher education, industry, and government to create a high performance national electronic network that will enhance scholarly collaboration, research productivity, and technology transfer among scholars and researchers in industry and higher education.

In recognizing the importance of collective activity in pursuing projects and activities in these areas, Buzz Waterhouse, applications solutions director of the IBM Academic Information System (ACIS) organization, explained that he sees the grant as a natural extension of IBM's long collaborative relationship with EDUCOM. He said, "We continue to work closely with many individual colleges and universities. However, we recognize that some of the obstacles keeping us from achieving the most creative, cost-effective use of information technology for instruction and research in higher education can only be overcome by inter-institutional collaboration on sharply targeted projects, and by effectively disseminating the results. EDUCOM is an organization dedicated to doing so, and we are happy to support it. We hope other corporations will join us."

For more information on EDUCOM's projects, and opportunities for their support, contact CAP at the Princeton office or via BITNET: CAP@EDUCOM.

EDUCOM'89 Gaining Momentum

In 1964 EDUCOM was founded on the campus of the University of Michigan. This October 16–19, EDUCOM returns to Ann Arbor for the 25th Anniversary Conference, "Lessons from the Past, Strategies for the Fut-



The University of Michigan, Ann Arbor site for EDUCOM'89: "Lessons from the Past, Strategies for the Future."

ure: Information Technology in Higher Education from 1964 to 2014." The Program Committee, chaired by EDUCOM Trustee Douglas Van Houweling, vice provost for Information Technology at the University of Michigan, is reviewing over 180 proposals submitted since January. More than 2,600 representatives of higher education, industry, and government from the U.S. and abroad attended EDUCOM'88 in Washington, DC.

John Akers, chief executive officer of IBM, is scheduled to deliver the keynote address, and Nobelist Arno Penzias, vice president of research at AT&T Bell Laboratories, known for his contributions to the Big Bang Theory of the origin of the universe, will be the closing speaker. University of Michigan President James Duderstadt will participate in a featured panel discussion on the future of information technology.

Over 30 sessions in concurrent tracks; special interest group meetings; tours of University research, instructional, and administrative facilities; an educational software showcase featuring winners of the 1989 EDUCOM/NCRIPTAL higher education software awards; and the largest-ever Corporate Associates demonstration area are in the program plan. Other events include a musical theater production and an evening at the Henry Ford Museum in Dearborn.

Conference program sessions will be held in campus facilities, including the 4,000-seat Hill Auditorium. Housing is provided in a group of nearby hotels linked by a shuttle bus system and "InfoNet," an integrated communications and information services facility, designed for EDUCOM'89 by the University of Michigan and a group of EDUCOM's Corporate Associates. InfoNet will also facilitate preconference communication among conferees through interconnection to the national Internet and BITNET.

The advance program is scheduled for an April mailing, and all *Review* subscribers are on the mailing list. For additional information or to register, write to the Princeton office, call 609 520-3360, fax to 609 520-3975, or send electronic mail via BITNET to CONF89@EDUCOM. To obtain conference hotel information and reservations, call 313 995-7281.

LC and NTTF Cooperate

Representatives of the Library of Congress Network Advisory Committee (LCNAC) and the EDUCOM Networking and Telecommunications Task Force (NTTF) met on December 6, 1988 in Washington, DC to review cooperative measures for advancing a coordinated library/academic/research network.

Henriette Avram, assistant librarian for Processing Services at the Library of Congress, and EDUCOM Trustee, who is well known for her key role in the development of the Library of Congress' MARC format for machine-readable cataloging, welcomed the group and gave a brief history of the NAC.

EDUCOM President Kenneth M. King suggested four goals for the networking efforts: connect every scholar in the world to every other scholar to reduce barriers to scholarly interaction; connect to the network all important information sources, specialized instruments, and computing resources worth sharing; build collaboratively and dynamically maintained databases that contain all that is known on a particular subject; and, create a knowledge management system that will enable scholars to navigate through these resources in a standard, intuitive, and consistent way.

Moderator Sandra K. Paul of SKP Associates presented a set of "common assumptions" and a "Statement of a Common Vision" for library networking that the NAC had developed. According to Paul, "Our common vision of networking is an environment in which libraries can provide each individual in the United States with equal opportunity for access to resources that will satisfy their and society's information needs and interests. All users should have access on a timely basis to the information they require without being faced with costs beyond their own or society's means."

Six breakout groups formed to examine specific issues and to draft a joint mission statement: "Our common effort must recognize our shared mission of service to the information user. These users can best be served through interconnected networks. The members of NAC and EDUCOM will work together in a coalition whose purpose is to achieve this common mission." Other groups met to establish criteria for pilot projects, plan advocacy steps toward the library/academic/research network, and funding, among other issues.

Interested parties should contact NTTF at EDUCOM's Washington office or via BITNET: NTTF@EDUCOM

National NET'89

The effort toward a national research and education network continues to gain momentum, culminating in the upcoming National NET'89 conference set for April 3–5 in Washington, DC. Following the success of last year's flagship conference, this year's program features a wide range of education, government, and industry leaders, as well as opportunities to gain insight into major network developments in Europe and Japan.

Senator Albert Gore of Tennessee, a leading advocate of the national network who recently introduced major networking legislation, is expected to deliver the conference keynote address.

Breakout sessions will feature presentations on advanced network technology, the latest on regional network developments, and the impact of emerging federal networking standards, among other sessions. Three sessions specifically devoted to library networking issues have been included to improve the conference coverage of this critical aspect of the national network.

(continued on page 48)

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National NET'89 is organized by EDUCOM's Networking and Telecommunications Task force (NTTF), and sponsored by the Association of American Universities (AAU), the Association of Research Libraries (ARL), BITNET, CAUSE, FARNet, the National Association of State Universities and Land Grant Colleges (NASULCG), and the National Science Foundation DNCRI. Contact NTTF at EDUCOM's Washington office or via BITNET: NTTF@EDUCOM.

BITNET/CSNET Merger Approved, Board Members Elected

The BITNET Board of Trustees February referendum resulted in a strong mandate to merge BITNET with CSNET, the network serving computer science departments. Of the 417 members of BITNET eligible to vote, 216 votes were cast in the merger election, 195 in favor of the merger and 21 opposed.

The mandate enables the BITNET Board of Trustees and CSNET and UCAR (University Corporation for Atmospheric Research) representatives, through a Transition Team representing both networks, to begin formulating bylaws, a policy manual, long-range business plan and short-range transition plan, and other specific components required for the merger to actually take place. Members of the two networks can expect to be informed as proposals develop.

Elected to three-year terms on the BITNET Board of Trustees were George Kemper, assistant director of the Computing Services Center at Texas A&M; Glenn Ricart, director of the Computer Science Center at the University of Maryland; Patricia Skarulis, vice president in charge of Information Systems at Duke University; and, William Yundt, director of Networking and Communications Systems at Stanford University.

BITNIC Moves to Nation's Capital

The BITNET Network Information Center, previously operating out of EDUCOM offices in Princeton, New Jersey, is relocating to the new EDUCOM offices in Washington, DC. The move began in January 1989 and should be completed within several months.

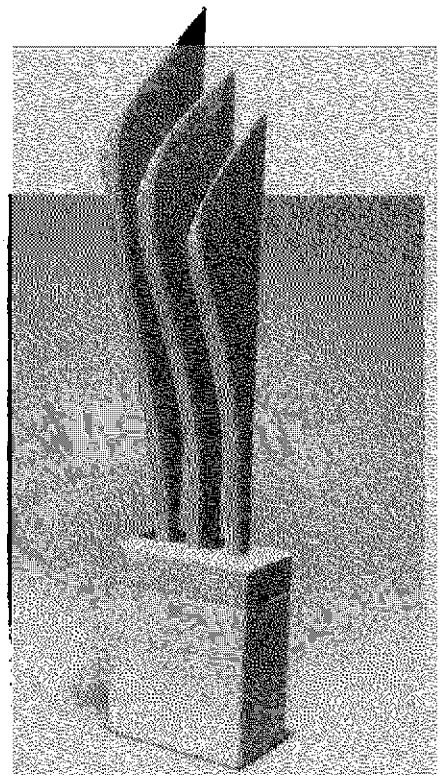
The present BITNIC computer, an IBM 4361, will remain in Princeton until a replacement system in Washington is in place. Staff members now in the Princeton office will remain through April 1989, and arrangements are currently under way to staff the Washington office.

According to BITNIC Director James Conklin, "Every effort will be made to ensure constant and continuous service to BITNET and its membership." EDUCOM is under contract to the BITNET Board of Directors to operate the BITNET Network Information Center.

1989 Software Awards Program

EDUCOM and the National Center for Research to Improve Postsecondary Teaching and Learning (NCRIPTAL) are reviewing entries and nominees to compete in the third annual EDUCOM/NCRIPTAL Software Awards Program. Outstanding software packages and effective curricular implementations of computing in undergraduate higher education will be identified and rewarded this October at the annual EDUCOM conference in Ann Arbor, Michigan. The program committee also announced an expansion of the program to include undergraduate accounting and engineering, as well as liberal arts.

Last year 182 entries were reviewed, of which 19 were identified as Distinguished, and 10 awarded Best in various categories. Winners of the Best Awards each received a trophy and $5,000, and the Distinguished Award winners received $500 and a plaque.



Program Director Robert B. Kozma of NCRIPTAL and EDUCOM Vice President Steven W. Gilbert invite those interested in the program to contact: NCRIPTAL, Suite 2400, School of Education Building, The University of Michigan, Ann Arbor, 48109-1259; or call 313 936-2741.

Equal Access

Informing colleges and universities about the issues, resources, and legislation involving computer accessibility for campus users with disabilities is the focus of a new project of the EDUCOM Software Initiative.

Project EASI (Equal Access to Software for Instruction), co-chaired by Krista Kramer of the Family Services in Eugene, Oregon, and Nils Peterson of the University of Oregon, plans to develop three products for higher education during the coming year, including a brochure for disabled student service providers and campus computing centers about basic computer accessibility for users with disabilities, and a handbook on planning and implementing campus computer accessibility. Also planned is a brochure for software developers, alerting them to issues involved in

designing more accessible software. Each of these products intends to help campuses meet existing or anticipated federal regulations covering equal access to educational opportunities.

Participation in Project EASI is open to anyone; contact Krista Kramer, 608 North Eighth Street, Springfield, OR 97477; 503 485-5111.

NCAIR Supports Awards Program

The National Center for Automated Information Retrieval (NCAIR) has committed more than $40,000 over the next two years to the EDUCOM/NCRIPTAL Higher Education Software Awards Program, for the purpose of adding an Accounting category to the 1989 awards.

Robert B. Kozma, program director for NCRIPTAL, applauds NCAIR's sponsorship. Says Kozma, "A long-term goal of the EDUCOM/NCRIPTAL Awards Program has been to include all fields of higher education. NCAIR's grant provides us with a strong base to move into other professional areas in future years."

NCAIR's grant establishes awards named for the association's founder—the NCAIR Weston Vernon, Jr. Award for Best Educational Software in Accounting (in 1989) and in Law (in 1990). Software submitted in this competition would also be eligible for awards in other appropriate categories, such as Distinguished Software or Curriculum Innovation, Best Tutorial, Best Simulation, Best Curriculum Innovation, etc.

EDUCOM President Kenneth M. King sees NCAIR's participation as the next step in expanding the scope of the Awards Program. Says King, "The Awards Program is a major aspect of EDUCOM's efforts to help colleges and universities infuse computing into the curriculum. NCAIR's grant helps us realize our goal of improving instruction and learning in professional areas, as well as within the academic community."

Steven W. Gilbert, EDUCOM vice president and director of the EDUCOM Software Initiative, sees NCAIR's support as an indication that professional associations are committed to the use of information technology to ensure that students graduate with appropriate computer knowledge and skills. "I welcome NCAIR's involvement in the EDUCOM/NCRIPTAL Awards Program," he says. "Our continued success and expansion depend upon the growing support of professional associations such as NCAIR and their efforts to encourage their members to develop top-quality instructional software."

Academic Software Reference List

The EDUCOM Software Initiative (ESI) is calling for nominations of exemplary software for inclusion in its new reference list of selected academic software. This list, intended for use by faculty and support staff in higher education, identifies software that through various forms of review has been identified as being both useful and of high quality. Authors, publishers, and software users are asked to nominate software they believe would be of interest and value for teaching and learning.

"The ESI is grateful for the help of Ohio State University in launching this important new project," says EDUCOM Vice President Steven W. Gilbert. "The idea to produce a reference list of highly recommended academic software was first suggested by Peggy Seiden of Carnegie Mellon University in a series of meetings conducted by the ESI. The goal was to develop projects to enable faculty to improve teaching and learning through effective use of information technology—especially computer software—at a group of 40 pilot site colleges and universities."

Information on selected software will be compiled, and various plans for its distribution are under consideration. Such mechanisms might involve academic networks (e.g.,

BITNET), a directory available through the EDUCOM Software Initiative, and a notation indicating each selection in an online catalog.

Software submitted must be used in a college or university and meet at least one of the following criteria:

- currently in use in an instructional context at three or more universities or colleges (a faculty member at each must recommend the software);
- highly favorable peer reviews published within the last three years;
- winner of an educational software award from a professional organization within the last three years.

Nominations for the first directory must be received by April 1, 1989.

For further information or nomination forms, contact John D. Chovan or Frances M. Blake, Instruction and Research Computer Center, Ohio State University, 1971 Neil Avenue, Columbus, OH 43210, 614 292-4843.

ECG in Puerto Rico

The University of Puerto Rico, Central Administration, Office of Planning and Development has contracted with the EDUCOM Consulting Group to provide services for the University's library automation project.

Roberto Loran Santos, director of central administration, contacted EDUCOM in December to explore the possibilities of developing a multi-campus library automation project linking 12 remote campuses into an integrated system. Murray Martin, special assistant to the provost for library planning at Tufts University, has been selected to head the consultation, and plans a two- to three-day visit to gain insight into the overall environment. Martin is expected to make specific recommendations on a needs analysis soon after the visit.

The EDUCOM Consulting Group has experienced steady growth, providing consulting services to 16 member institutions since September 1988. Topics of recent consultations include strategic planning, networking, academic computing, acquisition of student information systems, organizational structure, electronic mail systems, electronic software libraries, and library automation.

Contact ECG through the Princeton office or send electronic mail via BITNET to ECG@EDUCOM.

New Corporate Associates

Hewlett-Packard. Developers of computing and information system environments, Hewlett-Packard recognizes that computing and other information technologies continue to play a strategic role in the future of higher education. HP's membership in EDUCOM will provide member universities and colleges direct access to the company, ensuring that future products and services will continue to be tailored to meet the computing needs of academia.

Microwave Bypass Systems. Microwave Bypass Systems, Inc. was the first company in the nation to develop and install a microwave link capable of transmitting multi-vendor, 802.3 Ethernet at the full bandwidth of 10Mbps. MBS provides a full turnkey installation including obtaining frequencies and FCC licensing. The LAN extension systems are ideal for campus type environments providing high bandwidth at a far lower cost than other traditional alternatives. MBS has also used its technology to provide access to universities and research centers to the NSF supercomputer network.

Vestra-Subco, Inc. Vestra Subco, Inc. produces LANMASTER Workstations and a complete range of LAN products that can be used in college and university offices, as well as in computer labs and classrooms for instruction and learning. Vestra Subco, Inc. offers institutions of higher education a special educational program providing colleges and universities with discounts and special offers.

Waterloo Microsystems. Rooted in the University of Waterloo, Waterloo Microsystems is uniquely positioned to assist colleges and universities in the process of personal computerization. The Waterloo PORT PC LAN program, designed at the University, can provide the same features for both administrative and classroom users—resource sharing, ease of use, electronic mail, extensive network security, simplified network management, host connectivity, remote PC access, and LAN-to-LAN communications. Plus, the flexible architecture enables the network to be customized to meet specific needs of users.

The Whitewater Group. Founded in 1985, The Whitewater Group is a microcomputer software development company responsible for introducing the Actor programming language, useful for computer science and engineering curricula. According to the company, "Professors in virtually every discipline are using Actor for developing software because it allows them to produce sophisticated programs in the Windows environment in record time." The Whitewater Group supports academic use of Actor for teaching and research with exceptional academic discounts and site licensing terms.

(For a copy of the *Special Offer Brochure* contact the Princeton office, or via BITNET: CAP@EDUCOM.)

CAP Seminar: The Higher Education Market

The EDUCOM Corporate Associates Program's (CAP) annual seminar convened in San Diego on March 1, and this year's agenda featured university and legal specialists addressing a range of issues relevant to the needs of higher education. More than 60 representatives of the hardware and software industry, as well as service firms, heard presentations on the trends now affecting the buying patterns.

EDUCOM President Kenneth M. King welcomed the group, and William Arms, vice president for academic services at Carnegie Mellon University, discussed networking in higher education today. Daniel Burk, president of Compass Computer Serv-

ices, spoke about network software licensing issues, clarifying for the group the complexities of the legal and ethical issues involved with using software in a network environment.

Thomas West, assistant vice chancellor of computing & communications resources at California State University—System Office, David Smallen, director of information technology services at Hamilton College, and Jacqueline Brown of Princeton Universit, took part in a panel discussion on computing decisions.

Breakout sessions led by higher education, legal, and industry experts, addressed concerns such as Computing for the Handicapped; Software Licensing and Piracy Issues; Emerging Needs for Delivering Services Via Networks; and a discussion of EDUCOM's new National Survey of Microcomputer Users in Higher Education.

The EDUCOM Corporate Associates Seminar is held annually. Contact CAP at the Princeton office or via BITNET: CAP@EDUCOM.

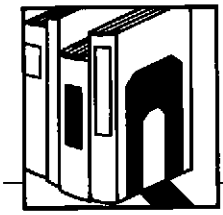
New Growth for HEDS

The Tufts-EDUCOM Data-Sharing Project officially adopted a new name at its 1989 Winter Workshop in New Orleans on January 11–13. Renamed HEDS—The Higher Education Data-Sharing Consortium is a group which is operated in association with Tufts University and EDUCOM and includes more than 120 research universities and liberal arts colleges.

The consortium had its origins in the EFPM User Group (subscribers to EDUCOM's EFPM planning model software), and was initially assisted by grants from the Exxon Education Foundation. It has also been the recipient of software from Lotus Development Corporation and of computer hardware from Apple Computer. The group is currently supported by a staff at Tufts, directed by Jennifer Mauldin.

HEDS' purpose is to aid in the planning and management of the member institutions by assembling, analyzing, and sharing a wide range of institutional information. HEDS members share data in such areas as admissions statistics and costs; student charges and financial aid; enrollments, retention, and degrees granted; faculty numbers and salaries; library collections and costs; financial operations, fund-raising performance and costs, and endowment management; sponsored research activities; and attitudes and plans of entering students, graduating seniors, and alumni.

"The name change," according to John A. Dunn, Jr., vice president of planning at Tufts University, and EDUCOM Trustee, "signals a growing maturity for the HEDS consortium." The biannual meeting drew more than 85 participants who examined the use of shared data to provide a context for improved planning and management. "The best testimonial to the HEDS Consortium's usefulness," Dunn commented, "is the continued growth in numbers of members, including many of the strongest and most selective colleges and universities in the country."

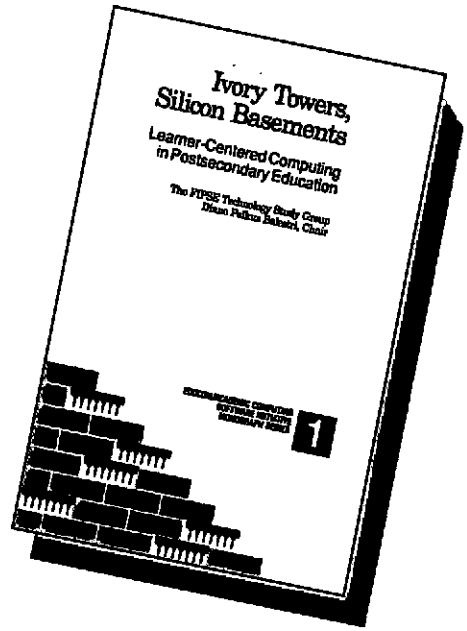


Book Review

Ivory Towers, Silicon Basements

(Ivory Towers, Silicon Basements: Learner-Centered Computing in Postsecondary Education, *by the FIPSE Technology Study Group, Diane Pelkus Balestri, Chair; 124pp.; EDUCOM/Academic Computing Software Initiative Monograph Series, P.O. Box 804, McKinney, TX 75069; EDUCOM Members $9.95, Nonmembers $14.95*)

By Carol P. Hartzog



In *Ivory Towers, Silicon Basements*, the FIPSE Technology Study Group offers advice for educators watching the "inexorable but uneven" spread of computers across campus. The participants directed academic computing projects supported in the late 1970s and 1980s by the Fund for the Improvement of Postsecondary Education (FIPSE). They met as the FIPSE Technology Study Group between 1984 and 1987 to discover and advance the common elements of their work. *Ivory Towers, Silicon Basements* is a report of their findings and recommendations.

This report is brief—94 pages of text and 30 pages of project descriptions and bibliography. It contains the ideas and writing of more than 60 project directors, with Diane Pelkus Balestri and Stephen C. Ehrmann serving as principal authors and others serving as collaborative authors or contributors. This summary of the shared observations of experienced project directors is the first volume in the EDUCOM/Academic Computing Software Initiative Monograph Series. It is addressed to "academic administrators, department heads, faculty, accreditors, and educational policy makers who are concerned about the quality and accessibility of higher education in America today" (p. xi).

The commitment to quality and accessibility, described as the FIPSE perspective, dominates this report. Its authors received funding for projects using computing and related technologies to strengthen and enrich undergraduate programs. The projects themselves vary widely: Some integrate computing into the study of specific disciplines on university, college, or community college campuses; some emphasize adult literacy in rural or urban areas; some focus on pedagogy and faculty development; some provide for the national distribution of educational software. To qualify for funding, each project met the FIPSE criteria of being learner-centered, cost-effective, and far-reaching. In *Ivory Towers, Silicon Basements* little attention is given to specific projects; rather, the common purpose that guided the original proposals, now shaped by experi-

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ence and discussion into a shared vision, is the subject of this report.

Learner-Centered Computing

Central to the work is the conviction that "the outcome of education is influenced more by the direction and degree of the student's engagement in learning than by any other factor" (p. 9). Affirming that the value of computers on campus will be determined not by numbers but by use, the authors advocate learner-centered computing. This model of computing is consistent with the findings of the Study Group on the Conditions of Excellence in American Higher Education, sponsored by the National Institute of Education in 1984 (p. 32). It contrasts with teacher-centered learning or, if the computer acts as the professor's apprentice, computer-centered learning. These strategies are offered for promoting engaged, active learning:

1. Introduce students to computer-based tools and resources for thinking and for doing their work that they can employ in classes and after graduation.

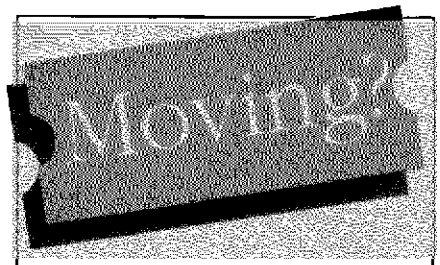
2. Use focused applications of learning to widen specific "instructional bottlenecks" which hinder subsequent learning.

3. Rethink clusters or sequences of courses in light of faculty and student access to computing, so that improved learning can be cumulative (p. 11).

This initial and key set of recommendations has implications, the authors observe, "for faculty work and careers, for the achievement of educational equity, and for the evaluation of such innovations" (p. 7). They take up each subject in turn, then address problems in producing and distributing software.

Faculty Roles

For faculty engaged in computing projects, the rewards are new energy and new engagement; the risks are new obstacles and new isolation. These rewards and risks are discussed under such headings as mastering new skills, rethinking the discipline, and redesigning the content and methods of teaching. Recommenda-



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tions are offered for developing a faculty culture that values computer technology and promotes its use for teaching as well as research.

Educational Equity

Viewing isolation and passivity as the common and powerful effects of disadvantage, the authors discuss computing strategies and programs for engaging students in an active learning community. These examples are cited: Project BESTNET is "helping a consortium of institutions in Mexico and the United States to offer a better, more accessible education in the sciences to students whose primary language is Spanish" (pp. 53–54). Solidaridad Humana is "a community-based project in New York [which] prepare[s] young Hispanic high school graduates to enter science and technology programs in the CUNY system" (p. 56). While some of the FIPSE computing projects serve nontraditional students, the authors offer recommendations that will be widely applicable in varied educational settings.

Evaluation

The discussion of evaluation focuses on one question: "How can we uncover the kinds of information about student learning that will contribute most to the evaluation of academic computing?" (p. 61). Guidelines are offered for evaluating both the impact and the uses of learning, and models for combining both types are presented. Attention is directed to the need for carefully evaluating innovative projects, and to the importance of allowing sufficient time and resources to meet that need.

Delivery

Next, attention is given to the practical considerations, internal and external, that can inhibit the widespread use of computers for learning. These include access, technical support, and conditions and terms of software distribution. Several models for software production and distribution have been developed by study group members. These are briefly described: the League for Innovation in the Community College; CONDUIT, operated by the University of Iowa; and the National Collegiate Software Clearinghouse, located at North Carolina State University. The FIPSE Technology Study Group itself was a forum for exchanging information on academic computing. It also became a precursor of the current, more ambitious EDUCOM Software Initiative.

L'Envoi

In "L'Envoi" the authors express their surprise at gradually discovering consensus on technology's promise for increasing access to and engagement in learning. They also express disagreement over the long-range implications of their findings. While all feel that computing will critically influence the future of higher education, some expect traditional structures and concerns to be continued with new force, others predict more radical change in the course of higher education. Readers are invited to take up these issues as members of the academic computing community.

As a brief report, *Ivory Towers, Silicon Basements* contains general findings and recommendations, simply stated and clearly outlined, with individual projects being cited as examples within the text and listed in the Appendix. Its achievement is also its weakness: The consensus reported among many directors of widely varying projects carries with it a sense of satisfaction. In particular, the emphasis given to equity, active learning, and programmatic coherence is appropriate and welcome. However, such brief treatment of richly varied programs and complex issues leaves an unsatisfied need for more substance, more detail.

Reading *Ivory Towers, Silicon Basements*, I sensed that the accomplishment of the FIPSE Technology Study Group stands primarily outside the text, in the support given to active project directors and in the community they have formed. This observation lends weight to the authors' concluding appeal for more extensive networks of support and for continuing conversation on the issues addressed in this report.

CCNEWS: A WIRE SERVICE FOR THE WIRED CAMPUS

Do 850 subscribers from 366 institutions in the first ten months constitute a publications success story? What if the subscribers represent 22 countries from Asia, Australia, Europe, Latin and North America? What if the subscribers don't pay for the publication and sign up simply by sending electronic mail? Is it a viable membership service if the publication can only be received by subscribers connected to BITNET or another network with a gateway to BITNET? These and other questions are raised by our experience with CCNEWS, launched last April as "An Electronic Forum for Campus Computing Newsletter Editors."

One of the striking aspects of academic networks is the proliferation of special interest mailing lists, discussion groups, and electronic newsletters. For example, on BITNET and its related networks (EARN in Europe and NetNorth in Canada), the "list of lists" is 22 pages, single spaced, with topics ranging from computers and computing center operations to public health, scholarly specialties, recreation, and humor. Formats vary from freewheeling discussions ("Has anyone got a solution to the following problem ...?"), to monthly newsletters with cover graphics and regular columns. Some lists are open for subscription by anyone; others are restricted to those approved by a list "owner."

Given the broad support for networking within EDUCOM—290 of EDUCOM's 590 member campuses are connected to BITNET, and others are accessible via CSNET, NSFNET, and UUCP—an electronic publication seemed an attractive option. It could be a cost-effective way to facilitate communication among half the membership and, if successful, encourage the other half to join networks (or at least obtain guest accounts at nearby connected campuses). But what should be the focus?

Over the years EDUCOM staff have observed marked similarities among the scores of campus computing newsletters we receive; some contain especially creative and thorough articles and others use reprints of these articles. This suggested a focus: an electronic newsletter for editors to discuss newsletter design, writing, editing, production, and distribution, combined with a database from which the full text of relevant articles can be retrieved for research or reprinting (no graphics at present). Recently, a calendar of events has been added to

By Daniel A. Updegrove

EDUCOM Vice President Daniel A. Updegrove is responsible for Membership Services, Conferences, Seminars, and Publications.

assist editors in reporting on relevant conferences, seminars, and workshops.

Discussions in CCNEWS have covered desktop publishing systems, graphic design, reprint attribution policies, computer viruses, and electronic mail etiquette, among others. As we had hoped, questions posed in one issue are usually answered in subsequent issues. To facilitate the exchange, all contributions include bylines with electronic mail addresses so subscribers can contact authors directly.

Over 100 articles have been contributed, including award winners from the annual ACM SIGUCCS Newsletter Contest. A brief abstract of each article is included in the newsletter, so that interested subscribers can retrieve articles of interest. In addition to newsletter articles, the database includes sample style sheets, book reviews, and conference announcements. Claudia Lynch from University of North Texas envisions CCNEWS "serving as a vehicle from which I can gather articles for reprinting in my newsletter and from which I can gain inspiration on research topics I might otherwise have ignored." Anecdotal data suggest that articles from the archive are reprinted widely.

CCNEWS resides on the IBM 4361 computer that serves the BITNET Network Information Center (BITNIC) at EDUCOM and is based on LISTSERV, the mailing list/file server software developed by Eric Thomas in Europe and available on many BITNET host computers.

CCNEWS is open to anyone who has access to BITNET, either directly or via gateways from other networks. Subscribers include editors, writers, graphic artists, computing center staff, and others. Mary Peterson, from the University of New Hampshire, writes, "I am not a campus newsletter editor, but I do assist with our computing newsletter, On-Line, and I find CCNEWS interesting, relevant, and helpful."

Over 100 subscribers are from outside the U.S., mirroring the growth of international participation in other EDUCOM activities, including the conference. Since hard-copy newsletters rarely find their way to foreign institutions, CCNEWS promises to be an effective medium of international information exchange

Prospects for the Future

Developments in network communications—both technical and political—foreshadow the time when electronic publishing and information delivery will compete with or even supersede newsletters, journals, and books. Electronic libraries and network-accessible databases will become commonplace.

In the meantime, the network movement in higher education is gaining momentum. Paralleling the dramatic growth of national networks like BITNET and NSFNET are the extensive campuswide networks being planned and implemented. As documented in the EDUCOM monograph, *Campus Networking Strategies*, colleges and universities are spending millions to connect faculty and staff offices to labs, libraries, computing centers, and (in some cases) dormitories. Such developments are, of course, extremely propitious for services like CCNEWS.

The number of campuses with access to networks and the number of connected individuals on these campuses provide an enormous base of potential contributors and readers of this service. As is typical of voluntary groups, early experience with CCNEWS suggests that most subscribers are passive recipients rather than active contributors, but growth in subscribers could result in more contributions. An alternate source to be explored is syndicated writers, who might find such a large audience (both direct subscribers and readers of subscribers' publications) worth

their efforts.

Growth is not always easy to manage, of course. In the case of CCNEWS, the current articles indexing scheme would probably not support 500 articles; it certainly would break down before 5,000. In addition, new subscribers would not necessarily have interests and needs matching the earlier ones, perhaps leading to special editions for liberal arts or community colleges. Alternatively, divisions might emerge focused on desktop publishing and/or electronic publishing, independent of campus computing content.

Assuming that both the contributions and indexing problems can be solved, there is no reason to restrict archive access to newsletter editors or campus computing staff. CCNEWS or its successor(s) could become repositories of information for anyone on campuses interested in its topics. This notion dovetails with developments on some campuses, like Cornell's CUINFO, which offer extensive databases of computing and non-computing information to the entire campus community.

For the immediate future, however, higher education publications and information resource professionals interested in such services are wrestling with such vexing questions as:

- How should graphics and formatted text be distributed for printing?
- How should electronic newsletters be designed for online viewing or printing?
- How will hypertext, hypermedia, CD-ROM, and distributed databases affect distribution of information?
- What intellectual property rights apply to network communications?
- Is an electronic mail address directory feasible?

Michigan State University's Marilyn Everingham finds that " CCNEWS pulls together a peer group from which information and help can be drawn. Questions can be posed with a good chance of getting an answer from someone who's actually experienced the same problem. Nothing speaks quite as clearly as the voice of experience." According to Claudia Lynch, "I see CCNEWS serving as a window to the world of other computing center newsletter editors. I can console myself, knowing that I am not the only one who suffers from reluctant staff contributors, etc."

Although CCNEWS is not a startling technical innovation, we see great potential in a worldwide network of campus newsletter editors — or of campus-based electronic information services — combined with an easily accessible archive of articles and other materials. Charity Cicardo at the University of Denver, sums up her experience with CCNEWS this way: "I feel that new doors have been opened. In the future I could be publishing only electronic publications. With exposure to CCNEWS, at least I won't be taken by surprise when it occurs."

Is your campus participating in CCNEWS? Has it been useful? How could it be improved? The EDUCOM Board of Trustees has encouraged the staff to consider additional electronic publications; what should the next publication be? We are interested in your experiences and suggestions.

For information on CCNEWS contact the Publications department at the Princeton office, or via BITNET send mail to: CCNEWS@BITNIC. ■

DEC's Education Initiative

Digital Equipment Corporation (DEC) has announced a new "Education Initiative" program designed to make its computer technology more widely accessible and affordable to educational institutions. Under the initiative three programs are effective immediately:

—The Campuswide Software License Grant Program, which grants licenses for virtually all Digital's non-royalty VAX software products (160), including the VMS and ULTRIX operating systems, at no charge to educational institutions.

—An expanded Education Software Library, which includes all VAX computer systems, and substantially reduces the cost of supporting software.

—The Campus Service Agreement, a hardware self-maintenance plan that enables educational institutions to reduce service costs by sharing support responsibilities with Digital.

Excluded are software licenses for which Digital must pay a royalty fee, licenses for PC products, and licenses for PDP-11 software. Licenses for royalty software and PC software strategic to education are offered under Digital's Education Market Basket Program at special prices for educational institutions.

According to EDUCOM President Kenneth M. King, "The DEC announcement is enlightened in several dimensions. It recognizes the strategic importance of higher education in developing and transferring computing and communications technology; it recognizes the importance of infusing computing into the curriculum and into research and administrative arenas; it eliminates much of the complication of controlling software by providing for site licenses; and it saves money. I hope other vendors will follow DEC's lead."

Supercomputing for Undergraduates and Faculty

In an effort to encourage the development of supercomputing skills in undergraduates, and provide support and training for faculty, the Cornell National Supercomputing Facility (CNSF), in collaboration with the National Science Foundation (NSF), is sponsoring its second annual Research Experiences for Undergraduates/Undergraduate Faculty Enhancement Program (REU/UFE).

The REU/UFE program, the only one to offer supercomputing to undergraduates, has the dual focus of training undergraduates in advanced computing methods, with particular emphasis on parallelism and vectorization, and providing faculty members with updates on new techniques and developments in supercomputing they can bring back to their home insitutions. Both students and faculty are brought to the Cornell campus for the program, where students are given time on the IBM 3090.

According to Carol Doerr, manager of Technical Consulting and Education at CNSF, "The REU/UFE program is an important step in giving undergraduates exposure to research and insight into supercomputing." She also points out the mutual benefit to faculty of "a leadership role in making use of new ideas to integrate into the undergraduate curriculum."

Participants have access to all CNSF resources, including two IBM 3090 multi-processor supercomputers with 12 vector facilities, parallel processing, and extensive graphics facilities. Students will satisfy a four-week course from June 5–30, and the faculty program runs from June 19–30. The deadline for applications for the 1989 REU/UFE program is March 30.

Students and faculty interested in learning more about the REU/UFE Program may contact the Cornell National Supercomputer Facility at 607 255-3985.

NeXT in Undergraduate Education

Cornell University is among the first institutions of higher education to purchase the much-publicized computers announced last October by NeXT, Inc. The 30 machines, consisting of 25 "client machines" and 5 "servers," have arrived and are being prepared for use by students and faculty. Cornell is the first to use the computers in undergraduate engineering and computer science, according to NeXT officials.

Cornell engineers and computer scientists have been investigating the machines for use at Cornell over the past year. They received private briefings from the company, visited the factory, and ran test programs on a sample machine, according to M. Stuart Lynn, Cornell's vice president for information technologies. Lynn is a member of an unpaid advisory board for the company, as were the director of academic computing, Gordon Galloway, and Lynn's predecessor, Kenneth M. King, the former vice provost for computing who is now president of EDUCOM.

Thank-you for your support!

EDUCOM wishes to acknowledge the following organizations for contributions and grants during the past year.

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EDUCOM also wishes to express appreciation to Rutgers, the State University of New Jersey, for its generous support this year.

EDUCOM

The primary use of the 30 Cornell NeXT machines will be in undergraduate courses in engineering and computer science, initially in upper-level computer science courses in such areas as programming languages and artificial intelligence. The machines will also be available to faculty and students elsewhere on the campus, enabling them to investigate possible applications.

"The Computer Science Department is the first major user because we feel a responsibility to take the lead in understanding what new trends in hardware and software will be important for the university at large," said Tim Teitelbaum, associate professor of computer science. He said the computer science courses represent a reasonable way to use the machines before all functions are in place.

Updating the CD-ROM Catalog

A new software program that cuts the cost of producing its CD-ROM (compact disk-read only memory) catalog by more than 80 percent was announced in October by the University of Guelph in Ontario, Canada. The new catalog works more quickly and simplifies the process through which people can find items in the library's 2.4 million-volume collection.

The University of Guelph library was the first major academic library to offer users its online catalog on a compact disk. The portable catalog—a disk weighs only 19 grams and can be used wherever there is a microcomputer—is now widely used on the Guelph campus, in faculty offices and student homes, and by scholars thousands of miles away.

Developed by the University's library staff, the new software program enables the library to update the information provided by the CD-ROM catalog without remastering the compact disk. As new materials are received, their records can be added to the micro-based catalog as supplementary information, without changing the way users search for information. These "seamless updates" ensure that the catalog remains current.

The University has sold the software for marketing purposes to Pen Dragon Optical Media, a software house, and has been contracted by PDOM to complete a system that will soon permit users to search for the title of a book and then check its status—whether it is in the stacks, or out on loan—without leaving the CD-ROM workstation. The project is expected to be completed by April 1.

Larry Porter, associate librarian at the University, pointed out that two versions of the software have been developed since the original. "Now," he states, "the results of a 170,000-record scan are available in less than 60 seconds." The catalog contains more indexes than its predecessor and will quickly conduct a complex search—when all the user knows is the the general subject area—to provide a complete listing of library resources on the subject.

For more information, contact the chief librarian's office at the University of Guelph, 519 824-4120, Ext. 2181.

Museum Computer Network

Museums face peculiar problems when trying to catalog their artifacts. If having too many objects doesn't make the project prohibitive or difficult, finding words to describe or classify them can.

The Museum Computer Network (MCN), based in Syracuse University's School of Computer and Information Science, has undertaken the task of developing museum cataloging standards to facilitate the computerization of records. Affiliated with the American Association of Museums (AAM), MCN is the only organization in the world that combines museum information management with computer technology.

"Currently, we are focused on the computerization of collection records and records having to do with descriptions of objects," says Deidre Stam, executive director of MCN and adjunct professor of Information Studies. "The AAM has, in effect, relegated computerization issues to us."

"Museums are just now beginning to see the benefits of computerization and to think about the potential for their catalog," says Stam. "Up to this point, no one has developed standards or guidelines to help museums utilize this technology. MCN has decided to focus its efforts on developing those standards."

The use of standard terminology is crucial to accessing information in a database, particularly in humanistic fields and the nonverbal arts, such as painting or sculpture. Since artists rarely provide written explanations of their work, words used to describe art are subjective. According to Stam, "It's essential that we turn to the experts in each field and ask them to develop standardized lists that we can use as we develop computer programs. Only then can we hope to develop programs that are effective."

Stam also points out that they are "working with the Art Collection and Academic Computing Services to update the collection's automated system with MARC (Machine Readable Cataloging), the national standard. We want to use MARC for object information and mount it on the academic computing network," she says, "so that information pertaining to the collection is available to everyone, just as computerized book catalogs are in the library."

After 20 years of moving from one institution to another, MCN settled on the Syracuse campus last September. Syracuse's interest in relating technology to scholarly inquiry, and its location—New York has more museums than any other state—has enabled MCN to grow. Those interested in additional information can contact Deidre Stam at 315 443-5612.

(Send submissions for "Member News" to the Publications Department at EDUCOM's Princeton Office, or via BITNET: PUBS@EDUCOM)

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SCT
Silicon Graphics
The Software Group
Software Publishers Association
Solar Systems Software
Solutions Unlimited
Spectrum Digital Corp.
SPSS Inc.
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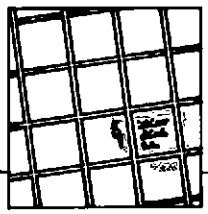

Calendar of Events

APRIL

22nd Annual Small College Computing Symposium
University of Wisconsin–Eau Claire
Eau Claire, WI
April 21–22
contact: D. Raleigh or C. Roraff
Academic Computing Services
University of Wisconsin–Eau Claire
Eau Claire, WI 54701
715 836-5162 or 715 836-5158
via BITNET: DRALEIGH@UWEC
CRORAFF@UWEC

Annual Forum of the Association for Institutional Research
Baltimore, MD
April 30–May 3
contact: AIR, 314 Stone Building
Florida State University
Tallahassee, FL 32306-3038
904 644-4470
via BITNET: CHULAK@FSU

MAY

CUMREC'89, College and University Computer Users Conference
Boston, MA
May 14–17
contact: Phil Philips
Massachusetts Institute of Technology
617 253-1343

American Society for Information Science Mid-Year Meeting (ASIS)
San Diego, CA
May 21–24
contact: ASIS, 1424 16th Street, N.W.
Washington, DC 20036
202 462-1000
via BITNET: MCT@OCLCRSUM

Software Publishers Association's 1989 Spring Symposium
San Diego, CA
May 21–24
contact: SPA Symposium Registrar
1101 Connecticut Ave., N.W., Suite 901, Washington, DC 20036
202 452-1600

JUNE

NetNorth/CDNnet Conference
Concordia University
Montreal, CN
June 8–9
contact: J. Woodrow
Concordia University
1455 DeMaisonneuve Blvd.
Montreal, Quebec, H3G 1MB
NET89@CONCORDIA.CA

National Educational Computing Conference (NECC)
Boston, MA
June 20–22, 1989
contact: Susan Friel & Nancy Roberts
Lesley College
29 Everett Street
Cambridge, MA 02138-2790
617 868-9600

AUGUST

EDUCOM Software Initiative
August 3–5
Snowmass, CO
contact: 609 520-3350
via BITNET: ESI@EDUCOM

Seminar on Academic Computing
August 4–9
Snowmass, CO
contact: 503 754-2052
via BITNET: DJBIRD@ORSTATE

OCTOBER

1989 ACM SIGUCCS User Services Conference
October 1–4
Bethesda, MD
contact: 301 454-6030
via BITNET:
SIGUCCS@UMDD.UMD.EDU

University of the World Conference
University of Michigan–Ann Arbor
October 14–16
Ann Arbor, MI
contact: 619 456-0103
via BITNET: MILLERJ@SDSC

EDUCOM'89
University of Michigan–Ann Arbor
October 16–19
Ann Arbor, MI
contact: 609 520-3340
via BITNET: CONF89@EDUCOM

NOVEMBER

Western Educational Computing Conference
Burlingame, CA
November 16–17
contact: 415 338-1212

CAUSE'89
November 28–December 1
San Diego, CA
contact: 303 449-4430
via BITNET: CAUSE@COLORADO

(Send information on events focused on information technology in higher education to the Publications Department at the Princeton office of EDUCOM, or via BITNET: PUBS@EDUCOM.)

(continued from page 64)

phical systems, user environments, and workstation technology. But are there creative and systematic mechanisms for improving the rate of technology development to which we could also contribute?

There are cultural barriers, suspicions, and substantive intellectual property issues to be overcome if higher education is to forge a more effective partnership with industry. Some people in industry think that dealing with us is an activity akin to trying to herd cats. A high-level executive in the computer industry once summarized what my university was prepared to contribute to a partnership with his company by saying, "You are offering us the sleeves to your vest." Our proposition was, "Give us lots of money and equipment, and we'll do great things that you will be able to read about in the open literature some day." This sounded very reasonable to me at the time. On the other hand, from the perspective of university people, the bureaucracy of big companies is formidable and one can grow old trying to penetrate it. Breaking down the barriers to communication is a major first step. In some ways, the people who manage technology in higher education are ideal participants in this process. They have a long history of dealing with vendors and have learned to live with faculty. A starting point might be to initiate discussions with your industrial counterparts designed to create better understanding of the others' problems.

The EDUCOM Networking and Telecommunications Task Force (NTTF) should provide a good laboratory for learning how to forge an effective three-way partnership. The Task Force, which is working to create a high-performance national education and research network, convened a workshop on major networking policy issues in Washington on January 23 and 24 to which representatives from industry and government were invited. The workshop benefited from having as its moderator Dr. Lewis Branscomb, who directs the Science, Technology, and Public Policy Program at the J. F. Kennedy School of Government at Harvard University.

Since Professor Branscomb has served as Director of the National Bureau of Standards, IBM Chief Scientist, and Chairman of the National Science Board, his distinguished career has spanned the three cultures. His opening remarks, framing a context for the discussion on the network, are reproduced in this issue. A tribute to his skill is that a major outcome of the workshop was agreement on the goal of the National Education and Research Network:

The goal of the National Education and Research Network is to enhance national competitiveness and productivity through a high-speed, high-quality network infrastructure that supports a broad set of applications and network services. To reach this goal, the following objectives must be achieved:

- use the Network to foster development of U.S. network technology and services;
- create and facilitate educational and research collaboration and increase technology transfer among government, industry, and education, regardless of the participating institution's size or location;
- provide standardized access to and stimulate development of in-formation sources, instruments, and computing resources whose characteristics make them national assets worth sharing; and
- create a cohesive, standard, and consistent network architecture that will evolve gracefully to meet capacity, connectivity, management, and service requirements.

The workshop recommended that consistent with this goal statement, the network should be accessible to the entire U.S. research, education, and development community in the higher education, government, and industrial sectors.

Realizing this goal will require partnership among the three sectors. A full report on the outcome of this workshop will be presented at NET'89, the second NTTF-sponsored national networking conference, to be held April 3–5 in Washington, DC. Creating this network and better working relationships with the other sectors should help improve technology transfer. But what are we doing about the problems of elementary and secondary education?

The EDUCOM project with the most potential for contributing to the improvement of teaching and learning at all educational levels is the EDUCOM Software Initiative. This project has broad participation from industry and higher education but not from government. Is it possible that lessons learned and technology developed in higher education will be relevant to elementary and secondary education? Could the emerging national network be used to connect grade school and high school teachers with each other and with colleagues in the higher education community? Would people in higher education be willing to "adopt" grade schools and high schools, help them connect to the network, and then contribute to electronic information exchanges directed toward improving elementary and secondary education? Would this help? What is it that we *should* be doing?

With a national network connecting the entire intellectual community, there should be a way of involving that community in the solution of these problems, provided we can find appropriate mechanisms. If Ross Perot could single-handedly transform the Texas school system, we should be able to collectively achieve something that will make a difference. Does anyone have any good ideas? Are we up to the challenge?

Letter from

Kenneth M. King

AMERICA AT RISK: ARE WE UP TO THE CHALLENGE?

CAN ACADEMIA, GOVERNMENT, AND INDUSTRY ENHANCE THEIR TECHNOLOGY TRANSFER RELATIONSHIP?

Major leaders from education, industry and government have been sounding a common theme. The United States is in trouble with respect to the competitiveness of its products and services, and the rate at which ideas are translated into products and services. In addition, our elementary and secondary school systems are in serious trouble, which bodes poorly for the nation's future ability to compete in a knowledge-based world economy. As National Science Foundation Director Erich Bloch put it, "In modern global markets, knowledge is the critical asset, replacing in importance access to natural resources and low-skilled labor." These themes were common to a number of presentations at the EDUCOM'88 conference and were particularly evident in the presentations by William Kirwan, Ross Perot, and Erich Bloch, representing education, industry, and government respectively. Their presentations have been reproduced in this issue of the *EDUCOM Review*.

Kenneth M. King is president of EDUCOM.

In seeking solutions to these problems, a consensus has emerged around the notion that we need a strengthened, more systematic, and more effective partnership among education, industry, and government, and that this partnership should be directed toward improving both the rate of technology development and the quality of our educational system. As Dr. Kirwan stated, "In a very real sense, the future well-being of our country depends upon our ability to discover new and creative ways for these three sectors to work together."

Readers of the *EDUCOM Review* are members of the higher education information technology community, and thus are among the preeminent technology transfer and knowledge worker professionals in the world. Are we contributing as much as we can to the solution of these problems? Are we just leaning forward in our foxholes or have we started charging uphill? Shouldn't we be playing a greater role in this effort?

We have contributed in major ways to important technology development successes. The national supercomputer industry has progressed enormously since the National Supercomputer Centers were established. Even Wall Street is now starting to acquire supercomputers. Colleges and universities adopted promising technologies early and have helped nurture those technologies to commercial success. A highly successful current microcomputer was a $2,000 "Etch-a-Sketch" when some colleges and universities first acquired it. We continue to make important contributions in other technology areas such as networking, artificial intelligence, distributed computing, gra-

(continued on page 63)

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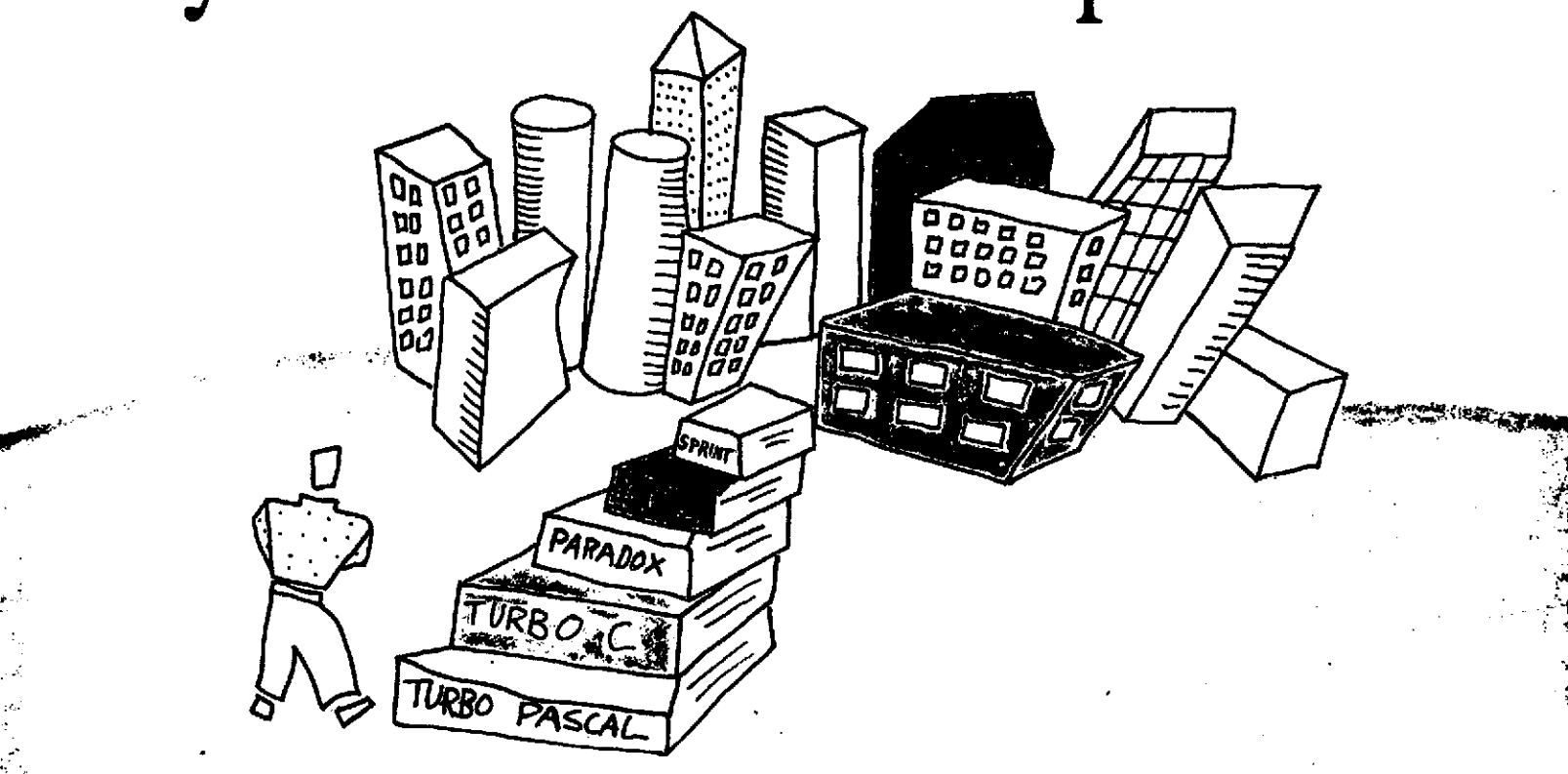

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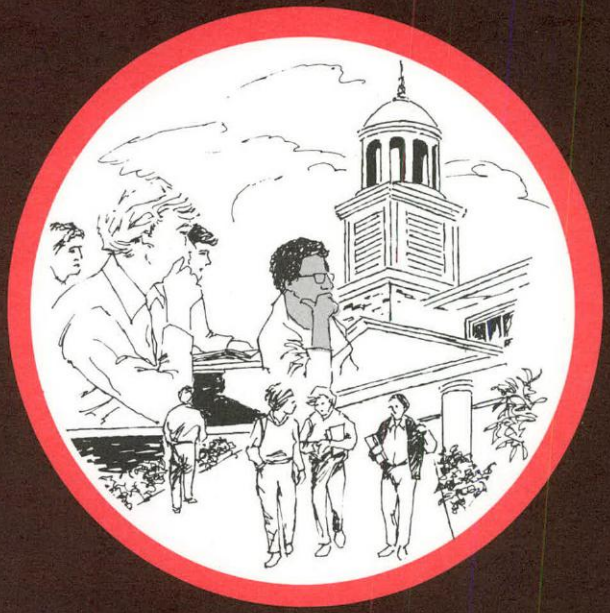


A GUIDE TO THE ETHICAL AND LEGAL USE OF SOFTWARE FOR MEMBERS OF THE ACADEMIC COMMUNITY

SOFTWARE enables us to accomplish many different tasks with computers. Unfortunately, in order to get their work done quickly and conveniently, some people justify making and using unauthorized copies of software. They may not understand the implications of their actions or the restrictions of the U.S. copyright law.

EDUCOM
Software Initiative
P.O. Box 364
Princeton, NJ 08540

ADAPSO
1300 North 17th Street
Suite 300
Arlington, VA 22209

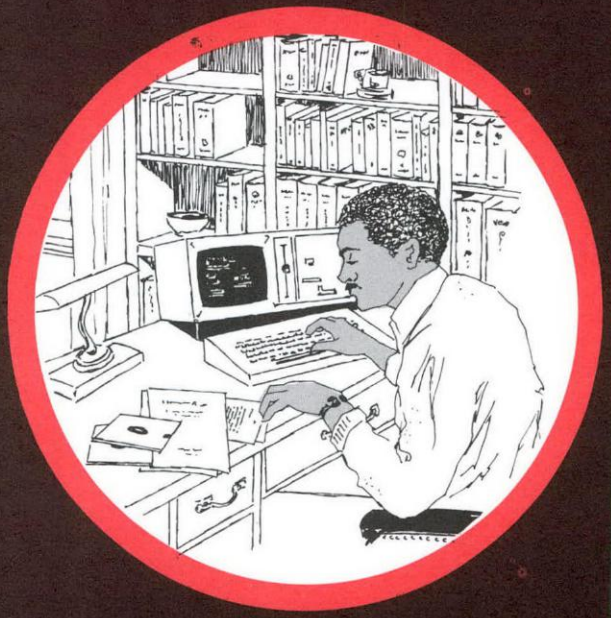
A FINAL NOTE

Restrictions on the use of software are far from uniform. You should check carefully each piece of software and the accompanying documentation yourself. In general, you do not have the right to:

1. *receive and use unauthorized copies of software, or*
2. *make unauthorized copies of software for others.*

If you have questions not answered by this brochure about the proper use and distribution of a software product, seek help from your computing office, from the software developer, or publisher.

HERE ARE SOME RELEVANT FACTS:



1

UNAUTHORIZED copying of software is illegal. Copyright law protects software authors and publishers, just as patent law protects inventors.

ALTERNATIVES TO EXPLORE

Software can be expensive. You may think that you cannot afford to purchase certain programs that you need. But there are legal alternatives to unauthorized copying.

SITE LICENSED AND BULK-PURCHASED SOFTWARE

Your institution may have negotiated agreements that make software available either to use or to purchase at special prices. Consult your campus computing office for information. Software available through institutional site licenses or bulk purchases is subject to copyright and license restrictions, and you may not make or distribute copies without authorization.

SHAREWARE

Shareware, or "user-supported" software, is copyrighted software that the developer encourages you to copy and distribute to others. This permission is explicitly stated in the documentation or displayed on the computer screen. The developer of shareware generally asks for a small donation or registration fee if you like the software and plan to use it. By registering, you may receive further documentation, updates and enhancements. You are also supporting future software development.

PUBLIC DOMAIN SOFTWARE

Sometimes authors dedicate their software to the public domain, which means that the software is not subject to any copyright restrictions. It can be copied and shared freely.

Software without copyright notice is often, but not necessarily, in the public domain. Before you copy or distribute software that is not explicitly in the public domain, check with your campus computing office.

UNAUTHORIZED copying of software by individuals can harm the entire academic community. If unauthorized copying proliferates on a campus, the institution may incur a legal liability. Also, the institution may find it more difficult to negotiate agreements that would make software more widely and less expensively available to members of the academic community.

UNAUTHORIZED copying of software can deprive developers of a fair return for their work, increase prices, reduce the level of future support and enhancement, and inhibit the development of new software products.

c. *If software is not copy-protected, do I have the right to copy it?*

Lack of copy-protection does NOT constitute permission to copy software in order to share or sell it. "Non-copy-protected" software enables you to protect your investment by making a back-up copy. In offering non-copy-protected software to you, the developer or publisher has demonstrated significant trust in your integrity.

d. *May I copy software that is available through facilities on my campus, so that I can use it more conveniently in my own room?*

Software acquired by colleges and universities is usually licensed. The licenses restrict how and where the software may be legally used by members of the community. This applies to software installed on hard disks in microcomputer clusters, software distributed on disks by a campus lending library, and software available on a campus mainframe or network. Some institutional licenses permit copying for certain purposes. Consult your campus authorities if you are unsure about the use of a particular software product.

e. *Isn't it legally "fair use" to copy software if the purpose in sharing it is purely educational?*

No. It is illegal for a faculty member or student to copy software for distribution among the members of a class, without permission of the author or publisher.

QUESTIONS YOU MAY HAVE ABOUT USING SOFTWARE

a. ***What do I need to know about software and the U.S. Copyright Act?***

Unless it has been placed in the public domain, software is protected by copyright law. The owner of a copyright holds exclusive right to the reproduction and distribution of his or her work. Therefore, it is illegal to duplicate or distribute software or its documentation without the permission of the copyright owner. If you have purchased your copy, however, you may make a back-up for your own use in case the original is destroyed or fails to work.

b. ***Can I loan software I have purchased myself?***

If your software came with a clearly visible license agreement, or if you signed a registration card, READ THE LICENSE CAREFULLY before you use the software. Some licenses may restrict use to a specific computer. Copyright law does not permit you to run your software on two or more computers simultaneously unless the license agreement specifically allows it. It may, however, be legal to loan your software to a friend temporarily as long as you do not keep a copy.

RESPECT for the intellectual work and property of others has traditionally been essential to the mission of colleges and universities. As members of the academic community, we value the free exchange of ideas. Just as we do not tolerate plagiarism, we do not condone the unauthorized copying of software, including programs, applications, data bases and code.

THEREFORE, we offer the following statement of principle about intellectual property and the legal and ethical use of software. This "code"—intended for adaptation and use by individual colleges and universities—was developed by the EDUCOM Software Initiative.

SOFTWARE AND INTELLECTUAL RIGHTS

Respect for intellectual labor and creativity is vital to academic discourse and enterprise. This principle applies to works of all authors and publishers in all media. It encompasses respect for the right to acknowledgment, right to privacy, and right to determine the form, manner, and terms of publication and distribution.

Because electronic information is volatile and easily reproduced, respect for the work and personal expression of others is especially critical in computer environments. Violations of authorial integrity, including plagiarism, invasion of privacy, unauthorized access, and trade secret and copyright violations, may be grounds for sanctions against members of the academic community.

The Software Initiative Newsletter

Published by EDUCOM | Volume 3 | Issue #4 | November/December1989

Mathematics Association of America Endorses EDUCOM Code

The Board of Governors of the Mathematical Association of America (MAA) unanimously endorsed the EDUCOM Code at its August 1989 meeting. In doing so, the MAA becomes the first professional disciplinary society to join thousands of individuals at colleges and universities who have already endorsed the Code.

Peter Renz, Associate Director of the MAA and editor of its *FOCUS* newsletter says, "With its endorsement, the Board is suggesting that the MAA membership take a closer look at computing technology and especially how we train people to use software. I am pleased to include the EDUCOM Code in the October issue of *FOCUS*. We are asking that members distribute and discuss the Code with software users at their institutions."

Steven W. Gilbert, EDUCOM Vice President and Director of the Software Initiative said, "I am extremely pleased that the MAA has joined us in recognizing that computer-based works can and should be a part of higher education's central tradition of respect for intellectual achievements and that plagiarism in any form should be repudiated."

Kenneth M. King, President of EDUCOM stated, "I welcome the MAA into the ever-growing group of individuals and institutions

(continued on page 3)

Bell Atlantic Supports EDUCOM/ NCRIPTAL Awards Program

The Bell Atlantic Charitable Foundation is awarding $30,000 to EDUCOM in support of the EDUCOM/NCRIPTAL Higher Education Software Awards Program, according to Christopher E. Clouser, president. The grant will be paid in three installments each of $10,000, the first of which is expected by December 1, 1989.

"By rewarding developers and the faculty members who guide them, this program encourages the use of software for instructional purposes, an important component in improving education in this country," said Clouser.

According to EDUCOM's Vice President Steven Gilbert, "We're delighted by Bell Atlantic's commitment to the continuation of the awards program, now entering its fourth year. This kind of support sends the right message to software developers and faculty to continue meeting the challenge of integrating technology in the curriculum."

Message from ESI Director Steven W. Gilbert

It seems that we take a significant step forward at every ESI Meeting, and the October 15-16, 1989 Ann Arbor session was no exception. As you will read in this Newsletter about our new Educational Users of Information Technology (EUIT) Member Committee, we have made great progress in integrating the ESI (and its growing scope) within EDUCOM. We are even closer to "institutionalizing" the ESI and more assured that our work will continue with a broader scope and increasing commitment from EDUCOM's Board.

It was my great pleasure to be able to make several important announcements during our meeting on Monday, October 16 and to introduce Ken King, EDUCOM's President, for a presentation confirming the new role of the ESI and some new directions and structures for EDUCOM. We also heard presentations from ESI "old-timers": Brian Hawkins, Reaching the Faculty—An Academic Viewpoint; Peggy Seiden, Software Information Resources—An Update; Mike Looney, Vendor Concerns—A Software Publisher's View; and Brian Kahin, The Software Patent Crisis (NOTE: A much abbreviated version is available on page 5 of this Newsletter).

(continued on page 2)

In This Issue...

EDUCOM and the EDUCOM Software Initiative

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ISSN 1041-7206

EDUCOM is a non-profit consortium of colleges, universities, and other institutions founded to facilitate the introduction, use, and management of information technology in higher education. EDUCOM provides a forum for the exchange of ideas on computer applications for addressing critical issues about the role of computing and related technology in higher education.

The EDUCOM Software Initiative (ESI) addresses the development, distribution, and use of software in higher education. Through active collaboration of EDUCOM members and corporate associates, the ESI has formed Task Groups that conduct various projects and generate publications.

The ESI Newsletter is published 4 times a year by the EDUCOM Software Initiative and is distributed to more than 1,150 individuals, including active ESI participants and groups interested in the ESI mission. It provides a timely update on relevant progress and events, and distributes requests for help and collaboration, etc.

Individuals wishing to contribute articles, announcements, or other items of interest to the ESI participants are encouraged to send the contribution to ESI@EDUCOM or X1938 on AppleLink; or send Macintosh or IBM PC diskettes in text-only format; or hard copy to Pauline Eden, EDUCOM, 777 Alexander Road, Princeton, NJ 08540.

The EDUCOM Software Initiative is grateful to the following institutions for their continuing financial support, collaboration, and/or partnership roles in the ESI:

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Pew Charitable Trusts
Rutgers, The State U. of NJ
Software Publishers Association
Sun Microsystems, Inc.
U. of Missouri-Columbia
U. of Southern Calif.

Message from ESI Director Steven W. Gilbert

(continued from page 1)

We were delighted to learn later in the week that Brian Hawkins had been elected Chairman of the Board of Trustees for EDUCOM, and that Tom West, another ESI founder on EDUCOM's board, was elected Treasurer.

It was an honor to provide an opportunity for John Connolly to make the first public announcement of his new company, Course Technology, Inc., which is the first company I know of that focuses entirely on developing and publishing software for higher education. (More information available in News Briefs, page 13.)

Perhaps of greatest long-term significance was the announcement that the Mathematics Association of America has officially endorsed the EDUCOM Code and is distributing the full text of our brochure ***Using Software*** to its 28,000 members. While many colleges and universities have adopted versions of the EDUCOM Code, this is the first professional academic disciplinary society to do so. We hope more will follow. More significant, the MAA's action reflects a growing awareness of the problems (and commitment to solve them) in higher education about ethical and legal treatment of intellectual property in our increasingly electronic environment. (See page 1 for more information about the MAA's endorsement.)

As you see from the article on page 1, Bell Atlantic has become a sponsor of the EDUCOM/NCRIPTAL Higher Education Software Awards Program, with a three-year commitment. The active participation of Bell Atlantic's Karen Maples and Nancy Ebling have also aided our efforts.

Just after the Snowmass meeting this summer, John Seamster of Borland took the time to tell me of his concerns about the somewhat dwindling role of vendors within the ESI and of an apparent lapse in ESI's commitment to those aspects of the original mission of greatest relevance to the software industry. As is typical of ESI participants, John has been willing to convert this concern to constructive action and is rekindling the enthusiasm of some of his vendor-representing colleagues. On short notice, John was able to put together a brief meeting of a few such representatives in Ann Arbor and is now planning to move that group ahead in concert with other ESI activities. I believe that his group is about to suggest several specific projects, including a successor to the ***Using Software*** brochure that more directly addresses the concerns and needs of faculty and administrators.

The vendor group first met with other ESI project groups for a brief update and overview of several projects that share some focus on matters of the distribution of software and the distribution of information about software. This group includes Review of Academic Software (Project 2.2), EDUCOM Distinguished Software Collection (Project 3.2), and Directory of Software Sources for Higher Education (Project 3.4). We are still learning about how to disseminate and publish the results of these and other projects.

Project EASI continues to work the longest hours and initiate the greatest number of activities per participant. Help them out by ordering several of their attractive and informative T-shirts!

Also of symbolic significance is the distribution by the League for Innovation in the Community College of Kamala Anandam's ESI project brochure ***Software Snapshots: Where are You in the Picture?*** This is the first time that EDUCOM has been formally linked with a leading community college organization. Anandam has also just edited a book in the EDUCOM Strategy Series, **Transforming Teaching with Technology: Perspectives from 2-Year Colleges.**

You will find on page 5 another update on the status of the Software Rental Amendments Act. It appears that guarded optimism is in order. Our efforts, which have been guided and led so effectively by Frank Connolly, have been heard.

I continue to be encouraged by the growing number of individuals within the EDUCOM community and from other organizations that are recognizing the increasing importance of intellectual property issues for the effective use of information technology in education in the next decade. The number of meetings and presentations on this broad and complex subject is growing. I was invited to testify at an oversight hearing on Computers and Intellectual Property for the House Judiciary Subcommittee on Courts, Intellectual Property and the Administration of Justice (see summary of testimony on page 6), and to write a paper on the subject for the Office of Technology Assessment.

Finally, Dave Smallen, Chair of the EDUCOM Board's Euit Committee, offers some encouraging insights for those of you who are dismayed by how slowly we progress and how hard-won our victories seem to be. Dave's article (see page 7) provides heartening food for thought.

The last few months have been hectic, but exhilarating. And, the coming months are lining up to be more of the same. Your input on EUIT is critical now. Please take the time to send your comments to me, Pauline Eden at EDUCOM, or to any of the ESI/EUIT committee members whose phone numbers and e-mail addresses appear on page 4. We all look forward to hearing from you.

MAA Endorses EDUCOM Code

(continued from page 1)

endorsing both the statement and the intent of the EDUCOM Code. Their endorsement indicates that professional academic associations are uniting to extend the same respect and courtesy to software developers as to authors of print material. We invite other societies and associations to do likewise."

David Smith, Chair of MAA's Committee on Computers in Mathematics Education (CCIME), described the Committee's involvement, "After many months of discussion, we agreed that the bad practices of the past should be rectified, and one way that professors could help was to support and discuss the Code with their students. Consequently, the CCIME unanimously agreed to ask the MAA Board to support the EDUCOM Code at their next meeting."

Eugene Herman, Editor of Computer Corner in **The College Mathematics Journal**, and other members of the editorial staff observed, "This statement marks the end of an era of naive thinking about ownership and fair use of software and a pledge that we will now grant the same respect to the intellectual work and property of software authors as we are accustomed to granting print authors. We're reprinting the EDUCOM Code in **The CMJ**'s March 1990 issue so that our readers at colleges or universities without a responsible policy on student and faculty use of copyrighted software will have a good starting point."

About to celebrate its 75th anniversary, the Mathematical Association of America is a professional disciplinary association of approximately 28,000 members involved in mathematics education on the post-high school and high school levels. For information about the MAA, write to the Association's offices at 1529 18th Street NW, Washington, DC 20036.

More than 350,000 copies of the EDUCOM Code, contained within ***Using Software—A Guide to the Ethical and Legal Use of Software for Members of the Academic Community***, have already been distributed to colleges, universities, and software vendors. The ***Using Software*** brochure was produced collaboratively by EDUCOM and ADAPSO, the computer software and services industry association. For information about EDUCOM, the EDUCOM Software Initiative, or a complimentary copy of the EDUCOM Code, contact Angela Walsh at EDUCOM.

ESI/EUIT Member Committee Report, November 1989

Alison Hartman, Tulane University

In the slightly more than four years since its inception, the EDUCOM Software Initiative (ESI) has reached beyond its unpretentious name and modest expectations to develop solutions to problems of vital interest and importance to participants and their institutions. To acknowledge the ESI's accomplishments—and to seek effective ways to represent and involve EDUCOM member institutions—the EDUCOM Board of Trustees has adopted a new programmatic focus, the Educational Uses of Information Technology (EUIT).

Accompanying this focus is a new organizational structure that includes a set of "member committees," groups of individuals who will work with EDUCOM Board committees to shape and implement EDUCOM's evolving mission. In Ann Arbor, the Board proposed EUIT as the first such committee. Others are likely to include the National Telecommunications Task Force (NTTF); Publications; and Conference, Seminar, and Workshop committees.

Responding swiftly to the Board's invitation, ESI participants in

(continued on page 4)

Project 4.4: The Computer Software Rental Amendments Act

(continued from page 5)

Thanksgiving break. It is most likely this legislation will not be reconsidered by the Senate until it reconvenes in January, 1990.

There has been no hearing scheduled on the specific legislation in the House — although one can presume no action will occur until Nintendo and the other games manufacturers reach some form of agreement.

Last week, Steve Gilbert testified at a background hearing before the House Judiciary Committee looking into Intellectual Property and computer software issues in general. (NOTE: A summary of the testimony appears on page 6.)

What to do in the meantime? Stay tuned. It appears we have won the exemption we sought as no one objected to the change introduced by Sen. Hatch. That seems to mean we wait and watch, making sure that our interests are neither forgotten nor compromised. When the Bill is back on track, I'll let you know. If our interests are in danger, I'll not only let you know, I'll ask for your help. Please check LISTSERV at AUVM for a weekly update.

Thanks for your help. Have a Happy Holiday.

To check LISTSERV from IBM/VM sites:
TELL LISTSERV AT AUVM GET COPYRITE PACKAGE

From VAX/VMS sites:
SEND LISTSERV@AUVM SEND COPYRITE PACKAGE

Or, request individual files with the command:

From IBM/VM Sites:
TELL LISTSERV AT AUVM GET COPYRITE x

From VAX/VMS sites:
SEND LISTSERV@AUVM SEND COPYRITE x

where *x* is:

SENATORS — for names, addresses, and phone numbers of senators on the Judiciary committee
REPS — for names, addresses, and phone numbers of members of the House of Representatives
STATUS — for the latest status
EDUCOM — for a copy of Steve Gilbert's testimony to Senate Judiciary Committee
EXPLAIN — for a summary of the issue prepared by Brian Kahin
CHANGE — for the wording of the modification currently being considered
CONNOLLY — for a copy of Frank Connolly's testimony to Senate Judiciary Committee

Information Technology, Intellectual Property, & Education

Summary of Testimony of Steven W. Gilbert, Vice President, EDUCOM for the Oversight Hearing on Computers and Intellectual Property before the House Subcommittee on Courts, Intellectual Property and the Administration of Justice — November 8, 1989

EDUCOM, founded in 1964, is a consortium of some 580 colleges and universities and more than 140 Corporate Associates dedicated to facilitating effective use of information technology in higher education. We developed the EDUCOM Code [NOTE: see page 7 of this Newsletter], a broad statement of principle widely disseminated in higher education and adopted by many colleges and universities.

We are concerned about a complex constellation of interests and resources represented by: 1) those who are deeply involved with education, 2) those who provide information technologies and related services, and 3) those who are actively concerned with intellectual property issues. Education depends on publishers and distributors of information of all kinds. All industries, but especially those that produce, publish, and distribute information-based products and services, rely on education as the primary source of new research and of new qualified personnel and leaders. We need to work together to develop a new stable system of information policies and mechanisms to serve the vast information needs of all the people. Under the present legal and economic conventions, easy use of the widest range of information and related services may become available only to individuals affiliated with a few large universities or corporations.

It would be a tragedy if the technology that offers the greatest hope for democratizing information became the mechanism for withholding it.

The risk is that in this rapidly changing technological environment the better-represented interests of the more traditional publishers and distributors, and of industries such as entertainment and telecommunications, may influence the development of new economic and legal patterns in ways that inadvertently conflict with the best long-term interests of the creator/producers and of the users of information especially in educational institutions.

It is too early to suggest immediate solutions, but we can begin to better define terms, articulate issues, and develop a more effective conceptual framework, one extending beyond the legal issues of "intellectual property." While we are deeply concerned about developments in patents which threaten to undermine our efforts to create an environment of respect for the rights of software authors and publishers, we can also identify four broader needs that should be addressed:

1. The need for new economic mechanisms to democratize the access to and use of information. Economic mechanisms beyond copyright and patent must be considered. "Fair use" must be extended to the new electronic environment.

2. The need for a new code of ethics and new guidelines.

3. The need for effective representation of creator/producers and users of information.

4. The need for a forum in which the voice of education will be strong and well-heard.

EDUCOM Software Initiative

SNOWMASS Meeting
August 8, 1990 - August 11, 1990

Controversial Issues and Ideas

A Great Problem With A Great Tradition

David Smallen, Hamilton College
Chair of the EDUCOM Board EUIT Committee

Discouragement is a common feeling among those of us who have been waiting and working for the important impact information technology will have in the areas of teaching and learning. We sometimes wonder if, and when, our Presidents, Provosts, and Deans will call off the investments that many of them have made on information technology to improve what goes on in the classroom.

We can point to some notable achievements, exemplified by the annual winners of the EDUCOM/NCRIPTAL Software Awards. Among our own faculty there are good examples of those who have triumphed over the barriers of software development and adaptation to integrate computing into their courses. But, progress seems painfully slow. New software development tools that will remove the barriers always seem just around the next corner.

So, what keeps us going?

What we don't remind ourselves often enough is how difficult the challenge is that we are facing. A challenge that is the most difficult one faced by those of us supporting the use of information technology in higher education. Building infrastructure (campus, regional and national networks, public facilities, providing for the financing of sufficient hardware and software) is difficult, but orders of magnitude easier than improving what goes on in the classroom.

Colleges and universities have a long history, in the case of my institution over 175 years, of transmitting knowledge pretty much in the way we currently do. Lectures and seminars are a traditional part of academe, and nothing is as hard to change as tradition. This is especially true when it appears that putting motivated students together with good faculty in a comfortable setting is 80 percent or more of what is necessary to produce good results.

Progress IS slow, and our institutions have been equally slow in investing in the infrastructure that might move the process along at a faster pace. After all, what we have been doing for the last century appears to be working fairly well.

The difficult question is: "Will substantial investments in information technology significantly improve what goes on in the undergraduate years, or would other investments have bigger payoffs for our institutions as we move into the 21st century?"

Don't get discouraged. Recognize, up front, that what you are doing is (a) important, and (b) difficult. Celebrate the small victories, and redouble your efforts when things don't seem to be going your way. We don't have all the answers, but rather, we are all a part of an important experiment.

What's your opinion? Send your responses to Pauline Eden at EDUCOM, and we will print them in the next issue of the Newsletter.

The EDUCOM Code

Respect for intellectual labor and creativity is vital to academic discourse and enterprise. This principle applies to works of all authors and publishers in all media. It encompasses respect for the right to acknowledgement, the right to privacy, and the right to determine the form, manner, and terms of publication and distribution.

Because electronic information is volatile and easily reproduced, respect for the work and personal expression of others is especially critical in computer environments. Violations of authorial integrity, including plagiarism, invasion of privacy, unauthorized access, and trade secret and copyright violations, may be grounds for sanctions against members of the academic community.

The EDUCOM Code, a statement of principle about intellectual property and the legal and ethical use of software, was developed by the EDUCOM Software Initiative and intended for adaptation and use by individuals, colleges and universities.

1989 EDUCOM-USC Survey of Desktop Computer Use in Higher Education

Kenneth C. Green, University of Southern California

In Fall 1989, USC's Center for Scholarly Technology will conduct a national survey of desktop computing in higher education. The survey, sponsored by EDUCOM and supported by EDUCOM's Corporate Associates, will provide a comprehensive profile of desktop computing in the nations two- and four-year colleges and universities.

Some 2000 campuses (all four-year colleges and universities plus a stratified one-third sample of two-year institutions) will be surveyed as part of a broad effort to profile both the macro- (i.e.,

(continued on page 8)

1989 EDUCOM–USC Survey

(continued from page 11)

cross-campus) and micro- (i.e., departmental) environments of desktop computing. The microenvironment analyses will address the broad differences in computing activities, policies, and resources across the humanities, social sciences, and the life/physical sciences.

The survey project will focus on campus policies, procedures, programs, and plans affecting desktop computing. The questionnaires will address an array of issues of concern to campuses and corporations, as outlined below:

Campus codes governing computer access;
User support policies and programs;
Hardware preferences and standards;
Software preferences and standards;
Campus labs;
Site licensing agreements;
Institutional purchasing plans;
Services for disabled users;
Installed base of campus systems;
Estimated number of campus users;
Resale policies and programs;
Networking;
Faculty support/purchase policies and programs; and
Instructional software utilization and development.

The data analysis and survey reports will focus on institutional and disciplinary profiles. The summary reports will profile computing in key departments (engineering vs. psychology vs. English/writing programs) as well as computing in different types of institutions (research universities vs. comprehensive campuses vs. liberal arts colleges vs. two-year institutions). The summary reports will also address departmental differences across institutional types (e.g., computing activities and resources in engineering or psychology programs in research universities vs. comprehensive institutions).

Campuses participating in the survey will receive a profile report comparing their campus data with national normative data for similar types of institutions (i.e., research universities, liberal arts colleges, state universities, and two-year campuses). Additionally, participating campuses may order supplemental reports with special comparative analyses. Corporate sponsors will receive early access to the summary data and reports, plus a limited opportunity to request special supplemental analyses. (Note: USC will not provide special supplemental reports to EDUCOM Corporate Associates and other vendors who are not survey sponsors.)

For additional information about the survey, please contact: Kenneth C. Green, Senior Research Associate; Center for Scholarly Technology; University of Southern California; 230 Doheny Library, Los Angeles, CA, 90089-0182; (213) 743-3470.

IBM Chairman Announces Award at EDUCOM'89

IBM Chairman John F. Akers, speaking before an audience of higher education academics and administrators, announced the Dr. Louis Robinson Award, honoring the late IBM computer technology expert. Mr. Akers was the keynote speaker at the opening of the 25th anniversary conference of EDUCOM, held at the University of Michigan, Ann Arbor on October 17, 1989.

The Robinson Award, funded by IBM and administered by EDUCOM, is being created to stimulate and recognize advances in understanding how to use information technology to improve teaching and learning. Dr. Louis Robinson, a former director of IBM university relations, served the company for 32 years and was a highly regarded expert on technology for the industry and the general public.

"While he may have been a business executive by profession, he was at heart a teacher," said Mr. Akers. "He had a unique ability to combine technology with the humanities."

Winners of the Robinson Award will receive $25,000 in cash and $25,000 in IBM equipment and software. One award will be presented annually at the EDUCOM fall conference for the next four years beginning in 1990. In addition, up to three recognition awards will be presented each year, and will consist of $10,000 in cash and $10,000 in IBM equipment and software.

Academics, administrators, colleges and universities, or a group within an institution are eligible based on one of the following criteria:

- a contribution to the understanding of how information technology can be used to improve teaching and learning;
- a contribution to the understanding of how to evaluate the effectiveness and impact of information technology;
- an outstanding example of a support system that applies information technology to improve the teaching and learning environment.

For information about the Robinson Award or to receive an application, write to Louis Robinson Award, c/o EDUCOM, 777 Alexander Road, Princeton, NJ 08540.

ESI Newsletter Editorial Calendar

For Volume 4:	Deadline is:
February/March	March 1, 1990
April/May	May 1, 1990
July/August	August 9, 1990
October/November	November 1, 1990

New "Strategies Series" Titles

Four new books in the EDUCOM Strategies Series on Information Technology have been released recently. Development of all four was generously supported by EDUCOM Corporate Leadership Sponsors Apple Computer, Inc. and International Business Machines Corporation.

■ **Campus Strategies for Libraries and Electronic Information**, edited by Caroline Arms, describes through case studies written by participants, the planning and implementation of library and information systems at ten academic institutions in the United States. The emphasis is on their handling of information in electronic form. Also included are chapters covering relevant technology trends and projects at other libraries. EDUCOM members, contact Academic Computing Publications, Inc., PO Box 804, McKinney, TX 75069; 214-548-2101, cost $25. Non-EDUCOM members, contact Digital Press Order Division, 12 Crosby Drive, Bedford, MA 01730-1493; phone 1-800-343-8321, order number EY-C185E-DP, cost $35.

Editor Caroline Arms is an independent computing consultant specializing in applications and training for education and small businesses. She is also the editor of **Campus Networking Strategies**, published in 1988.

The development of this book was supported in part by grants from EDUCOM Corporate Associates — Apple Computer, Inc., Digital Equipment Corporation, International Business Machines Corporation, and NeXT, Inc.

■ **Computing Across the Curriculum: Academic Perspectives**, edited by William Graves, University of North Carolina-Chapel Hill, presents faculty, curriculum, and institutional perspectives on technology in higher education.

Faculty perspectives are provided by 10 academicians. The curriculum perspectives involve a discussion of computing in writing instruction and in foreign language teaching and research. Profiles offer a detailed glimpse of computing at Cornell, Dartmouth, Drake, Iona, Miami-Dade, Stevens Institute of Technology, the University of Illinois at Urbana-Champaign, the University of North Carolina at Chapel Hill, and Western Washington University.

Editor William Graves is a Special Assistant to the Provost with responsibility for, among others, coordinating academic information technologies campus-wide. As of June, 1989, Dr. Graves became the Director of the Institute for Academic Technology, supported by IBM and located at UNC-CH.

The development of this book was supported in part by grants from EDUCOM Corporate Associates — Apple Computer, Inc., Digital Equipment Corporation, International Business Machines Corporation, and NeXT, Inc.

■ **Organizing and Managing Information Resources on Campus** was edited by Brian Hawkins, Vice President for Computing and Information Services at Brown University. The book consists of three sections, focusing on the perspectives, logistics, and financing associated with information resources on campus.

The first section, provides perspectives on information technology on campus, and includes chapters written from the perspective of a Research University, A Small College, a Community College, and a Vendor. The second section discusses planning, organizing, and supporting information resources on campus, and the third section describes financial planning for information resources on campus.

Development of this book was made possible by grants from EDUCOM Corporate Leadership Sponsors Apple Computer, Inc. and International Business Machines Corporation.

■ **Transforming Teaching with Technology: Perspectives from 2-Year Colleges**, edited by Kamala Anandam, explores the role of technology at thirteen diverse community colleges. In her introduction, Anandam outlines the importance of the community college within the world of higher education, "Community colleges are no small force in higher education. Nearly half of all undergraduate students attend two-year colleges; almost one-third of the international students and 48 percent of the minority students in higher education are enrolled in community colleges; of all the credit students enrolled in the two-year colleges, nearly two-thirds are part-time, 80 percent are employed, 10 percent are physically handicapped, and 53 percent are women. The colleges assist the underprepared students who constitute 30 percent of the five million students enrolled for credit, train the vocationally inclined students for employment or retooling (roughly 50 percent), and prepare the college-bound students for transfer to upper-division classes."

Kamala Anandam, a native of India, currently serves as Associate Dean of Educational Technologies at Miami-Dade Community College. In 1988 she was selected as an IBM/ACIS Consulting Scholar, the first individual to be selected from a two-year college. Development of this book was made possible by grants from EDUCOM Corporate Associates — Apple Computer, Inc., Digital Equipment Corporation, and International Business Machines Corporation.

Computing Across the Curriculum: Academic Perspectives, Organizing and Managing Information Resources on Campus, and Transforming Teaching with Technology: Perspectives from 2-Year Colleges may be ordered from Academic Computing Publications, Inc. PO Box 804, McKinney, TX 75069, 214-548-2101. The price of each book is $30.00 for EDUCOM members and $40.00 for non-members.

EDUCOM/NCRIPTAL Awards Calendar

October, 1989	Entry forms available for 1990 Awards Competition from NCRIPTAL
March 2, 1990	Application Entry Deadline
August 8, 1990	First Public Announcement of Winners at ESI Snowmass Meeting
October 14-17, 1990	Awards Presented at EDUCOM'90 Conference

Mark Your Calendar

American Association of Higher Education
San Francisco Hilton
San Francisco, CA
April 1-4, 1990

Steve Gilbert (ESI Director) and Casey Green (ESI participant) are on the program. For information about the conference contact AAHE at 202-293-6440.

National Association of College Stores
San Jose, CA
April 4-8, 1990

"NACS'90: Forging the Future" is being held in conjunction with Campus Market Expo '90. Steve Gilbert and Casey Green are on the program. For information about the conference contact Roger Reynolds, 801-581-3158.

Fifth World Conference on Computers in Education
Darling Harbour Convention
Sydney, Australia
July 9-13, 1990

The conference, held every five years, addresses all aspects of educational computing. For information, contact: WCCE/90, Australian Computer Society, PO Box 319, Darlinghurst, NSW 2010, Australia; Phone (+612) 211 5855.

Electronic Publishing '90
Preliminary announcement
Washington, DC area
September, 1990

An international conference on electronic publishing will be held on the Washington campus of the National Institute of Standards and Technology. For information, contact: Lawrence A. Welsch/ EP90, National Institute of Standards and Technology/TECH B266, Gaithersburg, MD 20899, or electronically via Internet: EP90@ASL.ICST.NBS.GOV (Source: CCNEWS)

Silicon Basement Seminars

The Seminar is designed for academic deans, directors of academic computing, and other interested individuals. The goal is to provide assistance in planning for incorporating computing into the curriculum. Also addressed are specifics such as the quality of teaching and learning, and access to resources of the institution. For additional information, or a schedule of upcoming seminars, contact Diane Balestri, Princeton University, (609) 452-5524.

Software Licensing Agreements

For a comprehensive listing of courses and seminars, contact Barbara Fieser, Executive Director, Computer Law Association, Fairfax, VA; (703) 560-7747.

(Editor's Note: Conferences and seminars are listed for your information. EDUCOM and the EDUCOM Software Initiative neither endorse nor sponsor any Conference unless so stated. To list your organization's conference in this column, contact Pauline Eden at EDUCOM.)

ESI Participants Respond to Surveys

Last spring and again at the ESI 1989 Snowmass meeting, ESI participants returned completed surveys that were designed to solicit information concerning each person's level of involvement and individual satisfaction with the ESI and ESI activities. Since the two surveys were slightly different, the results are discussed separately.

The First Survey

The first survey of ESI Participants and ESI Newsletter readers was distributed with copies of the April/May, 1989 issue of the Newsletter. A total of 127 surveys were completed and returned. Almost half of the respondents had the primary responsibility for managing college or university staff who help faculty members with information technology. The second largest group was comprised of college or university staff who themselves help faculty members with information technology.

When asked what aspects of the ESI events were most valuable, respondents indicated that the most valuable activities were meeting ESI college/university participants, working in task groups, and working on projects.

When asked which publications they had recommended to others, respondents overwhelmingly indicated the ***Using Software*** brochure. The next most recommended books were **Directory of Software Sources for Higher Education** (Peggy Seiden), **Campus Networking Strategies** (Caroline Arms), **University Software Resource Guide** (SPA/EDUCOM), **NCRIPTAL video tapes** (NCRIPTAL), and **Ivory Towers, Silicon Basements** (Balestri).

The publication most often listed as useful to individuals in their jobs was **EDUCOM's Directory of Members, Programs, & Projects, 1988-1989.** The next most useful books were **Directory of Software Sources for Higher Education** (Seiden), **University Software Resource Guide** (SPA/EDUCOM), **EDUCOM Corporate Associates Program Special Offers for EDUCOM Members** (EDUCOM), and equally useful were **Facilitating Academic Software Development** (Sprecher) and **Ivory Towers, Silicon Basements** (Balestri).

Respondents prioritized the general goals that ESI should address during the coming year. More people felt that the ESI's first priority should be to evaluate the quality and impact of software so that better information would be available about the use and impact of information technology on teaching and learning in higher education. An equal number of people identified the following as their first priorities: (a) new alliances should be established among the academic computing staff, vendors, college stores, libraries, etc., to promote more effective distribution of software, examination copies of software, and information about its use; (b) more and better academic software be developed for higher education.

When asked to identify the specific issues/projects/objectives that the ESI should address during the coming year, more people indicated as first priority the development of models for software pricing and licensing agreements that are both more comfortable for college and university purchasers and more consistently supportive of economic returns to software publishers adequate to sustain continued product development for higher education. Two smaller groups of equal number indicated the following to be first priority: (a) more and better information available to faculty about how to use software to support teaching, learning, and research; (b) more and better access for faculty to software for examination, review, demonstration, etc.

The Second Survey

A second, similar, survey was distributed to 116 registrants who attended the ESI Snowmass 1989 meeting during August, 1989. Of this second survey, twenty-two (19%) were completed and returned. (NOTE: Many preferred to limit their responses to the first survey distributed in the last Newsletter.) Approximately one-third indicated that they were primarily employed as someone who manages college or university staff who help faculty members with information technology.

The group indicated that working in projects and meeting other ESI college/university participants were the more valuable aspects of attending ESI events.

Respondents were asked to indicate their level of agreement/disagreement about the articulation of the EUIT (Educational Uses of Information Technology Program) and the ESI. Mixed response was elicited by the statement "The ESI should maintain its name and identity as one specific project within the 'umbrella' of the EUIT" (with more people indicating they disagreed with the statement). Most people indicated strong agreement with "The ESI should expand its scope and change its name, becoming the EUIT;" but, strongly disagreed that "The ESI should conclude all ESI activities, and permit the EUIT to form as a new structure."

There were mixed opinions about the importance of being officially identified as an individual member of EDUCOM, with the largest number expressing indifference. Approximately the same number of people were in strong agreement with the importance of being identified as a member of the ESI (assuming that individual membership in the ESI includes having an opportunity to vote on attaching priorities to issues and electing individuals to an ESI Executive Advisory Committee) or of the EUIT (assuming that the ESI is merged into the EUIT, and that individual membership in EUIT has a set of benefits and responsibilities in addition to individual membership in EDUCOM.)

Summary:

Similar trends were apparent in both sets of survey responses. These include:

- ❑ Most ESI survey participants manage college or university staff who help faculty members with information technology.
- ❑ Attendance at ESI meetings has climbed steadily from 1986 to 1988.
- ❑ The most valuable aspects of ESI meetings are meeting other ESI college/university participants and working in project and task groups.

The first survey indicated that:

- ❑ General goals of the ESI during the coming year should be:
  - To evaluate the quality and impact of software
  - To establish functional ESI alliances and structure
  - To have more/better academic software available for higher education.
- ❑ Specific issues/projects/objectives that the ESI should address during the coming year should be:
  - Intellectual property and beyond
  - More/better information available to faculty (and those who help faculty) about how to use software to support teaching, learning, research
  - More/better access for faculty to software for examination, review, demonstration, etc.
- ❑ Many who received the survey from the ESI Newsletter are not familiar with most of the ESI publications.
- ❑ The single publication overwhelmingly recommended to others was the ***Using Software*** Brochure.

The second survey indicated that:

- ❑ Regardless of the group's name (whether ESI or EUIT), individuals wanted to continue and/or expand the original mission and goals.

ESI Snowmass 5th Annual Working Sessions
August 8 - 11, 1990
Snowmass, Colorado

Meetings will be held at the Snowmass Conference Center and the Silver Tree Hotel. Accommodations for attendees will be available at the Silver Tree Hotel and the Woodrun Place/Chamonix. Full registration information with a tentative agenda will be available and mailed to all ESI participants after the first of the year.

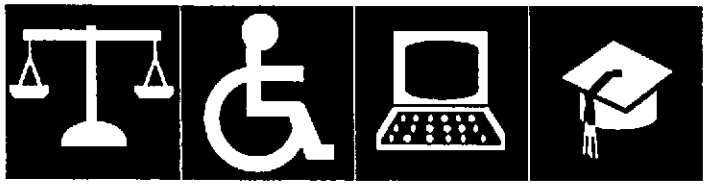
Society for Computers in Psychology Endorses Code

As this issue of the *ESI Newsletter* goes to press, The Society for Computers in Psychology endorsed the EDUCOM Code at its meeting in Atlanta. Watch for details in the next issue of this newsletter!

Project Updates

Project 2.2 — Reviews of Academic Software

Reviews of Instructional Software in Scholarly Journals: a Selected Bibliography, edited by David Bantz, Dartmouth College is now completed. The 99-entry bibliography, arranged alphabetically by academic discipline, includes the name of the journal or book in which the software is reviewed, issue or publication date, length of review, and other specifics about the software. Watch for information about availability.



Project 2.3 — Equal Access to Software for Instruction

Darola Hockley, University of Missouri-Columbia

EASI sessions and activities at EDUCOM were an unqualified success. Once again, EASI committee members worked long and hard to heighten awareness regarding the higher education information technologies access needs of people with disabilities.

The EASI morning panel session provided an overview of campus and statewide approaches to ensure computing access for people with disabilities. Current federal and state legislative initiatives were discussed emphasizing the rights of people with disabilities to fair and equitable access to an information-based society. Several afternoon sessions gave practical advice on adapting existing campus programs to accommodate users with disabilities and provided a look at current and future trends. Adaptive systems providing hands-on opportunities were available in the University of Michigan's new major computing site and in the exhibit area at both the NeXT and CadKey booths.

The University of Michigan's Barrier Free Computer User Group greatly facilitated the accomplishments of all EASI/EDUCOM activities. Barrier Free members along with several Computing Services and Disabled Student Services providers extended offers of support to project EASI.

The Chronicle of Higher Education expressed interest in publishing an article on information technology access needs of people with disabilities in a higher education environment. **The Library High Tech Journal** is exploring the possibility of EASI authoring and coordinating several panel articles related to higher education technology access issues.

EASI energy continued at the Closing the Gap conference in Minnesota. Several EASI members presented on adaptive technology services and support needs. Half of a session was dedicated to discussion of Project EASI's development and activities. Closing the Gap Postsecondary SIG members joined Project EASI to enhance awareness efforts. In addition, Project EASI was invited to present a higher education adaptive technology pre-conference workshop for the Special Education/Rehabilitation Conference to be held at California State University - Northridge (CSUN) in March. Project EASI will hold its midyear working session in conjunction with the CSUN conference.

Project 3.3 — EDUCOM Selected Academic Software

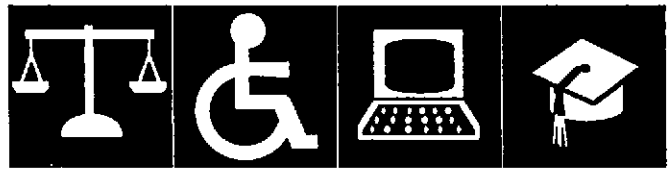
The 1989 preliminary edition of **EDUCOM Selected Academic Software**, compiled by Instruction & Research Computer Center of The Ohio State University, and edited by John D. Chovan of The Ohio State University is now available. The comments that follow are excerpted from the Introduction written by John Chovan.

Although much of software included in this volume was written for a specific course at a specific college or university, much can be applied to a wider context. The project identified, for faculty and support staff in higher education, 138 software programs that through widespread adoption and various forms of review has shown a high level of appropriateness for higher education.

Nominations were solicited from authors, publishers, software users, EDUCOM Corporate Associates, and through ads placed in ***The Chronicle of Higher Education***. To be considered for inclusion, software must have been used in a college or university and met at least one of the following criteria: a faculty member at each of three institutions must recommend the software; received highly favorable peer reviews published within the past three years; or received an educational award from a professional organization within the last three years.

The volume is organized alphabetically by the title of the software package. Each record contains an abstract of the software, system requirements, information about the author, publisher, price (if available), and who nominated the software. Also included is a subject index, an appendix outlining evaluation criteria, and a nomination form for consideration in the second edition.

For additional copies or more information, contact ESI, PO Box 364, Princeton, NJ 08540, 609-520-3340; BITNET: ESI@EDUCOM.



EASI T-Shirts Available

Contact:
Jim Knox
University of Michigan Computer Center
611 Church St. 2nd Fl.
Ann Arbor, MI 48104-3056
313-998-7634
BITNET: user266@UMICHUM
$10.00 Specify size M, L, or XL

News Briefs

Course Technology, Inc., a new company devoted to producing educational software specifically designed for higher education and the company's membership in the EDUCOM Corporate Associates Program were both announced at EDUCOM89 Conference. Course Technology will offer three product lines which will address the need for software-based materials adapted for use on the college level — academic editions of commercial productivity software; academic edition courseware; and standalone courseware. All product lines feature software, sample files, documentation, and faculty support. More information on Course Technology can be obtained by writing to Stephen Bayle, Senior Vice President, Course Technology, Inc., One Main Street, Cambridge, MA 02142; phone 508-922-9820.

Two articles on the legal implications of copyright and electronic media are available on the CCNEWS Articles Archive. Both articles originally appeared in the Fall 1989 issue of the EDUCOM Review. To receive the online versions of these articles send an interactive message or electronic mail to: LISTSERV@BITNIC containing GET Filename Filetype.

"Copyright in the Electronic Environment," by Henriette D. Avram, Library of Congress. This article discusses the Library of Congress' Networking Advisory Committee's recommendations on issues related to intellectual property rights in an electronic environment. NAC members met in April 1987 to discuss copyright, royalty, taxation, licensing, and other topics. The author gives a brief background of the networking issues NAC has addressed in the past and goes on to describe the conclusions NAC reached. This summary document will be published under the title "Networking Planning Papers" in 1989. Filename Filetype: COPYRITE AVRAM_H (209 lines in length)

"Library Automation and the National Research Network," by Clifford A. Lynch, University of California. Using the University of California's electronic cataloging system as an example, this article discusses the challenges facing libraries and institutions as electronic information networks and systems evolve. The practical, economic and legal ramifications of resource networking and sharing are explored in this article as this becomes a reality in universities around the country. The library takes on a new role in the rapidly changing area of electronic information and cataloging. Filename Filetype: LIBAUT LYNC_CL (388 lines in length)

National Collegiate Software Clearinghouse (NCSC) of Duke University Press announced the release of two software programs for undergraduate courses in sociology and economics. FAMSIM helps history and sociology students explore the impact of demographics on family structure. EcoTutor is a set of HyperCard stacks for the Macintosh offering over 300 graphs and diagrams—some with animation—on basic micro and macroeconomic concepts. For further information or a free catalog, write Duke University press, 6697 College Station, Durham, NC 27708; (919) 684-6837.

InterLinguistics Unlimited Inc. (ILU) announced the release of Interlex, a line of multi-lingual dictionary retrieval and reference tools. Interlex is an IBM PC compatible software package designed for professionals in business, education, translating, and government who must read or write in more than one language. A demo disk is available. For information contact ILU, 624 South Front Street, Philadelphia, PA 19147; 215-923-6828.

Publications

New Publications

Campus Strategies for Libraries and Electronic Information, Carolyn Arms, Editor, 1989.

Describes through case studies written by participants, the planning and implementation of library and information systems at ten academic institutions in the United States. The emphasis is on their handling of information in electronic form. Also included are chapters covering relevant technology trends and projects at other libraries. EDUCOM members, contact Academic Computing Publications, Inc., PO Box 804, McKinney, TX 75069; 214-548-2101, cost $25. Non-EDUCOM members, contact Digital Press Order Division, 12 Crosby Drive, Bedford, MA 01730-1493; phone 1-800-343-8321, order number EY-C185E-DP, cost $35.

Computing Across the Curriculum: Academic Perspectives, William Graves, Editor, 1989.

Presents faculty, curriculum, and institutional perspectives on technology in higher education. To order contact Academic Computing Publications, Inc. PO Box 804, McKinney, TX 75069; 214-548-2101. EDUCOM members, $30.00; non-EDUCOM members, $40.00.

EDUCOM's Directory of Members, Programs, & Projects, 1989-1990.

A comprehensive directory of people, institutions, and corporations that support higher education through affiliation with EDUCOM. Includes a list (arranged alphabetically by last name) of key people involved in EDUCOM programs and projects, profiles of the more than 120 EDUCOM Corporate Associations, information about special offers and announcements from the Corporate Associates. EDUCOM members and Corporate Associates may obtain additional copies for $30.00 each. To order contact EDUCOM Corporate Associates Program, PO Box 364, Princeton, NJ 08540, 609-520-3350; BITNET: CAP@EDUCOM.

EDUCOM Selected Academic Software, Preliminary Edition John D. Chovan, Editor, 1989.

The volume is organized alphabetically by the title of the software package. Each of the 138 software records contains an abstract of the software, system requirements, information about the author, publisher, price, and who nominated the software. Also included is a subject index, an appendix outlining evaluation criteria, and a nomination form for consideration in the second edition. For copies or more information, contact ESI, PO Box 364, 777 Alexander

(continued on page 14)

Publications

(continued from page 13)

Road, Princeton, NJ 08540; phone 609-520-3340; BITNET: ESI@EDUCOM.

Organizing and Managing Information Resources on Campus, Brian Hawkins, Editor, 1989.

Consists of three sections, focusing on the perspectives, logistics, and financing associated with information resources on campus. To order contact Academic Computing Publications, Inc. PO Box 804, McKinney, TX 75069, 214-548-2101. EDUCOM members, $30.00; non-EDUCOM members, $40.00.

Reviews of Instructional Software in Scholarly Journals: A Selected Bibliography, 1989.
David A. Bantz, Project Director

The 99-entry bibliography, arranged alphabetically by academic discipline, includes the name of the journal or book in which the software is reviewed, issue or publication date, length of review, and other specifics about the software. Watch for availability.

Transforming Teaching with Technology: Perspectives from 2-Year Colleges,
Kamala Anandam, Editor, 1989.

Explores the role of technology at thirteen diverse community colleges. To order contact Academic Computing Publications, Inc. PO Box 804, McKinney, TX 75069, 214-548-2101. EDUCOM members, $30.00; non-EDUCOM members, $40.00.

See prior issues of ESI Newsletters for details:

Academic Computing: Quick Reference Guide to Higher Education, Spring 1989. Available from Academic Computing, PO Box 804, McKinney, TX 75069; Phone 214-548-2101; FAX 214-542-3451. (Details in Vol. 3 #1)

Campus Networking Strategies, Caroline Arms, Editor, 1988.

Available to EDUCOM members from EDUCOM, 777 Alexander Road, Princeton, NJ 08540; 609-750-3366; BITNET: PUBS@EDUCOM; cost $20. Non-EDUCOM members contact Digital Press Order Division, 12 Crosby Drive, Bedford, MA 01730-1493; phone 1-800-343-8321, order number EY-6736-DP, cost $30. (Details in Vol. 2 #3)

Computer Conferencing as a Tool for Communications, Daniel Oberst, Princeton University, 1988. Free copies available from Angela Walsh at EDUCOM. (Details in Vol. 2 #5)

Directory of Software Sources for Higher Education: A Resource Guide for Instructional Applications, Peggy Seiden, Carnegie Mellon University, Editor, 1988. Peterson's Guides (800-EDU-DATA) for $29.95, (EDUCOM members $19.95). (Details in Vol. 2 #1)

EASI Fixes: Guidelines for Developers of Higher Education Software, ESI Project 2.3, Equal Access to Software for Instruction, July 1989. Available from Angela Walsh at EDUCOM. (Details in Vol. 3 #3)

EDUCOM Corporate Associates Program: Special Offers for EDUCOM Members, Spring 1989. Limited-time discounts on software, hardware, and publications for EDUCOM Member institutions. Available from EDUCOM Corporate Associates Program, 777 Alexander Road, Princeton, NJ 08540, 609-520-3350; BITNET: CAP@EDUCOM. (Details in Vol. 3 #2)

Electronic Learning: From Audiotape to Videodisc by Jerome Johnston, The University of Michigan. Lawrence Erlbaum Associates Inc., 365 Broadway, Hillsdale, New Jersey 07642, $24.95 ($14.95, paper). (Details in Vol. 2 #1)

Evaluation Guidelines For Institutional Information Technology Resources, CAUSE and EDUCOM. Free copies are available from CAUSE, 737 29th Street, Boulder, CO 80303 or from Angela Walsh at EDUCOM. (Details in Vol. 2 #5)

Facilitating Academic Software Development, Jerry W. Sprecher, Editor. Available from Academic Computing, PO Box 804, McKinney, Texas 75069, 214-548-2101; $14.95 (Retail) $9.95 (EDUCOM Members). (Details in Vol. 2 #3)

Ivory Towers, Silicon Basements: Learner-Centered Computing in Postsecondary Education, The FIPSE Technology Study Group. Available from Academic Computing, PO Box 804, McKinney, Texas 75069, 214-548-2101; $14.95 (Retail) $9.95 (EDUCOM Members). (Details in Vol. 2 #3)

Managing Academic Software: Leadership, Law and Logistics for Administrators, Faculty and Publishers by Shirley Smith, Osage Associates. Available from Academic Computing, PO Box 804, McKinney, Texas 75069, 214-548-2101; $14.95 (Retail) $9.95 (EDUCOM Members). (Details in Vol. 2 #3)

Property and Propriety in the Digital Environment: Towards an Examination Copy License—ESI White Paper, by Brian Kahin, MIT. Funded by the Pew Charitable Trusts and Rutgers—The State University of New Jersey, free copies are available from Angela Walsh at EDUCOM. Comments on the models are still welcome and useful. (Details in Vol. 2 #5)

Software Snapshots: Where Are You In The Picture? ESI Project 1.3, Faculty Involvement in the Development and Adaptation of Educational Software, 1989. Available from Angela Walsh at EDUCOM. (Details in Vol. 3 #3)

University Software Resource Guide: A Guide for College Faculty Software Publishers Association and EDUCOM. For information on availability contact Computer Learning Month, PO Box 60007, Palo Alto, CA 94306-0007, 415-858-1103, or contact Angela Walsh at EDUCOM. (Details in Vol. 2 #5)

Using Software—A Guide to the Ethical and Legal Use of Software for Members of the Academic Community. Discusses a variety of commonly asked questions about the legal and ethical issues involved in software use. Contact: EDUCOM, Using Software, PO Box 364, Princeton, NJ 08540. (Details in Vol. 2 #3)

TASK GROUPS AND RELATED PROJECTS

I - ACADEMIC SOFTWARE DEVELOPMENT AND USE

1.1 Computing Across the Curriculum: Academic Perspectives
Chair: William H. Graves; Director, Institute for Academic Technology; PO Box 12017, Research Triangle Park, NC 27709; 919-560-5031; ugrave@tucc

1.3 Faculty Involvement in the Development and Adaptation of Educational Software (Software Snapshots: Where Are You In The Picture)
Chair: Kamala Anandam; IBM/ACIS Consulting Scholar; Associate Dean, Educational Technologies; Room 1436; Miami-Dade Community College; 11011 S.W. 104 St.; Miami, FL 33176; 305-347-2540; xncmdc21@servax

1.4 Developer Tools and Issues: The Promise, Reality, and Hope (A 60 Minute Video)
Chair: Robert Cavalier; Assistant Director, ICEC, Carnegie Mellon University; CDED/ Building B; Pittsburgh, PA 15213; 412-268-7643; rc2z@andrew

1.5 Silicon Basement Seminar
Chair: Diane Balestri; Assistant Dean of the College; 408 West College; Princeton University; Princeton, NJ 08544; 609-452-5524; balestri@pucc or x0525 AppleLink

1.7 A Pilot Videotape of Award-Winning Curriculum Innovations & Mathematics Software
Chair: Jerome Johnston; Associate Research Scientist; NCRIPTAL, 5005 ISR; University of Michigan-Ann Arbor; 2400 School of Education Building; Ann Arbor, MI 48109; 313-936-2759; jerome_johnston@um.cc.umich.edu or usergb9d@umichum

II - INCENTIVES AND CRITERIA FOR DEVELOPMENT OF QUALITY ACADEMIC SOFTWARE.

2.1 EDUCOM/NCRIPTAL Higher Education Software Awards Program
Chair: Robert Kozma; Project Director; NCRIPTAL; University of Michigan-Ann Arbor; 2610 School of Education; 610 E. University; Ann Arbor, MI 48109; 313-936-2758; robert_kozma@um.cc.umich.edu or userk7yu@umichum; x0568 AppleLink

2.2 Reviews of Academic Software
Chair: Jack Chambers; Executive Director, Telecommunications & Computing, Loyola College in Maryland, Maryland Hall 0225; 4501 North Charles Street, Baltimore, MD 21210-2699; 301-532-5159; chambers@loyvax

2.3 Equal Access to Software for Instruction (EASI Fixes: Guidelines for Developers of Higher Education Software)
Chair: Darola Hockley; Coordinator, Adaptive Computer Technology Center; 200 Heinkel Building; University of Missouri-Columbia; Columbia, MO 65211; 314-882-2000; ccdarola@umcvmb

III - SOFTWARE INFORMATION RESOURCES

3.1 Academic Software Catalog
Chair: Peggy Seiden; Software Manager; Academic Computing; Hamburg Hall; Carnegie Mellon University; 5000 Forbes Avenue; Pittsburgh, PA 15213; 412-268-5118; peg@andrew.cmu.edu; x0529 AppleLink

3.2 EDUCOM Distinguished Software Collection
Chair: William G. Vincenti; Director, Computer Research & Training Institute; Kean College of New Jersey; Morris Avenue; Union, NJ 07083; 201-527-2246; VINCENTI@PILOT.NJIN.NET

3.3 EDUCOM Selected Academic Software
Co-Chair: Fran Blake; Associate Director, Instruction and Research Computer Center; Ohio State University; 1971 Neil Avenue; Columbus, OH 43210; 614-292-4843; ts0020@ohstvma

Co-Chair: John D. Chovan; Research Associate, Instruction and Research Computer Center, Ohio State University, 1971 Neil Avenue, Columbus, OH 43210, 614-292-4843; BITNET: ts2406@ohstvma

3.4 Directory of Software Sources for Higher Education
Chair: Peggy Seiden; Software Manager; Academic Computing; Hamburg Hall; Carnegie Mellon University; 5000 Forbes Avenue; Pittsburgh, PA 15213; 412-268-5118; peg@andrew.cmu.edu; x0529 AppleLink

IV - INTELLECTUAL PROPERTY

4.2 Using Software—A Guide to the Ethical and Legal Use of Software for Members of the Academic Community 2nd Edition (brochure currently available)
Chair: Dana E. Cartwright; Director, Academic Computer Services; Syracuse University; 215 Machinery Hall; Syracuse, NY 13244-1260; 315-443-4504; decartwr@suvm

4.3 Intellectual Property—Ongoing Issues and Tasks
Co-Chair: Frank Connolly; Director; Academic Computing; American University; 440 Massachusetts Ave., NW, Washington, DC 20016; 202-885-2277; frank@auvm

Co-Chair: Peter Lyman; Director; The Center for Scholarly Technology; University of Southern California; 300 Doheny Memorial Library; Los Angeles, CA 90089-0182; 213-743-8138; lyman@uscvm; U13 AppleLink

Co-Chair: Steven W. Gilbert; Vice President; EDUCOM; 777 Alexander Road, Princeton, NJ 08540; 609-520-3350; gilbert@educom; U53 AppleLink

4.4 S198—Software Rental Amendments Act
Co-Chair: Frank Connolly; Director; Academic Computing; American University; 440 Massachusetts Ave., NW, Washington, DC 20016; 202-885-2277; frank@auvm

Co-Chair: Steven W. Gilbert; Vice President; EDUCOM; 777 Alexander Road, Princeton, NJ 08540; 609-520-3350; gilbert@educom; U53 AppleLink

V - MANAGING ACADEMIC INFORMATION TECHNOLOGY SUPPORT SERVICES

5.2 Research on Current Practices in Software Support Policies and Procedures—Roles of Institutions, Vendors, and Users
Co-Chair: Ree Dawson; Assistant to the Director; Information Services 11-325; Massachusetts Institute of Technology; 77 Massachusetts Avenue; Cambridge, MA 02139; 617-253-6321; ree@isis.mit.edu

Co-Chair: Bill Mitchell; University of Missouri-Columbia; 200 Heinkel Bldg.; Columbia, MO 65211; 314-882-2000; ccwam@umcvmb

Co-Chair: Lee Shope; Director; Weeg Computing Center; University of Iowa; Iowa City, IA 52242; 319-335-6042; bptleepb@uiamvs

5.3 Innovative Support Strategy & Programs through Higher Education and Vendor Collaborations
Chair: George Bateman; Assistant Director, Computation Center; University of Chicago; 1155 E. 60th Street; Chicago, IL 60636; 312-702-7174; grb1@tank.uchicago.edu

5.4 User Documentation Clearinghouse
Co-Chair: Bill Mitchell; University of Missouri-Columbia; 200 Heinkel Bldg.; Columbia, MO 65211; 314-882-2000; ccwam@umcvmb

Co-Chair: David Benson; Associate Director; Educational Computing Services; Washington University; 1 Brookings Drive, St. Louis, MO 63130; 314-889-5313; c09800db@wuvmd

Co-Chair: Faye Kennedy; Microsystems Coordinator; Kansas State University; Cardwell Hall, Computing Activities, Manhattan, KS 66505; 913-532-6311; faye@ksuvm.ksu.edu

VI - RESEARCH ON EDUCATIONAL IMPACT OF INFORMATION TECHNOLOGIES

6.1 Collection of Institutional Research Instruments to Measure Academic Computing
Chair: Sally Webster; Assistant Director; Academic Computing Services; 210 Machinery Hall; Syracuse University-Main Campus; Syracuse, NY 13244-1260; 315-443-3807; acdspw@suvm

6.2 National Survey of Microcomputer Use in Higher Education
Chair: Kenneth C. Green; Senior Research Associate; Center for Scholarly Technology; 100 Doheny Library; University of Southern California; Los Angeles, CA 90089-0182; 213-743-4213; kcgreen@skat.usc.edu; U54 AppleLink

6.3 Project COMPASS: Computing Assessment in Higher Education
Co-Chair: Mark Shields; Assistant Professor; Department of Sociology; Brown University; Providence, RI 02912; 401-863-2065; an700035@brownvm

Co-Chair: Karen Cohen; Principal Research Associate; Project Athena; MIT E40-338; Massachusetts Institute of Technology; 1 Amherst Street; Cambridge, MA 02139; 617-253-0135; kccohen@athena.mit.edu

VII - INSTITUTIONAL SOFTWARE LICENSES, CONTRACTS, AND SITE AGREEMENTS

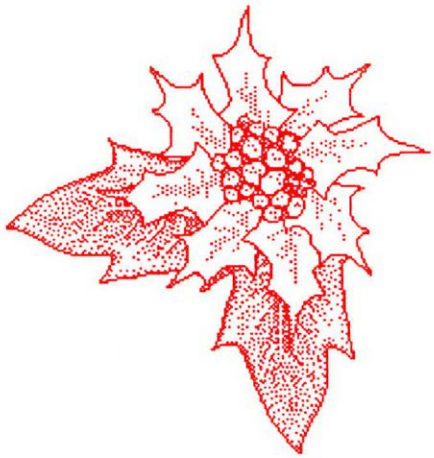
7.1 Networking Software Agreements
Chair: Ron Kalinoski; Associate Director, Academic Computing; Syracuse University—Main Campus; Syracuse, NY; 315-423-2143; acdrlk@suvm

7.2 Campus Software License Review Project
Co-Chair: Phyllis Kent; Assistant Director; Academic Computing Services; Machinery Hall; Syracuse University; Syracuse, NY 13244-1260; (for FEDEX use 105 Archbold); 315-443-1806; acdpak@suvm

Co-Chair: Claire LeDonne; Manager, Campus Software Office; 295 Evans Hall; University of California-Berkeley; Berkeley, CA 94720; 415-536-8836; cld-cso@ucbcmsa

EDITORIAL REVIEW COMMITTEE

Chair: Diane Balestri; Assistant Dean of the College; 408 West College; Princeton University; Princeton, NJ 08544; 609-452-5524; balestri@pucc or x0525 AppleLink



Season's Greetings

One of the joys of the Holiday Season is remembering friends and colleagues who have made the past year personally and professionally fulfilling.

We truly appreciate your loyalty, dedication, and efforts in helping to bring us closer to realizing our shared goals.

Please accept our warmest wishes for a refreshing holiday and a successful new year.

EDUCOM and the EDUCOM Software Initiative

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7/11/89 General

Directory of Software Sources for Higher Education: A Resource Guide for Instructional Applications

Edited by
Peggy Seiden, Carnegie Mellon University

Describes sources of software, sources of reviews and evaluations, and other critical information about software for higher education -- more than 400 listings in all.

Compiled by the Educational Software Library of Carnegie Mellon University for the Software Initiative, the directory is indexed by title, subject, and name of organization. Entries for each print or on-line source include a complete reference to the source and a summary of the types of software available, the machines on which the packages run, licensing terms, and price ranges. Entries for organizations include descriptions of their software dissemination activities.

This is now available from Peterson's Guides at the cost of $29.95, with a special EDUCOM member price of $19.95. Use the order form or call 800-EDU-DATA.

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EDUCOM/Academic Computing
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Ivory Towers, Silicon Basements
Learner-centered Computing in Postsecondary Education
by The FIPSE Technology Study Group

The Fund for the Improvement of Postsecondary Education (FIPSE) has awarded grants to over seventy institutions for innovative projects which use computer and related technologies to improve learning. Beginning in 1984, the directors of these projects were organized as the FIPSE Technology Study Group (FTSG). The group gradually uncovered common educational goals and strategies, as well as problems and concerns, which cut across all projects. Based on their experiences, FTSG members have now created a report which asks a question critical to every educator today:

"Is there a vision of education, enabled or supported by computing, so compelling that it is worth the risks and costs that institutions will have to accept in order to pursue it?"

Ivory Towers, Silicon Basements answers, "Yes!" and supports its analysis with a wealth of concrete examples and specific recommendations. Its authors conclude, "Most of us think that our view of computing in education, which puts students and learning above all other priorities of the university, is simply a statement of traditional values applied to a technological age. Others of us, frankly, see behind our common endeavor a subversive strategy for infusing new and much needed energy into the work of both faculty and students."

Facilitating Academic Software Development
edited by Jerry W. Sprecher

This report is intended as a resource for those colleges and universities considering involvement in academic software development. Key issues related to policy and technique and to developers themselves are reviewed so that readers can formulate an academic software development model tailored to their individual environments. Some of the highlights of the report are:

- An overview of "pioneer" activities at CMU, MIT, Brown, University of Delaware, University of North Carolina and others.

- Results of a national academic software development survey and reports from site visits at four institutions.

- Interviews with Steven Jobs, Alan Kay, and William Norris about the future technological environment for academic software development.

Chapter authors include Robert Cavalier, Carnegie Mellon University; Jack Chambers, Duquesne University; Kenneth Friend, Carnegie Mellon University; Greg Gaither, California State University, Fresno; Steven Gilbert, EDUCOM; Dorothy Lewis, Iowa State University; and Jerry Sprecher, California State University, The Chancellor's Office.

Managing Academic Software
Leadership, Law and Logistics for Administrators, Faculty and Publishers
by Shirley C. Smith

This manual deals with the unique aspects of the higher education market, promotion of legal and ethical use of software on campus, and negotiation of software site agreements. The following topics are addressed:

- Basic problems related to the higher education software market, particularly the relation between negotiation of software contracts and higher education posture on support of copyright restrictions.

- Legal and ethical use of software including examples of policies, procedures, and awareness campaigns developed on campuses throughout the country.

- Negotiation of software agreements including negotiation considerations, models for negotiation process, and examples from actual negotiated agreements.

Designed primarily as a reference tool for higher education administrators and faculty members, this manual should also be of value to software publishers, as it focuses on the special software needs of institutions of higher education, an important market which is just beginning to be tapped. (This book was funded by a grant from Apple Computer, Inc.)

The books are now available from Academic Computing Publishers at the cost of $14.95, with a special EDUCOM member price of $9.95. Please indicate below which book you wish to order, then fill out and send this form or call Academic Computing Publishers, Inc. at 214-548-2101.

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January 29, 1990

Mr. Thomas Nemcik
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Dear Mr. Nemcik:

Enclosed is the information you requested about EDUCOM and our Corporate Associates Program.

EDUCOM is a non-profit consortium of and for institutions of higher learning with special interests in information technology. Through our Corporate Associates Program we offer companies like Community Memory a direct communications link with over 600 colleges, universities, and non-profit organizations (see membership list in *What is EDUCOM*). These schools have made institutional commitments to joining EDUCOM, primarily through the Chief Information Officer of the campus. Our constituency includes academic computing services, administrative computing services, libraries, and academic departments with special interests in information technology (business, engineering, mathematics, etc.).

EDUCOM's Corporate Associates Program emphasizes participating as partners and colleagues with higher education. As an Associate, you will be able to have a corporate presence at the annual EDUCOM Conference, which is attended by policy- and decision-makers from many sectors of both member and non-member institutions. You'll be invited to participate in our CAP Seminar, which is open only to Associates and offers an unusual opportunity to learn what's happening in the academic world and to exchange ideas with colleagues in your field. Other Program benefits, including mailing list rental and special publications, are described in the enclosed packet.

If you have any questions about the enclosed materials, please feel free to call me at 609-520-3350. I look forward to hearing from you.

Sincerely,

Kathy Schaible
Manager, Corporate Associates Program

What is the EDUCOM Corporate Associates Program ?

October 1989
777 Alexander Road
Princeton, NJ 08540
609/520-3350
FAX# 609/520-3975

The EDUCOM Corporate Associates Program (CAP) is:

• ***A direct channel of communication*** between companies and institutions of higher education that is of great value to both. EDUCOM's work helping colleges and universities use information technology leads naturally to close relationships with the providers of that technology. In 1983, we formalized those relationships by creating what has become the EDUCOM Corporate Associates Program.

The Program offers corporations the opportunity to participate, in an exclusive way, in EDUCOM activities. Participation in the Program provides the opportunity for direct access to the decision-makers in member universities and colleges. And it is an additional way to show your support for institutions of higher education.

The Corporate Associates Program has attracted many of the leading corporations in computer hardware, software, and telecommunications, and the number of participants from publishing and other related fields is growing quickly.

Benefits for Corporate Associates

EDUCOM's primary mission is to serve its members in the academic world. And by acting as a conduit between members and associate companies, the EDUCOM Corporate Associates Program is able to provide unique benefits to Associates as well:

• ***Communication:*** The information and requests Corporate Associates receive from contact with member schools can help them design products and services or find applications for existing products and services that meet the special needs of higher education.

• ***Recognition:*** Established contact with members, and the trust Associates build with that contact, means a better reception to promotional and informational messages wherever they are encountered, not only within the context of EDUCOM.

• ***Making Contacts:*** Participation in EDUCOM activities, particularly in the annual Corporate Associates Seminars, provides special opportunities to meet and exchange ideas with higher education experts and colleagues.

• ***Goodwill:*** Association with EDUCOM helps establish each Corporate Associate's organization as a company committed to the higher education community.

Corporate Associates Program

Each company is different, and each will want to participate in the Program in a different way. To that end, we have created a Corporate Associates package that provides both standard benefits to all Associates and a variety of options at additional costs. Each Associate can decide how to participate.

The Corporate Associates Program includes all of these standard benefits:

• ***Participation in the Annual EDUCOM Conference.*** EDUCOM's Annual Conference is the most widely respected information technology conference in the academic world. Corporate Associates have the exclusive opportunity to participate in the Technology Demonstration area at the Conference. This is a separate area where corporate representatives may schedule appointments and hold one-on-one conferences and demonstrations with the people who are most interested in buying and/or using products and services. Associates may reserve space in the demonstration area (at a per sq. ft. fee), may sponsor Conference events, and may distribute promotional literature on the company's programs and services. Many Corporate Associates find that this benefit alone is well worth the cost of their EDUCOM fee.

• ***Inclusion in EDUCOM's Directory of Members, Programs & Projects.*** This book features profiles of your company and of the other Corporate Associates. It includes a description of products and services, special programs for educational institutions, discounts you may wish to offer, and company contacts. The names and phone numbers of an average of ten or more decision-makers at each of our close to 600 member institutions are included in the main section of the Directory. The Directory is only available to EDUCOM members and Corporate Associates. Your company, as a Corporate Associate, will receive a limited number of complimentary copies each year.

• ***Participation in the Annual Corporate Associates Seminars.*** These Seminars are open only to Associates. They offer Corporate Associates unique opportunities to find out what is happening in academic computing from experts at leading institutions. The Seminars also provide an important opportunity to learn about the campus community's special information technology needs and identify ways that companies can respond quickly to the academic community's needs for special products and services. Past Seminar topics have covered issues such as networking, supercomputers, and software site licenses. There is no additional fee for the CAP Seminars.

• ***A direct conduit to people in higher education with the power to make or influence purchasing decisions.*** Active EDUCOM participants include academic and administrative officers, deans, college and university CEOs, department chairpersons, faculty members and specialists involved in information technology decisions, software support people, and many more. These are the people you will come in contact with as an EDUCOM Corporate Associate -- at seminars and conferences, through the Special Offers Brochure, and through direct mail services.

• ***Assistance from EDUCOM.*** EDUCOM will offer informal assistance in structuring offers to our members. Corporate Associates can call on us anytime with questions -- we are happy to share our insights. In addition, we will provide formal consulting at discounted rates through the EDUCOM Consulting Group.

• ***Substantial discounts for all EDUCOM conferences, seminars and other EDUCOM events.*** Corporate Associates may send representatives to EDUCOM programs at the discounted Associate rate. Participation in these programs helps organizations stay current with the latest developments and concerns in academia. These programs also provide an important opportunity for your people to maintain their contacts with key campus decision-makers.

• ***Free subscriptions to EDUCOM publications, and additional subscriptions at a discounted rate.*** EDUCOM'S regular publications include a quarterly journal and newsletters, in addition to monographs and books. Circulating these publications within your company -- to research & development, marketing, sales, and executive departments -- can help Associates better serve the higher education community.

• ***Listing in the EDUCOM Review.*** A brief article in the *EDUCOM Review* (distributed quarterly to 13,000 academic computing professionals) will introduce your company as a new member of the Corporate Associates Program. Your company will also be included in the list of Corporate Associates in each issue of the *Review*.

Program Options

Associates may wish to extend participation in the Corporate Associates Program with one or more of these options:

• ***Direct Mail Services.*** EDUCOM offers several special services to help Associates make sure approved mailings reach the right people. They include an EDUCOM cover letter, mailing labels, and other mailing services.

• ***Press Releases.*** EDUCOM will send press releases announcing an Associate's participation in the Program to key publications. These include everything from major industry publications to newsletters with a small but important readership.

• ***Special Offer Brochure.*** If Associates offer significant special discounts or services to EDUCOM Members, they can be included in the Special Offer Brochure. This booklet is sent each spring to 5,000 representatives at EDUCOM member institutions.

• ***Advertising.*** Discounts on advertising in the EDUCOM *Review*, distributed to more than 13,000 individuals in higher education.

Fees

Full participation in the Corporate Associates Program means better communication--for our members and for our Corporate Associates. In order to give every company, large and small, the opportunity to participate, we've established a flexible fee structure, based on a corporation's gross sales and the percent of gross sales to higher education. The optional services provide additional flexibility.

Since EDUCOM is a nonprofit organization, Associates may also, if they prefer, arrange to treat their participation fees as a charitable contribution.

How to Join the Corporate Associates Program

It's easy to become an EDUCOM Corporate Associate. We will tell you more about the Program, answer your questions, and help you become a Corporate Associate. Simply contact the EDUCOM Corporate Relations Group at 609-520-3350, send electronic mail via BITNET to CAP@EDUCOM or write us at:

EDUCOM Corporate Associates Program
P. O. Box 364
777 Alexander Road
Princeton, NJ 08540
FAX# 609-520-3975

What is the EDUCOM Software Initiative ?

October 1989
777 Alexander Road
Princeton, NJ 08540
609-520-3350
FAX# 609-520-3975

The EDUCOM Software Initiative (ESI) is:

• ***A forum*** for fostering communication on how to improve the quality, accessibility and effectiveness of academic software; and
• ***A set of working groups and projects*** to solve problems in these areas.

The ESI is primarily concerned with the *uses* of technology—especially for learning and teaching. In the first years, the ESI worked toward a vision of an environment in which information technology is used to improve the quality of education, and encouraged a market for software in higher education in which:

- developers are motivated to create new and better academic software;
- information about software, including user evaluations and information about how to use it effectively, is readily available to both developers and potential users;
- software is distributed efficiently;
- terms and pricing structures encourage widespread acquisition and use.

Now in its fourth year, the ESI has become a group of diverse individuals dedicated to improving higher education in the broadest sense—teaching, learning, and research—through the use of information technology. Reflecting this expanding scope, the ESI will be changing its name to the "Educational Uses of Information Technology (EUIT)" Program in the fall of 1989. Pursuing this broader goal, the ESI (EUIT):

- identifies problems and issues of national importance to the higher education community;
- devises active approaches to solving these problems through the volunteer efforts of concerned professionals (educators, vendors, funders);
- implements solutions to specific problems that face those who use information technology in higher education;
- broadly disseminates the outcomes of these problem-solving efforts (using media including print, electronic, and video materials and services);
- develops partnerships with other organizations that are working toward similar goals;
- forms cooperative relationships with vendors to address specific strategic issues;
- advocates thoughtfully developed positions on issues of national importance.

Achieving the benefits of the technology revolution in higher education requires real collaboration between campuses and corporations. Consequently, the ESI provides a forum for a continuing discussion among representatives of diverse institutions from higher education and industry; representatives who share concerns about improving the quality, accessibility and effectiveness of academic software. Throughout the past four years, these individuals have worked cooperatively toward the intelligent solution of a variety of problems and issues.

Achievements

The volunteers, partners and staff of the ESI have done remarkable work since our first formative meeting in Snowmass, Colorado, in August, 1986. We are proud to be able to list the following accomplishments:

• 68 "best" and "distinguished" academic software packages identified by a national panel in the first three years of the annual EDUCOM/NCRIPTAL Higher Education Software Awards Program, with increased recognition of these awards in the publications and meetings of other respected organizations;

• adding the "Curriculum Innovation and Implementation" category to the Awards Program—recognizing faculty achievements in effective usage of software for instruction;

• linkages to more than 16 professional disciplinary associations through the Awards program and through efforts to produce scholarly reviews of academic software;

• development and distribution of the brochure, *Using Software—A Guide to the Legal and Ethical Use of Software for Members of the Academic Community* (more than 400,000 copies printed, and 350,000 distributed within 18 months of the first printing. Brochure was reprinted with graphic variations by Prime Computer Inc., and several colleges and universities. Widespread adaptation, adoption, and use of the "EDUCOM Code," included in the brochure, in many colleges and universities. Co-produced by ADAPSO, which has committed to publishing subsequent editions);

• *University Software Resource Guide*, containing written materials from three ESI projects, published as part of the Software Publishers Association Computer Learning Month Project, October, 1988;

• *Directory of Software Sources for Higher Education* (commercially available from Peterson's Guides, Princeton, NJ);

• *Change* Magazine, May/June 1989, focusing on "Intellectual Property Rights" including articles from active ESI participants;

• *Software Snapshots—Where Are You In The Picture?* An Invitation to Community College Faculty; the results of an ESI project, distributed by The League for Innovation in the Community College.

• EDUCOM/Academic Computing Software Initiative Monograph Series;

  - *Ivory Towers, Silicon Basements* (commercially available from Academic Computing Publishers, Inc., McKinney, TX)
  - *Facilitating Academic Software Development* (commercially available from Academic Computing Publishers, Inc., McKinney, TX)
  - *Managing Academic Software: Leadership, Law and Logistics for Administrators, Faculty and Publishers* (commercially available from Academic Computing Publishers, Inc., McKinney, TX)

• Working Papers and White Papers

  - Report *Development, Distribution, and Management of Computer Software for Higher Education —An Introduction to the Problems and Issues* for The Annenberg/CPB Project
  - White Paper *Property and Propriety in the Digital Environment: Towards an Examination Copy License*

- White Paper *Computer Conferencing As a Tool for Communications*
- Draft of *Rutgers University Evaluation Software Collection*
- Draft of *Research on Current Practices in Software Support Policies and Procedures—Roles of Institutions, Vendors, and Users*
- Draft of *Collection of Institutional Research Instruments to Measure Academic Computing*

• Executive Summary and full report of results of survey: *Microcomputer Use in Higher Education*, 1986

• Sixteen issues of the *ESI newsletter*

• Grant funding—More than $1,000,000 over a three-year period from:

The Annenberg/CPB Project
Apple Computer, Inc.
AT&T
CLARIS Corporation
FIPSE
IBM Corporation
Microsoft Corporation
NeXT, Inc.
National Center for Automated Information Retrieval (NCAIR)
The Pew Charitable Trusts
Rutgers—The State University of New Jersey
Sun Microsystems, Inc.

• Active partnership or commitment of non-cash resources beyond the level of individual volunteers:

Academic Computing
ADAPSO
California State University
Carnegie Mellon University
The Chronicle of Higher Education
Duquesne University
Edutech International
Higher Education Research Institute
Kinko's Academic Courseware Exchange
Loyola College of Maryland
Massachusetts Institute of Technology
Ohio State University
OCLC, Inc.
Peat Marwick Main & Co.
Peterson's Guides, Inc.
Rutgers—The State University of New Jersey
Software Publishers Association
Syracuse University
University of Michigan/NCRIPTAL
University of Missouri-Columbia
University of Southern California

• Active volunteer professionals from more than 180 institutions; approximately one-fourth from industry, three-fourths from higher education.

• Meetings:

- 1986 Snowmass: 50 individuals from 39 institutions,
- 1986 Annual Conference: 91 individuals from 65 institutions,

- 1987 Snowmass: 82 individuals from 63 institutions,
- 1987 Annual Conference: 149 individuals from 101 institutions,

- 1988 Snowmass: 103 individuals from 73 institutions,
- 1988 Annual Conference: 145 individuals from 103 institutions,

- 1989 Snowmass: 116 individuals from 82 institutions.

Our work is done primarily by active volunteer professionals in coordinated groups. Some recent projects are listed below:

I. Academic Software Development and Use

Computing Across the Curriculum: Academic Perspectives
William H. Graves, University of North Carolina-Chapel Hill

This project has developed a book of case studies on instructional computing as seen through three perspectives: (1) faculty (2) curriculum and (3) institutional.

Faculty Involvement in the Development and Adaptation of Educational Software
Kamala Anandam, Miami-Dade Community College

Prepare a booklet entitled *Software Snapshots: Where are You in the Picture?* to encourage faculty of higher education institutions (especially community colleges) to use, adapt, and develop educational software for the purpose of improving teaching and learning.

Developer Tools & Issues: The Promise, the Reality, and the Hope
Robert Cavalier, Carnegie Mellon University

Produce a 60-minute videotape reflecting the essence of an outstanding one-day series of presentations that discussed programming environments and educational issues relevant to the development of academic software. The video will contain a discussion among software developers and educators about the future directions of educational software development and use.

Silicon Basement Seminar
Diane Balestri, Princeton University

Revise and streamline a seminar based on the work of the FIPSE Technology Study Group as presented in the book, *Ivory Towers, Silicon Basements: Learner-Centered Computing in Postsecondary Education*. The seminar focuses on the needs of academic administrators in collegial relationships with their information technology officers and academic computing support staffs.

A Pilot Videotape of Award-Winning Curriculum Innovations & Mathematics Software
Jerome Johnston, NCRIPTAL/University of Michigan-Ann Arbor

Produce two videotapes, one on the innovative and outstanding use of software to teach writing and the other to teach mathematics skills to undergraduates. The 17-minute video on writing will introduce the issue of using computers to teach writing, show segments on each of two EDUCOM/NCRIPTAL Curriculum Innovations Award winners in writing, and conclude with a demonstration of the 3 winning software products on writing. The 15-minute video on mathematics will include excerpts of the 4 "Best" winners and the 8 "Distinguished" winners in the mathematics software category from 1987 and 1988.

II. Incentives and Criteria for Development of Quality Academic Software

EDUCOM/NCRIPTAL Higher Education Software Awards Program
Robert Kozma, NCRIPTAL/University of Michigan

Encourage the development and use of quality educational software by providing examples of excellent software and visible, tangible incentives for faculty and others to use, adapt, or develop software for instructional purposes.

Reviews of Academic Software
Jack Chambers, Loyola College of Maryland

Publish reviews of academic software in scholarly journals to promote the acceptance of originally developed software as evidence of scholarly contribution. An annual publication is planned.

Equal Access to Software for Instruction (EASI Fixes: Guidelines for Developers of Higher Education Software)
Darola Hockley, University of Missouri-Columbia

Address the issue of Equal Access to Software for Instruction (for those with disabilities) as mandated by the 1988 amendments to the Rehabilitation Act of 1973. The Project plans to write and disseminate a series of brochures and handbooks outlining the issues, listing available resources, and suggesting solutions to meet the requirements of the legislation.

III. Software Information Resources

Academic Software Catalog
Peggy Seiden, Carnegie Mellon University

Provide information resources to assist educators in colleges and universities with their efforts to identify and select computer software that supports their instructional objectives. Develop, disseminate, and evaluate a database of bibliographic records designed for users in higher education. A secondary goal is to provide leadership within the library community in promoting bibliographic control of software.

EDUCOM Distinguished Software Collection
William G. Vincenti, Kean College

Allow hands-on experience with outstanding instructional software including the winners of the EDUCOM/NCRIPTAL Higher Education Software Awards. Ideally, the collection will include some software with content close enough to the academic interests of the individual faculty member to inspire efforts to find software that he or she can adopt as part of a course syllabus.

EDUCOM Selected Academic Software Collection
Fran Blake, Ohio State University
John Chovan, Ohio State University

Identify academic software which has been nominated by authors, publishers, and users as effective in higher education institutions. The selected software will be described in a catalog distributed both electronically and in hard copy to faculty and academic support staff.

Software Sources of Higher Education
Peggy Seiden, Carnegie Mellon University

Describes sources of software, sources of reviews and evaluations, and other critical information about software for higher education—more than 400 listings in all. The directory is indexed by title, subject, and name of organization. Entries for each print or on-line source include a complete reference to the source and a summary of the types of software available, the machines on which the packages run, licensing terms, and price ranges.

IV. Intellectual Property

Intellectual Property -- Ongoing Issues and Tasks
Frank Connolly, American University
Peter Lyman, University of Southern California
Steven W. Gilbert, EDUCOM

Extend the initial effort to clarify relevant issues, engage other constituencies, and define specific tasks related to the role of intellectual works and information technology in higher education. Continue to foster the publication of articles in this general area, focusing on specific topics of relevance to EDUCOM.

S198 -- Software Rental Amendments Act
Frank Connolly, American University
Steven W. Gilbert, EDUCOM

Continuing effort to explain the implications for higher education of a proposed amendment to the U.S. Copyright Law.

***Using Software--A Guide to the Ethical and Legal Use of Software for Members of the Academic Community*, Second Edition (brochure currently available)**
Dana Cartwright, Syracuse University

Revise/update the first edition with comments solicited from the ESI participants, the EDUCOM membership, and the library community.

V. Managing Academic Information Technology Support Services

User Documentation Clearinghouse
Bill Mitchell, University of Missouri-Columbia
David Benson, Educational Computing Services
Faye Kennedy, Kansas State University

Finding a way to advertise present indexes which were willing and able to expand their clientele. Working to share a present model or models with other schools or regions which would be interested in developing document indexes.

Research on Current Practices in Software Support Policies & Procedures--Roles of Institutions, Vendors, and Users
Ree Dawson, Massachusetts Institute of Technology
Bill Mitchell, University of Missouri-Columbia
Lee Shope, University of Iowa

Identify, analyze, and describe practices in classifying and supporting software within various types of institutions; and the relationship between management of support schemes and management of other functions related to support and acquisition. Disseminate findings in a published report.

Innovative Support Strategy & Programs through Higher Education and Vendor Collaborations
George Bateman, University of Chicago

Consult with and encourage vendors about their direct and active work on software support services.

VI. Research on Educational Impact of Information Technologies

Collection of Institutional Research Instruments to Measure Academic Computing
Sally Webster, Syracuse University

Collect, analyze, and distribute in an annotated workbook format institutional research instruments used to measure the impact of academic computing.

National Survey of Microcomputer Use in Higher Education
Kenneth C. Green, University of Southern California

Replicate and expand upon the Spring 1986 EDUCOM/The Chronicle of Higher Education/Peat Marwick Main survey that provided data about the purchase of, policies for, and utilization of microcomputers in the academic community. Results will be distributed in report format, presented at conferences, and published in professional publications.

Project COMPASS: Computing Assessment in Higher Education
Mark Shields, Georgia Institute of Technology
Karen Cohen, Massachusetts Institute of Technology

Develop standardized questionnaires and formats for conducting cross-institutional assessments of computing in higher education. Results to be disseminated in workshops and conferences, and published in professional publication.

VII. Institutional Software Licenses, Contracts, and Site Agreements

Network Software Agreements
Ron Kalinoski, Syracuse University—Main Campus

Publish a monograph or pamphlet that assists campuses and publishers develop network access to software and information resources. Networking environments, models for distribution, types of agreements, licenses, and management issues will be covered.

Campus Software License Review Project
Phyllis Kent, Syracuse University
Claire Le Donne, UC-Berkeley

Continue to assist campuses and vendors interested in developing and implementing software agreements. Information will be disseminated in articles to professional publications (such as SPA Newsletter) and a monograph containing sample license agreements for a variety of educational settings.

Editorial Review Committee
Diane Balestri, Princeton University

Members of the Committee work closely with project leaders to help them define their audience, goals and timeline for publication of their work. The Committee facilitates connections between ESI authors and corporate partners/publishers so that ESI materials can be produced and distributed widely and cost-effectively. Committee members establish and review standards for ESI publications and review completed materials. The Committee may also, from time to time, recommend new initiatives to extend the overall body of ESI publications.

Strategic Issues for the ESI (EUIT)

- Infusing computing into the curriculum
- Information Distribution
- Intellectual Property Rights
- Students with Special Needs
- Management of the Educational Uses of Technology—Information Sharing

And, we want to improve teaching and learning.

For more information about participating in the EDUCOM Software Initiative, please phone the ESI staff at 609-520-3350, send electronic mail via BITNET to ESI@EDUCOM or write us at:
EDUCOM Software Initiative, P. O. Box 364, 777 Alexander Road, Princeton, NJ 08540
FAX # 609-520-3975

"The EDUCOM Code"

Software and Intellectual Rights

Respect for intellectual labor and creativity is vital to academic discourse and enterprise. This principle applies to works of all authors and publishers in all media. It encompasses respect for the right to acknowledgment, right to privacy, and right to determine the form, manner, and terms of publication and distribution.

Because electronic information is volatile and easily reproduced, respect for the work and personal expression of others is especially critical in computer environments. Violations of authorial integrity, including plagiarism, invasion of privacy, unauthorized access, and trade secret and copyright violations, may be grounds for sanctions against members of the academic community.

The EDUCOM Code, a statement of principle about intellectual property and the legal and ethical use of software, was developed by the EDUCOM Software Initiative and intended for adaptation and use by individual colleges and universities. It was first published jointly by EDUCOM and ADAPSO in the brochure "Using Software: A Guide to the Ethical and Legal Use of Software for Members of the Academic Community." More than 350,000 copies of the brochure were distributed by October, 1989. To order copies of the brochure or for further information contact: EDUCOM, Using Software, PO Box 364, Princeton, NJ 08540

What is EDUCOM ?

1112 16th Street N.W., Suite 600
Washington, DC 20036

777 Alexander Road
Princeton, NJ 08540

EDUCOM is:

•***A non-profit consortium*** of colleges, universities, and other institutions founded in 1964 to promote the effective use of computing and communication technology in higher education. Through direct services and cooperative efforts, EDUCOM assists its members and provides leadership for addressing critical issues about the role of information technology in higher education.

EDUCOM's membership includes virtually every major research university in the country, four-year private and public institutions, along with a number of two-year colleges, overseas campuses, foundations, consortia, and research laboratories. Close to 600 higher education institutions and more than 143 corporations participate in the following EDUCOM activities:

• ***EDUCOM General Membership:*** Members receive EDUCOM Publications, participate in task forces, and obtain discounts on conferences, seminars, consulting, and selected offerings from Corporate Associates. General publications include the quarterly *EDUCOM Review*, the *CCNEWS* electronic newsletter, and books such as: EDUCOM Strategies Series on Information Technology which includes: *Campus Networking Strategies; Campus Strategies for Libraries and Electronic Information; Computing Across the Curriculum: Academic Perspectives; Organizing and Managing Information Resources on Campus; Transforming Teaching with Technology: Perspectives From 2-year Colleges;* and the *Directory of Software Sources for Higher Education.* Recent seminar topics have included strategic planning for computing, campus network planning, and educational software acquisition, development, and support.

EDUCOM's annual fall conference is a forum for policymakers, educators, and corporate representatives concerned with campus computing and telecommunications. A unique format—general sessions and panels in the mornings, with technology demonstrations, discussion groups, and campus visits in the afternoons—provides a stimulating atmosphere for conferees interested in the latest issues, applications, and visions for the future. EDUCOM'89, "Lessons from the Past, Strategies for the Future", October 16-19, will be held on the campus where EDUCOM was founded 25 years ago, at the University of Michigan, Ann Arbor. EDUCOM'90 will be in Atlanta, October 14-17, and EDUCOM'91 will be October 16-19 in San Diego.

• ***Corporate Associates Program:*** A forum for companies to establish contact and exchange ideas with EDUCOM member institutions, through the EDUCOM conference, seminars, the annual Directory to Members & Projects plus other activities and services. Over 143 leading information technology firms currently participate and offer special discounts and packages to EDUCOM members.

• ***EDUCOM Networking Activities:*** Two projects to promote the growth and interconnection of computer networks throughout higher education:

> • ***Networking and Telecommunications Task Force (NTTF):*** NTTF provides leadership and focus for colleges and universities in identifying and communicating strategic networking and telecommunications policy issues and concerns. NTTF has become increasingly visible, especially through its spring National Net conferences, in response to growing interest about national networking policies among universities, corporations, and government.

• ***BITNET Network Information Center (BITNIC)***: BITNIC provides membership and information services for BITNET, the largest academic computer network. Faculty, students, and staff at over 480 colleges, universities, and research centers in the U.S. use BITNET for electronic mail, file transfer, information retrieval, and connection to other networks in the U.S. and abroad. BITNIC, which also helps support volunteers who contribute technical expertise, software, and documentation, is operated by EDUCOM under contract with the Board of Trustees of the Corporation for Research and Educational Networking (CREN).

• ***EDUCOM Software Initiative (ESI)***: The ESI is both a forum for fostering communication on how to improve the quality, accessibility and effectiveness of academic software, and a set of working groups and projects to solve problems in these areas. The ESI is primarily concerned with the *uses* of technology - especially for learning and teaching. In the first years, the ESI worked toward a vision of an environment in which information technology is used to improve the quality of education, and encouraged a maket for software in higher education. Now in its fourth year, the ESI has become a group of diverse individuals dedicated to improving higher education in the broadest sense - teaching, learning, and research - through the use of information technology. Reflecting this expanding scope, the ESI will be changing its name to the "Educational Uses of Information Technology (EUIT)" Program in the fall of 1989. Through active collaboration of EDUCOM members and Corporate Associates, ESI conducts a variety of projects and publications.

• ***EDUCOM Consulting Group (ECG)***: ECG provides evaluation and recommendations on administrative, research, and instructional uses of information technology; strategic planning and budgeting; organization, management, and staffing; financing; library automation; hardware and software selection, acquisition, and implementation; proposal reviews; and on-campus workshops. Because consultants are drawn from member faculty, administrators, and professional staff, the ECG is able to provide high quality, low cost consultations uniquely geared to the higher education environment.

EDUCOM is governed by a member council and a board of trustees, and is funded by membership dues, service fees, and grants from foundations, corporations, and government. The organization maintains executive offices in Washington, DC and program staff in Princeton, New Jersey.

For more information about joining EDUCOM or any EDUCOM activity, please send electronic mail to INQUIRY@EDUCOM.BITNET or contact us at:

Washington Office:
EDUCOM
1112 16th Street N.W., Suite 600
Washington, DC 20036
(202) 872-4200
FAX # (202) 872-4318

Princeton Office:
EDUCOM
777 Alexander Road
Princeton, NJ 08540
(609) 520-3340
FAX # (609) 520-3975

EDUCOM Member Institutions as of September 1989

ACEP
Abilene Christian University
Abraham Baldwin Agricultural College
Acadia University (Canada)
Adelphi University
Agnes Scott College
Albany State College
Albright College
Alderson Broaddus College
Alfred University
Allegheny College
Alma College
American University
Amherst College
Appalachian State University
Aquinas College
Arizona State University
Armstrong State College
Assoc of American Medical Colleges
Assoc of Research Libraries
Atlanta Metropolitan College
Auburn University-Main Campus
Augusta College
Bainbridge Junior College
Baldwin-Wallace College
Bard College
Baylor University
Beaver College
Bentley College
Biola University
Birmingham Southern College
Boise State University
Bond University
Boston College
Boston University
Bowdoin College
Bradley University
Brenau College
Brigham Young University-Main Campus
Brookdale Community College
Brookhaven National Laboratories
Brown University
Brunswick College
Bryant College
Bryn Mawr College
Bucknell University
Buena Vista College
Butler University
CUNY-Lehman College
CUNY-System Office
California Institute of Technology
California Lutheran University
California Polytechnic State Univ-San Luis Obispo
California State Polytechnic Univ-Pomona
California State University-Bakersfield
California State Univ-Chico
California State Univ-Dominguez Hills
California State Univ-Fresno
California State Univ-Fullerton
California State Univ-Hayward
California State Univ-Long Beach
California State Univ-Los Angeles
California State Univ-Northridge
California State Univ-Sacramento
California State Univ-San Bernardino
California State Univ-Stanislaus
California State University System
Canisius College
Cardinal Stritch College
Carleton College
Carnegie Mellon University
Catholic University of America
Cerritos College
Christopher Newport College
Claremont Graduate School
Clark County Community College
Clark University
Clarkson University
Clayton State College
Clemson University
Cleveland State University
Colby College
Colgate University
College of DuPage
College of St. Thomas
College of The Holy Cross
College of William and Mary
College of Wooster
Colorado College
Colorado School of Mines
Colorado State University
Columbia University
Columbia University Teachers College
Columbus College
Columbus State Community College
Cornell University
Cornell University Medical College
Council for Interinstitut'l Leadership
Dalhousie University
Dalton Junior College
Dartmouth College
Darton College
Davidson College
De Paul University
DePauw University
Denison University
Dickinson College
Dowling College
Drake University
Drew University
Drexel University
Duke University
Duquesne University
Dutchess Community College
East Carolina University
East Georgia College
Eastern Michigan University
Eastern Virginia Med School
Economic Dev Institute of the World Bank
Educational Testing Service
Educational Ventures Incorporated
El Paso Community College
Elizabeth City State University

EDUCOM Member Institutions as of September 1989

Emory University
Fairfield University
Floyd College
Fordham University
Forsyth Technical Community College
Fort Valley State College
Fox Chase Cancer Center
Franklin College of Indiana
Franklin and Marshall College
Fundacion Politecnico Grancolombiano
Gainesville Junior College
Gallaudet University
George Mason University
George Washington University
Georgetown University
Georgia College
Georgia Institute of Technology
Georgia Southern College
Georgia Southwestern College
Georgia State University
Gettysburg College
Glassboro State College
Golden Gate University
Gonzaga University
Gordon College
Goucher College
Grinnell College
Gustavus Adolphus College
Hamilton College
Hartford Graduate Center
Hartwick College
Harvard University
Haverford College
Hiram College
Hobart and William Smith College
Hofstra University
Hollins College
Hood College
Howard University
Humboldt State University
Idaho State University
Illinois Institute of Technology
Illinois Wesleyan University
Indiana University-Bloomington
Indiana University of Pennsylvania
Institute for Advanced Study
Instituto Tecnologico Autonoma de Mexico
Iona College
Iowa State Univ of Science & Tech
J. Paul Getty Trust - AHIP
Jersey City State College
Johns Hopkins University
Kalamazoo College
Kansas State University
Kauai Comm Coll
Kean College of New Jersey
Kennesaw State College
Kentucky Council on Higher Education
Kenyon College
Lafayette College
Lawrence Institute of Technology
Lawrence University
Le Moyne College
Lehigh University
Lewis & Clark College
Lewis-Clark State College
Lincoln University
Longwood College
Lorain County Community College
Loras College
Louisiana Tech University
Loyola College
Loyola University-New Orleans
Loyola University of Chicago
Macalester College
Macon College
Manhattan College
Mankato State University
Marist College
Marquette University
Mary Washington College
Marywood College
Massachusetts Institute of Technology
Mattatuck Community College
McMaster University
Medical College of Georgia
Medical College of Ohio at Toledo
Medical College of Wisconsin
Meharry Medical College
Memphis State University
Mercer University-Macon
Miami-Dade Community College
Michigan State University
Michigan Technological University
Middle Georgia College
Middlebury College
Mills College
Millsaps College
Missouri Western State College
Monterrey Inst of Technology (Mexico)
Montgomery College-Rockville
Moravian College
Mount Holyoke College
Mount Royal College
Mount Saint Vincent University
Mount San Antonio College
Muskingum College
National Coll of Education-Main Campus
National University of Singapore
New Jersey Institute of Technology
New Mexico State Univ-Main Campus
New York Chiropractic College
New York University
North Adams State College
North Carolina A & T State University
North Carolina Central University
North Carolina School of the Arts
North Carolina State University
North Dakota State Univ
North Georgia College
North Shore Community College
Northeast Missouri State University
Northeastern State University
Northeastern University

EDUCOM Member Institutions as of September 1989

Northern Illinois University
Northern Michigan University
Northern Nevada Community College
Northwestern University
Norwich University
Nova University
OCLC, Inc.
Oakland University
Oberlin College
Ohio State University-Main Campus
Ohio Wesleyan University
Old Dominion University
Olympic College
Ontario Inst for Studies in Education
Oregon State System of Higher Education
Oregon State University
Pacific Lutheran University
Palmer College of Chiropractic
Pan American University
Pembroke State University
Penn State Univ-Univ Park Campus
Pepperdine University
Philadelphia Coll of Textile & Science
Pontificia Universidad Catolica de Chile
Pontificia Universidad Javeriana
Pratt Institute
Princeton University
Purdue University-Main Campus
Queen's University
Ramapo College of New Jersey
Regents Computer Network
Rensselaer Polytechnic Institute
Research Foundation of SUNY
Rhodes College
Rice University
Rider College
Ripon College
Rochester Institute of Technology
Rockefeller University
Rockhurst College
Rutgers University-Camden Campus
Rutgers University-New Brunswick
Rutgers University-Newark
SUNY-Albany
SUNY-Binghamton
SUNY-Buffalo
SUNY-College of Technology
SUNY-Empire State College
SUNY-Health Science Ctr Brooklyn
SUNY-Health Science Ctr Syracuse
SUNY-Maritime College
SUNY-Stony Brook
SUNY-System Office
SUNY Agric & Technical Coll-Cobleskill
SUNY Agric & Technical Coll-Morrisville
SUNY College at Brockport
SUNY College at Buffalo
SUNY College at Cortland
SUNY College at Fredonia
SUNY College at Geneseo
SUNY College at New Paltz
SUNY College at Old Westbury
SUNY College at Oneonta
SUNY College at Oswego
SUNY College at Plattsburgh
SUNY College at Potsdam
SUNY College at Purchase
SUNY College of Optometry
SUNY College of Technology
SUNY College of Technology - Farmingdale
SUNY Coll of Env Sci/Forestry
SUNY Coll of Technology at Utica-Rome
Saint Bonaventure University
Saint John's College-Main Campus
Saint John's University
Saint Joseph's University
Saint Joseph College
Saint Louis University
Saint Mary's College
Saint Mary's University
Saint Michael's College
Saint Olaf College
Saint Vincent College & Seminary
Samford University
San Diego State University
San Francisco State University
San Jose State University
Santa Clara University
Savannah State College
Scripps Clinic & Research Foundation
Seoul National University
Seton Hall University
Seton Hall University School of Law
Siena College
Simon Fraser University
Simpson College
Skidmore College
Smith College
Sonoma State University
South Dakota State University
South Georgia College
Southampton University
Southeastern Massachusetts Univ
Southeastern University
Southern College of Technology
Southern Illinois Univ-Carbondale
Southern Methodist University
Southwest Texas State University
Southwestern College
Southwestern University
Spelman College
St. Louis Community College
Stanford University
Stetson University
Stevens Institute of Technology
Stockholm University
Susquehanna University
Swarthmore College
Syracuse University-Main Campus
Temple University
Tennessee Technological University
Texas A & M University-Main Campus
Texas Christian University
Texas Southern University

EDUCOM Member Institutions as of September 1989

The Citadel
The Naropa Institute
The Salk Institute
The University of Alabama
Thomas Jefferson University
Tomlinson College
Towson State University
Trenton State College
Trinity College
Trinity University
Truckee Meadows Community College
Tufts University
Tulane University of Louisiana
Tuskegee University
UNI-C Danish Comp. Ctr. for Res. & Educ.
Union College
Union County College
United States Air Force Academy
United States Merchant Marine Academy
United States Military Academy
United States Naval Academy
Universidad Externado de Colombia
Universidad Nacional Autonoma de Mexico
Universidad Nacional de Colombia
Universidad de Los Andes (Colombia)
University College of Cape Breton
University of Adelaide
University of Akron-Main Campus
University of Alabama-Birmingham
University of Alaska-Anchorage
University of Alaska Southeast
University of Alaska Statewide System
University of Alberta
University of Arizona
University of Arkansas-Little Rock
University of Arkansas-for Medical Sci.
University of Baltimore
University of Bridgeport
University of British Columbia
University of Calgary
University of Calif-Berkeley
University of Calif-Davis
University of Calif-Irvine
University of Calif-Los Angeles
University of Calif-Riverside
University of Calif-San Diego
University of Calif-San Francisco
University of Calif-Santa Barbara
University of Calif-Santa Cruz
University of Calif-System Wide Admin
University of Chicago
University of Dayton
University of Delaware
University of Denver
University of Dusseldorf
University of Evansville
University of Florida
University of Georgia
University of Georgia-System Office
University of Guelph
University of Hartford
University of Hawaii-Honolulu Comm Coll
University of Hawaii-Kapiolani Comm Coll
University of Hawaii-Leeward Comm Coll
University of Hawaii-Manoa
University of Hawaii-Maui Comm Coll
University of Hawaii-West Oahu
University of Hawaii-Windward Comm Coll
University of Hawaii System Office
University of Hawaii at Hilo
University of Houston
University of Illinois-Chicago
University of Illinois Urbana-Champaign
University of Indianapolis
University of Iowa
University of Kansas-Main Campus
University of Kentucky
University of Lethbridge (Canada)
University of Louisville
University of Maine-Machias
University of Maine-Presque Isle
University of Maine-System
University of Maine System
University of Manitoba
University of Maryland-College Park
University of Maryland Balt County
University of Maryland System Admin
University of Maryland at Baltimore
University of Massachusetts-Amherst
University of Massachusetts-Boston
University of Medicine & Dentistry of NJ
University of Miami
University of Michigan-Ann Arbor
University of Minnesota-Twin Cities
University of Missouri-Columbia
University of Missouri-Kansas City
University of Missouri-Rolla
University of Missouri-Saint Louis
University of Nebraska-Lincoln
University of Nebraska-Medical Center
University of Nebraska-System
University of Nevada-Las Vegas
University of Nevada-Reno
University of Nevada-System Computing
University of New Brunswick
University of New Mexico-Main Campus
University of New Orleans
University of North Carolina-Asheville
University of North Carolina-Chapel Hill
University of North Carolina-Charlotte
University of North Carolina-Greensboro
University of North Carolina-Wilmington
University of North Carolina Central Off
University of North Dakota-Main Campus
University of North Florida
University of Notre Dame
University of Oklahoma-Health Sci Ctr
University of Oklahoma-Norman
University of Pennsylvania
University of Pittsburgh-Main Campus
University of Puget Sound
University of Rhode Island
University of Rochester
University of SC-Columbia

EDUCOM Member Institutions as of September 1989

University of San Diego
University of Scranton
University of South Carolina-Lancaster
University of South Dakota
University of South Florida
University of Southern California
University of Southern Maine
University of Southern Mississippi
University of Tennessee-Chatanooga
University of Tennessee-Health Sciences
University of Tennessee-Knoxville
University of Texas-Arlington
University of Texas-Dallas
University of Texas-Hlth Sci-San Antonio
University of Texas-Houston
University of Texas-System
University of Toledo
University of Toronto
University of Tulsa
University of Utah
University of Vermont
University of Virginia-Main Campus
University of Washington
University of Western Ontario
University of Wisconsin-Centers
University of Wisconsin-Eau Claire
University of Wisconsin-Extension
University of Wisconsin-Green Bay
University of Wisconsin-La Crosse
University of Wisconsin-Madison
University of Wisconsin-Milwaukee
University of Wisconsin-Oshkosh
University of Wisconsin-Parkside
University of Wisconsin-Platteville
University of Wisconsin-River Falls
University of Wisconsin-Stevens Point
University of Wisconsin-Stout
University of Wisconsin-Superior
University of Wisconsin-System Office
University of Wisconsin-Whitewater
University of Wollongong
University of Wyoming
University of the South
Univ of Health Sciences-Chicago Med
Utah State University
Valdosta State College
Vanderbilt University
Vassar College
Vermont State Colleges System Office
Villanova University
Virginia Community College-System
Virginia Military Institute
Virginia Polytechnic Inst & State Univ
WA Higher Education Computer Consortium
WEST VIRGINIA UNIVERSITY
WVNET
Wabash College
Washington & Lee University
Washington College
Washington State University
Washington University
Waycross Junior College
Wayne State University
Weizmann Institute of Science (Israel)
Wellesley College
Wesleyan College
Wesleyan University
West Chester University of PA
West Georgia College
West Valley Community College
Western Carolina University
Western Maryland College
Western Michigan University
Western Nevada Community College
Wheaton College
Whitman College
Whittier College
Widener University
William Rainey Harper College
Williams College
Wittenberg University
Worcester Polytechnic Institute
Wright State University-Lake Campus
Wright State University-Main Campus
Yale University
Yeshiva University

EDUCOM Corporate Associates (November 21, 1989)

EDUCOM

P.O. Box 364
777 Alexander Road
Princeton, NJ 08540
609 520-3340

Academic Computing
Addison Wesley Publishing Company
Advanced Computer Communications
Advanced Computing Environments
Aldus Corporation
Amdahl Corporation
Ameritech
Apollo Computer Inc.
Apple Computer, Inc.
ArborText, Inc.
Asante Technologies, Inc.
Ashton-Tate Corporation
ASYS
AT&T
Authorware, Inc.
AutoDesk, Inc.
Avant-Garde Systems
Banyan Systems, Inc.
Bell Atlantic Corporation
BellSouth Corporation
Borland International
Broderbund Software, Inc.
BRS Information Technologies
Cabletron Systems Inc.
Cadkey
Caere
Camber-Roth
Cambridge Group Inc.
Campus Technology Products
Chipcom Corporation
The Chronicle of Higher Education
Cisco Systems Inc.
Clancy-Paul, Inc.
CLARIS Corporation
Commodore Business Machines
Coopers & Lybrand
Course Technology, Inc.
Cray Research, Inc.
Datability Software Systems
Data Research Associates Inc.
Data Switch Corporation
Dell Computer Corporation
Digital Equipment Corporation
Dragonfly Software
Eastman Kodak Company
Edutech
ELXSI
Enable Software, Inc.
EVEREX
Exelan-A Novell Company
1st Desk Systems, Inc.
Farallon Computing
Follett Software Company
Fujitsu America, Inc.
Gartner Group, Inc
GTE Education Services
Hayes Microcomputer Products, Inc.
Hewlett-Packard
High Performance Systems
IBM Corporation
Information Associates
Information Builders
InstaPlan Corporation
InterCon
Interleaf
John Wiley & Sons, Inc.
Joiner Associates, Inc.
Key Computer Laboratories, Inc.
Kinko's Academic Courseware Exchange
Lahey Computer Systems
Learn-PC Video Systems
Lifetree Software, Inc.
LiTel Telecommunications Corporation
Logitech, Inc.
Lotus Development Corporation
MT Xinu, Inc.
MacWeek Inc.
MacroMind, Inc.
Magna
MCI
McGraw-Hill Publishing Company
Microsoft Corporation
Microwave Bypass Systems, Inc.
Network General Corp.
New Jersey Educational Computer Network, Inc.
NeXT, Inc.
Niles & Associates, Inc.
Northern Telecom, Inc.
Northern Wire & Cable Inc.
NOTIS Systems, Inc
Novell, Inc.
Nynex Corporation
Optical Data Systems
Oracle
The Oryx Press
Paperback Software International
Pergamon Software, Inc.
Persoft, Inc.
Personal Bibliographic Software, Inc.
Peter Li, Inc.
Prime Computer Incorporated
Pro/Tem Software, Inc.
Proteon, Inc.
Quark, Inc.
Quicksoft, Inc.
Radius, Inc.
Realtime Learning Systems
Relational Technology, Inc.
Robbins Communication, Inc.
Scholastic Inc./Electronic Learning
SCT
Silicon Graphics
SilverPlatter Information
Software Publishers Association
Solar Systems Software
Solutions Unlimited
Sony Microsystems Company
South-Western Publishing Co.
SPSS Inc.
Sun Microsystems, Inc.
Symantec
T/Maker
T.H.E. Journal
Telematics International
Texas Instruments Incorporated
Toshiba American Information Systems, Inc.
Transarc Corporation
True BASIC, Inc.
UNISYS
US West Communications
Ven-Tel, Inc.
Vestra-Subco, Inc.
Vitalink Communications Corporation
The WATCOM Group, Inc.
Waterloo Microsystems
West Publishing Co.
The Whitewater Group
Wolfram Research, Inc.
WordPerfect Corporation
Xerox Corporation
Zenith Data Systems

Corporate Associates Program (CAP)
Application Form
EDUCOM Liaison
(to receive all CAP correspondence)

Name_____
Title_____
Company_____
Address_____
_____
Phone _____
Fee schedule for Corporate Associates

Gross Sales (Millions)	% of Sales to Higher Education Up to 1%	Up to 5%	Up to 15%	Over 15%
less than 5	$1,000	$1,000	$1,000	$1,000
less than 10	$1,000	$1,000	$2,500	$2,500
less than 25	$2,500	$2,500	$2,500	$2,500
less than 50	$2,500	$2,500	$2,500	$2,500
less than 100	$2,500	$2,500	$2,500	$5,000
less than 250	$2,500	$2,500	$5,000	$5,000
less than 500	$2,500	$5,000	$5,000	$5,000
less than 1000	$5,000	$5,000	$5,000	$7,500
less than 2500	$5,000	$5,000	$7,500	$7,500
less than 5000	$5,000	$7,500	$7,500	$7,500
over 5000	$7,500	$7,500	$7,500	$7,500

Using the above schedule, the appropriate fee for my company is $_____.
Note: EDUCOM treats all information about fees paid by specific companies as confidential.

Check enclosed $_____ Please invoice for the amount of $_____

Signature _____ Date _____

Additional information is available about sustaining member status.

We would like to feature your company as a new member of the Corporate Associates Program in the next issue of the EDUCOM Review. Please send us a paragraph answering the question "What relevance does your company have for the higher education market?" (For instance, what products or programs are geared to higher education? What are your future plans for the higher education market place? What do you expect to gain from affiliation with the Corporate Associates Program?) We would also like a copy of your most recent annual report and any other information about your activities, services, or products that might be of interest to EDUCOM's college and university membership.

PLEASE RETURN THIS FORM TO THE ATTENTION OF: Kathy Schaible, EDUCOM, P.O. Box 364, 777 Alexander Road, Princeton, NJ 08540, (609) 520-3350.

gen 5/89

1990 Corporate Associates Program Calendar

January 1990

5 Materials distributed for Spring Special Offer Announcement

16 Application materials for EDUCOM '90 distributed

February 1990

5 Materials due for Spring Special Offer Announcement

19 Application deadline for first-round assignment of EDUCOM '90 space and activities

TBA Advisory Council meeting

March 1990

2 Deadline for preliminary conference flyer copy

April 1990

6 Mailing of Spring Special Offer Announcement

TBA CAP Seminar

May 1990

4 Mailing of preliminary conference flyer

31 Deadline for final conference flyer; participation must be arranged by this date to be included.

June 1990

1 Deadline for payment on reserve demo space at EDUCOM'90

2 Materials distributed for *EDUCOM's Directory of Members, Programs, & Projects*

July 1990

13 Mailing of conference brochure

16 Material for *EDUCOM's Directory of Members, Programs, & Projects* due

August 1990

September 1990

4 Deadline for conference Final Program; participation must be arranged by this date to be included.

October 1990

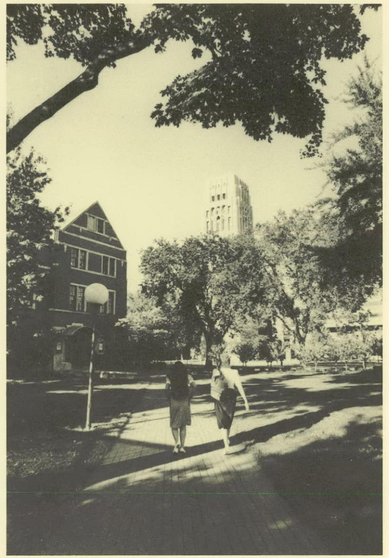
14-17 EDUCOM'90, Atlanta, GA
Host institution--Georgia Institute of Technology

16 *EDUCOM's Directory of Members, Programs, & Projects* mailed.

November 1990

December 1990

Michigan Welcomes EDUCOM'89!



The University of Michigan is proud to host EDUCOM'89, the celebration of the 25th anniversary of the founding of EDUCOM at the University in Ann Arbor. Over the years Michigan has fostered many beginnings in information technology and expects to provide continuing leadership into the next century.

Almost half of the city's present 110,000 population are University people: 35,000 students, 3,000 faculty and instructional staff, 12,000 support staff. The campus has 17 schools and colleges, 9 museums, 23 libraries, a major hospital complex, hundreds of laboratories and thousands of classrooms.

Information technology plays an important role in this large and complex organization. As an EDUCOM'89 attendee, you will be able to learn about and participate in the University's vast electronic environment. At the same time, you will be able to listen to, discuss and debate the important issues of higher education and information technology in a traditional and comfortable campus setting.

Register today so you can enjoy four days back on campus as a guest Wolverine!

Pre-Conference Events

Seminars, co-sponsored by CAUSE
Full and half-day seminars are planned for Monday, October 16. More detailed information will be made available within the next few months.

ESI
The EDUCOM Software Initiative Pre-Conference '89 Meeting will be held on October 16. Task Group and Project Leaders will meet on October 15. For more information, contact EDUCOM, P.O. Box 364, Princeton, NJ 08540; 609-520-3350; via BITNET: ESI@EDUCOM.

University of the World
The first annual meeting of the University of the World will be held October 14-16, immediately preceding EDUCOM'89. For more information or to register, contact the University of the World Central Office, 1055 Torrey Pines Road, Suite 203, La Jolla, CA 92037; 619-456-0103; FAX 619-456-3206; via BITNET: MILLERJ@SDSC.

EDUCOM Corporate Associate Demonstrations, Suites and Contributed Services

Addison-Wesley; Ameritech; Apollo Computer; Apple Computer; Ashton-Tate; AT&T; Authorware; Autodesk; Bell Atlantic; Borland International; BRS Information Technologies; Campus Technology Products; Claris; Control Data; Dell Computer; Digital Equipment; Edutech; Farallon; Hewlett-Packard; IBM; Information Associates; John Wiley & Sons; Joiner Associates; Kinetics; Kinko's; Logitech; Lotus; MCI; Mathtec; Microsoft; Microwave Bypass Systems; Network General; NeXT; Niles & Associates; Northern Telecom; Novell; Oracle; Personal Bibliographic Software; Prime Computer; Pro/Tem Software; Proteon; Quicksoft; Relational Technology; SCT; Solar Systems Software; Solutions Unlimited; Sun Microsystems; Texas Instruments; T.H.E. Journal; The Software Group; The Whitewater Group; Toshiba America; UNISYS; Ven-Tel; Watcom; Wordperfect; and Zenith.

Register Now for Best Housing and Program Selections!

25th Anniversary Program Highlights

Keynote Speakers

John Akers, IBM Chairman

Arno Penzias, AT&T, Nobel Laureate Physicist

Panel of University Presidents hosted by James Duderstadt, University of Michigan President

Panel of Corporate Presidents discuss "Putting the Future Together"

Anniversary Celebration Musical

"If My Friends Could See Me Now!"
The Great Songs of Cy Coleman

A special multi-media production by the University of Michigan School of Music.

Conference Information Network

Information Stations at meeting sites, demo area and hotels, networked to provide convenient electronic mail service and up-to-the-minute conference information about speakers, attendees, session schedules, transportation, maps.

DaVinci Art Exhibit

"Models of Invention"
Original Leonardo DaVinci lithographs and scale models on display for EDUCOM'89 attendees.

Other Special Events

Gala receptions each evening…Hospitality Suites…
Video Showcase…History of EDUCOM…and more!

EDUCOM'89

Conference Registrar
P.O. Box 364
777 Alexander Road
Princeton, NJ 08540

Nonprofit
Organization
U.S. Postage
PAID
Princeton, NJ 08540
Permit #373

REGISTER EARLY!

ADVANCE PROGRAM

ADVANCE PROGRAM

Lessons from the Past, Strategies for the Future

Information Technology in Higher Education from 1964 to 2014

October 16-19, 1989

The University of Michigan
Ann Arbor

EDUCOM'89

EDUCOM'89 Program Highlights

EDUCOM'89 At a Glance

Mon 10/16	Tues 10/17	Wed 10/18	Thurs 10/19
			8a-11a Software Showcase, Corp. Demos
8:30a-5p ESI Mtg	8:30a-10a Opening Session	8:30a-10a General Session	8:30a-10a General Session
8:30a-4p Full-Day Seminars	10:30a-11:30a Concurrent I	10:30a-11:30a Concurrent III	10:30a-11:30a Concurrent V
	11:45a-12:45p Concurrent II	11:45a-12:45p Concurrent IV	11:45a-12:45p Closing Session
12n-4p Half-Day Seminars	12n-5p Software Showcase, Corp. Demos Hosp. Suites	12n-5p Software Showcase, Corp. Demos Hosp. Suites	
4p-5p Newcomer Orientation	12:45p-1:30p Lunch	12:45p-1:30p Lunch	
4p-5:30p EDUCOM Council	1:45p-5p Special Campus Sessions	1:45p-5p Special Campus Sessions	
4p-7:30p Software Showcase, Corp. Demos	1:45p-3p SIGs - I	1:45p-3p SIGs - III	
	3:45p-5p SIGs - II	3:45p-5p SIGs - IV	
5:30p-7:30p Reception	5:30p-7:30p Reception	6p-8p Reception	
8p-10p Musical Event	8p-10p Musical Event	8p-10p Dessert Reception	
8p-10p Hospitality Suites	8p-10p Hospitality Suites		

General Sessions
will be held in the beautiful, 4,000-seat Hill Auditorium on the university's central campus.

Keynote Speakers
- John Akers, IBM Chairman
- Arno Penzias, AT&T, Nobel Laureate Physicist
- Panel of University Presidents hosted by James Duderstadt, University of Michigan President
- Panel of Corporate Presidents discuss "Putting the Future Together"

Concurrent Sessions

Track I The impact of information technology on higher education and its contribution to intellectual innovation: *Will Technology Make Us More Equal or Create a New Elite?; Financing the Future—Who Will Pay?; Information Literacy in a Changing Society; and more.*

Track II The growing role of information technology in our institutions: *Planning for the Big Picture; Teaching and Learning in Transition; Campus Networking—The New Cultural Revolution; and more.*

Track III Innovative applications of information technology in the classroom, laboratory, library, office and residence hall: *Knowledge Management—A Collaboration of Scholars, Librarians and Publishers; Evolving a Realistic Undergraduate Curriculum—Project Bioquest; Interactive Distance Instruction; and more.*

Track IV Recent progress and future prospects for information technology: *Collaboration—Networking's Legacy; Research and Supercomputers; Leveraging for Cooperation; and more.*

Special Interest Group (SIG) Sessions
Women in Technology… National Networking… Data Sharing…Public Computing Sites…Residence Hall Programs… Sales Programs… Institutional File Systems…Medical Computing…Computer Aided Engineering…Art, Music and Humanities Applications…and more.

Software Showcase
Major university-designed software selections, including EDUCOM-NCRIPTAL Higher Education Software Award winners.

Events Sponsored by
Ashton-Tate, AT&T, Apple Computer, IBM, NeXT, and Zenith.

Register Now for Best Housing and Program Selections!

If you would like more information about the EDUCOM'89 Conference — including hotels — please call:

1-800-727-3382

Recorded information at this number will be updated regularly.

Please Send Photocopy of This Registration Form and Keep the Original for Your Records

EDUCOM'89 Advance Registration Form

Mail to: EDUCOM
P.O.Box 364
Princeton, N.J. 08540

Phone: (609) 520-3960
FAX: (609) 520-3975
Via BITNET: CONF89@EDUCOM

PLEASE PRINT OR TYPE

Name: _____

Title: _____

Internal Address: _____

Institution: _____

Mailing Address: _____

City/State/Zip/Country: _____

Telephone: _____

Electronic Mail: _____

FEES:	Early	Late (after 9/15)
EDUCOM members:	$345	$395
Other non-profit institutions:	$485	$535
EDUCOM Corporate Associates:	$375	$425
Other corporations:	$520	$570
Community college EDUCOM members:	$115	$165
Other community colleges:	$150	$200

___Payment or purchase order enclosed.
___Charge my Visa __ /MasterCard___
#_____
Expiration date _____
___Signature _____
___Please bill me.
___Please bill my organization:
P.O. No.: _____

Please Send Photocopy of This Reservation Form and Keep the Original for Your Records

EDUCOM'89 Participating Hotels and Rates

Hotel reservations, including changes and cancellations must be made by mail through the Ann Arbor Convention and Visitors Bureau. Please use this form.

Shuttle buses will make regular runs to hotels throughout the conference. All hotels, with one exception, are within a 10 to 15 minute shuttle ride to the conference sites on the central campus. The Radisson Resort, six miles from Ann Arbor, is 20 minutes from the central campus.

Please indicate your first through sixth choices. Room assignments will be made in the order received. If the hotels of your choice are filled, the Bureau will make the best arrangements elsewhere. To cancel your reservation or make changes, please do so in writing to the Bureau.

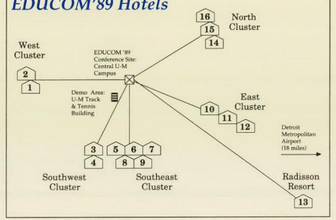
Reservations must be received **before September 15, 1989**. Hotel space in Ann Arbor is limited and conference rooms and rates cannot be guaranteed after this cutoff date. In addition, special rates will only apply to those who are registered for the conference.

In the list below, the single occupancy rate and double occupancy rate are shown after each hotel name. Additional information on each hotel is available by dialing 1-800-727-3382.

EDUCOM Software Initiative (ESI) pre-conference meeting will be at Holiday Inn West Holidome.

PLEASE INDICATE 6 HOTEL PREFERENCES: USE 1 FOR YOUR 1ST CHOICE, 2 FOR YOUR SECOND, ETC.

EDUCOM'89 Hotels



WEST Cluster
___1. Holiday Inn West Holidome ($78, $88)
___2. Weber's Inn ($62, $72)

SOUTHWEST Cluster
___3. Berkshire Hilton ($75, $85)
___4. Knights Inn ($35, $42)

SOUTHEAST Cluster
___5. Sheraton University Inn ($70, $75)
___6. Best Western Wolverine Inn ($32, $36)
___7. Days Inn ($50, $56)
___8. Hampton Inn South($47, $52)
___9. Ramada Inn ($70, $78)

EAST Cluster
___10. Holiday Inn East ($63, $70)
___11. Howard Johnson's ($42, $46)
___12. Comfort Inn ($50, $54)
___13. Radisson Resort - Ypsilanti ($80, $80)

NORTH Cluster
___14. Ann Arbor Marriott ($71, $81)
___15. Red Roof Inn ($38, $44)
___16. Hampton Inn North ($47, $52)

EDUCOM'89 Hotel Reservation Form

Complete and mail to:
Ann Arbor Convention & Visitors Bureau
211 East Huron, Suite 6
Ann Arbor, MI 48104
(313) 995-7285

PLEASE PRINT OR TYPE

Name: _____

Title: _____

Internal Address: _____

Institution: _____

Mailing Address: _____

City/State/Zip/Country: _____

Telephone: _____

___One Bed/One Person
___One Bed/Two People
___Two Beds/Two People

Total Number of people in room_____

Sharing with: Name_____
City_____

Please indicate any special needs, such as handicap access:

_____

Expected Arrival Date/Time _____

Expected Departure Date/Time _____

A reservation acknowledgement will be sent to you by the Bureau. After you receive it, the hotel indicated on the form should contact you to confirm; if you do not receive a response within ten days, you should call the hotel to confirm. Each hotel **requires a first night deposit** to guarantee the room. You may send your deposit to the hotel after you receive your confirmation, or you may indicate a credit card number below to guarantee your room in advance.

Credit Card Name_____#_____

Exp. Date_____ Signature_____

Northwest Airlines, Official Airline of EDUCOM'89, is offering the following discounted airfares to Detroit., October 13-22: 5% off the lowest discounted fare available at the time of booking or 45% off the full round trip coach class fare. Call Northwest Airlines at 800-328-1111 (in Canada, 800-328-7747), Forster-Joyce Travel at 800-345-6383, or your travel agent. Mention the code number 15021 to receive the discounted fares.

EDUCOM

P.O. Box 364
777 Alexander Road
Princeton, NJ 08540
609 520-3340

February 5, 1990

Mr. Thomas Nemcik
Community Memory
2617 San Pablo Avenue
Berkeley, CA 94702

DearMr. Nemcik:

Preparations for EDUCOM'90 are well under way, and opportunities for participation have just been announced to our corporate associates. There is still time forCommunity Memory to become an EDUCOM corporate associate and to be included in the first round of assignments for demo space, event sponsorship, and other opportunities.

Participation in the annual conference is limited to our Associates. Please note that your application for membership and for participation must be received by EDUCOM no later than February 19, 1990, for first-round consideration. Applications for membership will be accepted at any time, of course, and applications for conference participation which are received after the above date will be honored as availability allows.

We expect 4,000 computing professionals from higher education and organizations interested in higher education to attend our conference in Atlanta. We will be using the spectacular new INFORUM exhibit and meeting facilities, and the Hyatt Regency Atlanta will serve as headquarters hotel.

The enclosed reprint from the EDUCOM'89 program lists the corporations which participated in that conference. We have also enclosed information concerning EDUCOM and the Corporate Associates Program, and an application for membership. If you have any questions, please feel free to call Lynn Miranda at 609/520-3350.

Sincerely,

Kathy Schaible

Kathy Schaible
Manager, Corporate Associates Program

Enclosures

What is the EDUCOM Corporate Associates Program ?

October 1989
777 Alexander Road
Princeton, NJ 08540
609/520-3350
FAX# 609/520-3975

The EDUCOM Corporate Associates Program (CAP) is:

• ***A direct channel of communication*** between companies and institutions of higher education that is of great value to both. EDUCOM's work helping colleges and universities use information technology leads naturally to close relationships with the providers of that technology. In 1983, we formalized those relationships by creating what has become the EDUCOM Corporate Associates Program.

The Program offers corporations the opportunity to participate, in an exclusive way, in EDUCOM activities. Participation in the Program provides the opportunity for direct access to the decision-makers in member universities and colleges. And it is an additional way to show your support for institutions of higher education.

The Corporate Associates Program has attracted many of the leading corporations in computer hardware, software, and telecommunications, and the number of participants from publishing and other related fields is growing quickly.

Benefits for Corporate Associates

EDUCOM's primary mission is to serve its members in the academic world. And by acting as a conduit between members and associate companies, the EDUCOM Corporate Associates Program is able to provide unique benefits to Associates as well:

• ***Communication:*** The information and requests Corporate Associates receive from contact with member schools can help them design products and services or find applications for existing products and services that meet the special needs of higher education.

• ***Recognition:*** Established contact with members, and the trust Associates build with that contact, means a better reception to promotional and informational messages wherever they are encountered, not only within the context of EDUCOM.

• ***Making Contacts:*** Participation in EDUCOM activities, particularly in the annual Corporate Associates Seminars, provides special opportunities to meet and exchange ideas with higher education experts and colleagues.

• ***Goodwill:*** Association with EDUCOM helps establish each Corporate Associate's organization as a company committed to the higher education community.

Corporate Associates Program

Each company is different, and each will want to participate in the Program in a different way. To that end, we have created a Corporate Associates package that provides both standard benefits to all Associates and a variety of options at additional costs. Each Associate can decide how to participate.

The Corporate Associates Program includes all of these standard benefits:

• ***Participation in the Annual EDUCOM Conference.*** EDUCOM's Annual Conference is the most widely respected information technology conference in the academic world. Corporate Associates have the exclusive opportunity to participate in the Technology Demonstration area at the Conference. This is a separate area where corporate representatives may schedule appointments and hold one-on-one conferences and demonstrations with the people who are most interested in buying and/or using products and services. Associates may reserve space in the demonstration area (at a per sq. ft. fee), may sponsor Conference events, and may distribute promotional literature on the company's programs and services. Many Corporate Associates find that this benefit alone is well worth the cost of their EDUCOM fee.

• ***Inclusion in EDUCOM's Directory of Members, Programs & Projects.*** This book features profiles of your company and of the other Corporate Associates. It includes a description of products and services, special programs for educational institutions, discounts you may wish to offer, and company contacts. The names and phone numbers of an average of ten or more decision-makers at each of our close to 600 member institutions are included in the main section of the Directory. The Directory is only available to EDUCOM members and Corporate Associates. Your company, as a Corporate Associate, will receive a limited number of complimentary copies each year.

• ***Participation in the Annual Corporate Associates Seminars.*** These Seminars are open only to Associates. They offer Corporate Associates unique opportunities to find out what is happening in academic computing from experts at leading institutions. The Seminars also provide an important opportunity to learn about the campus community's special information technology needs and identify ways that companies can respond quickly to the academic community's needs for special products and services. Past Seminar topics have covered issues such as networking, supercomputers, and software site licenses. There is no additional fee for the CAP Seminars.

• ***A direct conduit to people in higher education with the power to make or influence purchasing decisions.*** Active EDUCOM participants include academic and administrative officers, deans, college and university CEOs, department chairpersons, faculty members and specialists involved in information technology decisions, software support people, and many more. These are the people you will come in contact with as an EDUCOM Corporate Associate -- at seminars and conferences, through the Special Offers Brochure, and through direct mail services.

• ***Assistance from EDUCOM.*** EDUCOM will offer informal assistance in structuring offers to our members. Corporate Associates can call on us anytime with questions -- we are happy to share our insights. In addition, we will provide formal consulting at discounted rates through the EDUCOM Consulting Group.

• ***Substantial discounts for all EDUCOM conferences, seminars and other EDUCOM events.*** Corporate Associates may send representatives to EDUCOM programs at the discounted Associate rate. Participation in these programs helps organizations stay current with the latest developments and concerns in academia. These programs also provide an important opportunity for your people to maintain their contacts with key campus decision-makers.

• ***Free subscriptions to EDUCOM publications, and additional subscriptions at a discounted rate.*** EDUCOM'S regular publications include a quarterly journal and newsletters, in addition to monographs and books. Circulating these publications within your company -- to research & development, marketing, sales, and executive departments -- can help Associates better serve the higher education community.

• ***Listing in the EDUCOM Review.*** A brief article in the *EDUCOM Review* (distributed quarterly to 13,000 academic computing professionals) will introduce your company as a new member of the Corporate Associates Program. Your company will also be included in the list of Corporate Associates in each issue of the *Review*.

Program Options

Associates may wish to extend participation in the Corporate Associates Program with one or more of these options:

• ***Direct Mail Services.*** EDUCOM offers several special services to help Associates make sure approved mailings reach the right people. They include an EDUCOM cover letter, mailing labels, and other mailing services.

• ***Press Releases.*** EDUCOM will send press releases announcing an Associate's participation in the Program to key publications. These include everything from major industry publications to newsletters with a small but important readership.

• ***Special Offer Brochure.*** If Associates offer significant special discounts or services to EDUCOM Members, they can be included in the Special Offer Brochure. This booklet is sent each spring to 5,000 representatives at EDUCOM member institutions.

• ***Advertising.*** Discounts on advertising in the EDUCOM *Review*, distributed to more than 13,000 individuals in higher education.

Fees

Full participation in the Corporate Associates Program means better communication--for our members and for our Corporate Associates. In order to give every company, large and small, the opportunity to participate, we've established a flexible fee structure, based on a corporation's gross sales and the percent of gross sales to higher education. The optional services provide additional flexibility.

Since EDUCOM is a nonprofit organization, Associates may also, if they prefer, arrange to treat their participation fees as a charitable contribution.

How to Join the Corporate Associates Program

It's easy to become an EDUCOM Corporate Associate. We will tell you more about the Program, answer your questions, and help you become a Corporate Associate. Simply contact the EDUCOM Corporate Relations Group at 609-520-3350, send electronic mail via BITNET to CAP@EDUCOM or write us at:

EDUCOM Corporate Associates Program
P. O. Box 364
777 Alexander Road
Princeton, NJ 08540
FAX# 609-520-3975

What is EDUCOM ?

1112 16th Street N.W., Suite 600
Washington, DC 20036

777 Alexander Road
Princeton, NJ 08540

EDUCOM is:

•***A non-profit consortium*** of colleges, universities, and other institutions founded in 1964 to promote the effective use of computing and communication technology in higher education. Through direct services and cooperative efforts, EDUCOM assists its members and provides leadership for addressing critical issues about the role of information technology in higher education.

EDUCOM's membership includes virtually every major research university in the country, four-year private and public institutions, along with a number of two-year colleges, overseas campuses, foundations, consortia, and research laboratories. Close to 600 higher education institutions and more than 143 corporations participate in the following EDUCOM activities:

• ***EDUCOM General Membership:*** Members receive EDUCOM Publications, participate in task forces, and obtain discounts on conferences, seminars, consulting, and selected offerings from Corporate Associates. General publications include the quarterly *EDUCOM Review*, the *CCNEWS* electronic newsletter, and books such as: EDUCOM Strategies Series on Information Technology which includes: *Campus Networking Strategies; Campus Strategies for Libraries and Electronic Information; Computing Across the Curriculum: Academic Perspectives; Organizing and Managing Information Resources on Campus; Transforming Teaching with Technology: Perspectives From 2-year Colleges;* and the *Directory of Software Sources for Higher Education.* Recent seminar topics have included strategic planning for computing, campus network planning, and educational software acquisition, development, and support.

EDUCOM's annual fall conference is a forum for policymakers, educators, and corporate representatives concerned with campus computing and telecommunications. A unique format—general sessions and panels in the mornings, with technology demonstrations, discussion groups, and campus visits in the afternoons—provides a stimulating atmosphere for conferees interested in the latest issues, applications, and visions for the future. EDUCOM'89, "Lessons from the Past, Strategies for the Future", October 16-19, will be held on the campus where EDUCOM was founded 25 years ago, at the University of Michigan, Ann Arbor. EDUCOM'90 will be in Atlanta, October 14-17, and EDUCOM'91 will be October 16-19 in San Diego.

• ***Corporate Associates Program:*** A forum for companies to establish contact and exchange ideas with EDUCOM member institutions, through the EDUCOM conference, seminars, the annual Directory to Members & Projects plus other activities and services. Over 143 leading information technology firms currently participate and offer special discounts and packages to EDUCOM members.

• ***EDUCOM Networking Activities:*** Two projects to promote the growth and interconnection of computer networks throughout higher education:

> • ***Networking and Telecommunications Task Force (NTTF):*** NTTF provides leadership and focus for colleges and universities in identifying and communicating strategic networking and telecommunications policy issues and concerns. NTTF has become increasingly visible, especially through its spring National Net conferences, in response to growing interest about national networking policies among universities, corporations, and government.

• ***BITNET Network Information Center (BITNIC)***: BITNIC provides membership and information services for BITNET, the largest academic computer network. Faculty, students, and staff at over 480 colleges, universities, and research centers in the U.S. use BITNET for electronic mail, file transfer, information retrieval, and connection to other networks in the U.S. and abroad. BITNIC, which also helps support volunteers who contribute technical expertise, software, and documentation, is operated by EDUCOM under contract with the Board of Trustees of the Corporation for Research and Educational Networking (CREN).

• ***EDUCOM Software Initiative (ESI)***: The ESI is both a forum for fostering communication on how to improve the quality, accessibility and effectiveness of academic software, and a set of working groups and projects to solve problems in these areas. The ESI is primarily concerned with the *uses* of technology - especially for learning and teaching. In the first years, the ESI worked toward a vision of an environment in which information technology is used to improve the quality of education, and encouraged a maket for software in higher education. Now in its fourth year, the ESI has become a group of diverse individuals dedicated to improving higher education in the broadest sense - teaching, learning, and research - through the use of information technology. Reflecting this expanding scope, the ESI will be changing its name to the "Educational Uses of Information Technology (EUIT)" Program in the fall of 1989. Through active collaboration of EDUCOM members and Corporate Associates, ESI conducts a variety of projects and publications.

• ***EDUCOM Consulting Group (ECG)***: ECG provides evaluation and recommendations on administrative, research, and instructional uses of information technology; strategic planning and budgeting; organization, management, and staffing; financing; library automation; hardware and software selection, acquisition, and implementation; proposal reviews; and on-campus workshops. Because consultants are drawn from member faculty, administrators, and professional staff, the ECG is able to provide high quality, low cost consultations uniquely geared to the higher education environment.

EDUCOM is governed by a member council and a board of trustees, and is funded by membership dues, service fees, and grants from foundations, corporations, and government. The organization maintains executive offices in Washington, DC and program staff in Princeton, New Jersey.

For more information about joining EDUCOM or any EDUCOM activity, please send electronic mail to INQUIRY@EDUCOM.BITNET or contact us at:

Washington Office:
EDUCOM
1112 16th Street N.W., Suite 600
Washington, DC 20036
(202) 872-4200
FAX # (202) 872-4318

Princeton Office:
EDUCOM
777 Alexander Road
Princeton, NJ 08540
(609) 520-3340
FAX # (609) 520-3975

EDUCOM Member Institutions as of September 1989

ACEP
Abilene Christian University
Abraham Baldwin Agricultural College
Acadia University (Canada)
Adelphi University
Agnes Scott College
Albany State College
Albright College
Alderson Broaddus College
Alfred University
Allegheny College
Alma College
American University
Amherst College
Appalachian State University
Aquinas College
Arizona State University
Armstrong State College
Assoc of American Medical Colleges
Assoc of Research Libraries
Atlanta Metropolitan College
Auburn University-Main Campus
Augusta College
Bainbridge Junior College
Baldwin-Wallace College
Bard College
Baylor University
Beaver College
Bentley College
Biola University
Birmingham Southern College
Boise State University
Bond University
Boston College
Boston University
Bowdoin College
Bradley University
Brenau College
Brigham Young University-Main Campus
Brookdale Community College
Brookhaven National Laboratories
Brown University
Brunswick College
Bryant College
Bryn Mawr College
Bucknell University
Buena Vista College
Butler University
CUNY-Lehman College
CUNY-System Office
California Institute of Technology
California Lutheran University
California Polytechnic State Univ-San Luis Obispo
California State Polytechnic Univ-Pomona
California State University-Bakersfield
California State Univ-Chico
California State Univ-Dominguez Hills
California State Univ-Fresno
California State Univ-Fullerton
California State Univ-Hayward
California State Univ-Long Beach
California State Univ-Los Angeles
California State Univ-Northridge
California State Univ-Sacramento
California State Univ-San Bernardino
California State Univ-Stanislaus
California State University System
Canisius College
Cardinal Stritch College
Carleton College
Carnegie Mellon University
Catholic University of America
Cerritos College
Christopher Newport College
Claremont Graduate School
Clark County Community College
Clark University
Clarkson University
Clayton State College
Clemson University
Cleveland State University
Colby College
Colgate University
College of DuPage
College of St. Thomas
College of The Holy Cross
College of William and Mary
College of Wooster
Colorado College
Colorado School of Mines
Colorado State University
Columbia University
Columbia University Teachers College
Columbus College
Columbus State Community College
Cornell University
Cornell University Medical College
Council for Interinstitut'l Leadership
Dalhousie University
Dalton Junior College
Dartmouth College
Darton College
Davidson College
De Paul University
DePauw University
Denison University
Dickinson College
Dowling College
Drake University
Drew University
Drexel University
Duke University
Duquesne University
Dutchess Community College
East Carolina University
East Georgia College
Eastern Michigan University
Eastern Virginia Med School
Economic Dev Institute of the World Bank
Educational Testing Service
Educational Ventures Incorporated
El Paso Community College
Elizabeth City State University

EDUCOM Member Institutions as of September 1989

Emory University
Fairfield University
Floyd College
Fordham University
Forsyth Technical Community College
Fort Valley State College
Fox Chase Cancer Center
Franklin College of Indiana
Franklin and Marshall College
Fundacion Politecnico Grancolombiano
Gainesville Junior College
Gallaudet University
George Mason University
George Washington University
Georgetown University
Georgia College
Georgia Institute of Technology
Georgia Southern College
Georgia Southwestern College
Georgia State University
Gettysburg College
Glassboro State College
Golden Gate University
Gonzaga University
Gordon College
Goucher College
Grinnell College
Gustavus Adolphus College
Hamilton College
Hartford Graduate Center
Hartwick College
Harvard University
Haverford College
Hiram College
Hobart and William Smith College
Hofstra University
Hollins College
Hood College
Howard University
Humboldt State University
Idaho State University
Illinois Institute of Technology
Illinois Wesleyan University
Indiana University-Bloomington
Indiana University of Pennsylvania
Institute for Advanced Study
Instituto Tecnologico Autonoma de Mexico
Iona College
Iowa State Univ of Science & Tech
J. Paul Getty Trust - AHIP
Jersey City State College
Johns Hopkins University
Kalamazoo College
Kansas State University
Kauai Comm Coll
Kean College of New Jersey
Kennesaw State College
Kentucky Council on Higher Education
Kenyon College
Lafayette College
Lawrence Institute of Technology
Lawrence University
Le Moyne College
Lehigh University
Lewis & Clark College
Lewis-Clark State College
Lincoln University
Longwood College
Lorain County Community College
Loras College
Louisiana Tech University
Loyola College
Loyola University-New Orleans
Loyola University of Chicago
Macalester College
Macon College
Manhattan College
Mankato State University
Marist College
Marquette University
Mary Washington College
Marywood College
Massachusetts Institute of Technology
Mattatuck Community College
McMaster University
Medical College of Georgia
Medical College of Ohio at Toledo
Medical College of Wisconsin
Meharry Medical College
Memphis State University
Mercer University-Macon
Miami-Dade Community College
Michigan State University
Michigan Technological University
Middle Georgia College
Middlebury College
Mills College
Millsaps College
Missouri Western State College
Monterrey Inst of Technology (Mexico)
Montgomery College-Rockville
Moravian College
Mount Holyoke College
Mount Royal College
Mount Saint Vincent University
Mount San Antonio College
Muskingum College
National Coll of Education-Main Campus
National University of Singapore
New Jersey Institute of Technology
New Mexico State Univ-Main Campus
New York Chiropractic College
New York University
North Adams State College
North Carolina A & T State University
North Carolina Central University
North Carolina School of the Arts
North Carolina State University
North Dakota State Univ
North Georgia College
North Shore Community College
Northeast Missouri State University
Northeastern State University
Northeastern University

EDUCOM Member Institutions as of September 1989

Northern Illinois University
Northern Michigan University
Northern Nevada Community College
Northwestern University
Norwich University
Nova University
OCLC, Inc.
Oakland University
Oberlin College
Ohio State University-Main Campus
Ohio Wesleyan University
Old Dominion University
Olympic College
Ontario Inst for Studies in Education
Oregon State System of Higher Education
Oregon State University
Pacific Lutheran University
Palmer College of Chiropractic
Pan American University
Pembroke State University
Penn State Univ-Univ Park Campus
Pepperdine University
Philadelphia Coll of Textile & Science
Pontificia Universidad Catolica de Chile
Pontificia Universidad Javeriana
Pratt Institute
Princeton University
Purdue University-Main Campus
Queen's University
Ramapo College of New Jersey
Regents Computer Network
Rensselaer Polytechnic Institute
Research Foundation of SUNY
Rhodes College
Rice University
Rider College
Ripon College
Rochester Institute of Technology
Rockefeller University
Rockhurst College
Rutgers University-Camden Campus
Rutgers University-New Brunswick
Rutgers University-Newark
SUNY-Albany
SUNY-Binghamton
SUNY-Buffalo
SUNY-College of Technology
SUNY-Empire State College
SUNY-Health Science Ctr Brooklyn
SUNY-Health Science Ctr Syracuse
SUNY-Maritime College
SUNY-Stony Brook
SUNY-System Office
SUNY Agric & Technical Coll-Cobleskill
SUNY Agric & Technical Coll-Morrisville
SUNY College at Brockport
SUNY College at Buffalo
SUNY College at Cortland
SUNY College at Fredonia
SUNY College at Geneseo
SUNY College at New Paltz
SUNY College at Old Westbury
SUNY College at Oneonta
SUNY College at Oswego
SUNY College at Plattsburgh
SUNY College at Potsdam
SUNY College at Purchase
SUNY College of Optometry
SUNY College of Technology
SUNY College of Technology - Farmingdale
SUNY Coll of Env Sci/Forestry
SUNY Coll of Technology at Utica-Rome
Saint Bonaventure University
Saint John's College-Main Campus
Saint John's University
Saint Joseph's University
Saint Joseph College
Saint Louis University
Saint Mary's College
Saint Mary's University
Saint Michael's College
Saint Olaf College
Saint Vincent College & Seminary
Samford University
San Diego State University
San Francisco State University
San Jose State University
Santa Clara University
Savannah State College
Scripps Clinic & Research Foundation
Seoul National University
Seton Hall University
Seton Hall University School of Law
Siena College
Simon Fraser University
Simpson College
Skidmore College
Smith College
Sonoma State University
South Dakota State University
South Georgia College
Southampton University
Southeastern Massachusetts Univ
Southeastern University
Southern College of Technology
Southern Illinois Univ-Carbondale
Southern Methodist University
Southwest Texas State University
Southwestern College
Southwestern University
Spelman College
St. Louis Community College
Stanford University
Stetson University
Stevens Institute of Technology
Stockholm University
Susquehanna University
Swarthmore College
Syracuse University-Main Campus
Temple University
Tennessee Technological University
Texas A & M University-Main Campus
Texas Christian University
Texas Southern University

EDUCOM Member Institutions as of September 1989

The Citadel
The Naropa Institute
The Salk Institute
The University of Alabama
Thomas Jefferson University
Tomlinson College
Towson State University
Trenton State College
Trinity College
Trinity University
Truckee Meadows Community College
Tufts University
Tulane University of Louisiana
Tuskegee University
UNI-C Danish Comp. Ctr. for Res. & Educ.
Union College
Union County College
United States Air Force Academy
United States Merchant Marine Academy
United States Military Academy
United States Naval Academy
Universidad Externado de Colombia
Universidad Nacional Autonoma de Mexico
Universidad Nacional de Colombia
Universidad de Los Andes (Colombia)
University College of Cape Breton
University of Adelaide
University of Akron-Main Campus
University of Alabama-Birmingham
University of Alaska-Anchorage
University of Alaska Southeast
University of Alaska Statewide System
University of Alberta
University of Arizona
University of Arkansas-Little Rock
University of Arkansas-for Medical Sci.
University of Baltimore
University of Bridgeport
University of British Columbia
University of Calgary
University of Calif-Berkeley
University of Calif-Davis
University of Calif-Irvine
University of Calif-Los Angeles
University of Calif-Riverside
University of Calif-San Diego
University of Calif-San Francisco
University of Calif-Santa Barbara
University of Calif-Santa Cruz
University of Calif-System Wide Admin
University of Chicago
University of Dayton
University of Delaware
University of Denver
University of Dusseldorf
University of Evansville
University of Florida
University of Georgia
University of Georgia-System Office
University of Guelph
University of Hartford
University of Hawaii-Honolulu Comm Coll
University of Hawaii-Kapiolani Comm Coll
University of Hawaii-Leeward Comm Coll
University of Hawaii-Manoa
University of Hawaii-Maui Comm Coll
University of Hawaii-West Oahu
University of Hawaii-Windward Comm Coll
University of Hawaii System Office
University of Hawaii at Hilo
University of Houston
University of Illinois-Chicago
University of Illinois Urbana-Champaign
University of Indianapolis
University of Iowa
University of Kansas-Main Campus
University of Kentucky
University of Lethbridge (Canada)
University of Louisville
University of Maine-Machias
University of Maine-Presque Isle
University of Maine-System
University of Maine System
University of Manitoba
University of Maryland-College Park
University of Maryland Balt County
University of Maryland System Admin
University of Maryland at Baltimore
University of Massachusetts-Amherst
University of Massachusetts-Boston
University of Medicine & Dentistry of NJ
University of Miami
University of Michigan-Ann Arbor
University of Minnesota-Twin Cities
University of Missouri-Columbia
University of Missouri-Kansas City
University of Missouri-Rolla
University of Missouri-Saint Louis
University of Nebraska-Lincoln
University of Nebraska-Medical Center
University of Nebraska-System
University of Nevada-Las Vegas
University of Nevada-Reno
University of Nevada-System Computing
University of New Brunswick
University of New Mexico-Main Campus
University of New Orleans
University of North Carolina-Asheville
University of North Carolina-Chapel Hill
University of North Carolina-Charlotte
University of North Carolina-Greensboro
University of North Carolina-Wilmington
University of North Carolina Central Off
University of North Dakota-Main Campus
University of North Florida
University of Notre Dame
University of Oklahoma-Health Sci Ctr
University of Oklahoma-Norman
University of Pennsylvania
University of Pittsburgh-Main Campus
University of Puget Sound
University of Rhode Island
University of Rochester
University of SC-Columbia

EDUCOM Member Institutions as of September 1989

University of San Diego
University of Scranton
University of South Carolina-Lancaster
University of South Dakota
University of South Florida
University of Southern California
University of Southern Maine
University of Southern Mississippi
University of Tennessee-Chatanooga
University of Tennessee-Health Sciences
University of Tennessee-Knoxville
University of Texas-Arlington
University of Texas-Dallas
University of Texas-Hlth Sci-San Antonio
University of Texas-Houston
University of Texas-System
University of Toledo
University of Toronto
University of Tulsa
University of Utah
University of Vermont
University of Virginia-Main Campus
University of Washington
University of Western Ontario
University of Wisconsin-Centers
University of Wisconsin-Eau Claire
University of Wisconsin-Extension
University of Wisconsin-Green Bay
University of Wisconsin-La Crosse
University of Wisconsin-Madison
University of Wisconsin-Milwaukee
University of Wisconsin-Oshkosh
University of Wisconsin-Parkside
University of Wisconsin-Platteville
University of Wisconsin-River Falls
University of Wisconsin-Stevens Point
University of Wisconsin-Stout
University of Wisconsin-Superior
University of Wisconsin-System Office
University of Wisconsin-Whitewater
University of Wollongong
University of Wyoming
University of the South
Univ of Health Sciences-Chicago Med
Utah State University
Valdosta State College
Vanderbilt University
Vassar College
Vermont State Colleges System Office
Villanova University
Virginia Community College-System
Virginia Military Institute
Virginia Polytechnic Inst & State Univ
WA Higher Education Computer Consortium
WEST VIRGINIA UNIVERSITY
WVNET
Wabash College
Washington & Lee University
Washington College
Washington State University
Washington University
Waycross Junior College
Wayne State University
Weizmann Institute of Science (Israel)
Wellesley College
Wesleyan College
Wesleyan University
West Chester University of PA
West Georgia College
West Valley Community College
Western Carolina University
Western Maryland College
Western Michigan University
Western Nevada Community College
Wheaton College
Whitman College
Whittier College
Widener University
William Rainey Harper College
Williams College
Wittenberg University
Worcester Polytechnic Institute
Wright State University-Lake Campus
Wright State University-Main Campus
Yale University
Yeshiva University

Corporate Associates Program (CAP)
Application Form
EDUCOM Liaison
(to receive all CAP correspondence)

Name_____
Title_____
Company_____
Address_____

_____

Phone _____

Fee schedule for Corporate Associates

Gross Sales (Millions)	% of Sales to Higher Education Up to 1%	Up to 5%	Up to 15%	Over 15%
less than 5	$1,000	$1,000	$1,000	$1,000
less than 10	$1,000	$1,000	$2,500	$2,500
less than 25	$2,500	$2,500	$2,500	$2,500
less than 50	$2,500	$2,500	$2,500	$2,500
less than 100	$2,500	$2,500	$2,500	$5,000
less than 250	$2,500	$2,500	$5,000	$5,000
less than 500	$2,500	$5,000	$5,000	$5,000
less than 1000	$5,000	$5,000	$5,000	$7,500
less than 2500	$5,000	$5,000	$7,500	$7,500
less than 5000	$5,000	$7,500	$7,500	$7,500
over 5000	$7,500	$7,500	$7,500	$7,500

Using the above schedule, the appropriate fee for my company is $_____.
Note: EDUCOM treats all information about fees paid by specific companies as confidential.

Check enclosed $_____ Please invoice for the amount of $_____

Signature _____ Date _____

Additional information is available about sustaining member status.

We would like to feature your company as a new member of the Corporate Associates Program in the next issue of the EDUCOM Review. Please send us a paragraph answering the question "What relevance does your company have for the higher education market?" (For instance, what products or programs are geared to higher education? What are your future plans for the higher education market place? What do you expect to gain from affiliation with the Corporate Associates Program?) We would also like a copy of your most recent annual report and any other information about your activities, services, or products that might be of interest to EDUCOM's college and university membership.

PLEASE RETURN THIS FORM TO THE ATTENTION OF: Kathy Schaible, EDUCOM, P.O. Box 364, 777 Alexander Road, Princeton, NJ 08540, (609) 520-3350.

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Academic Computing
Addison Wesley Publishing Company
Advanced Computer Communications
Aldus Corporation
Amdahl Corporation
Ameritech
Apollo Computer Inc.
Apple Computer, Inc.
ArborText, Inc.
Asante Technologies, Inc.
Ashton-Tate Corporation
ASYS
AT&T
Authorware, Inc.
AutoDesk, Inc.
Avant-Garde Systems
Banyan Systems, Inc.
Bell Atlantic Corporation
BellSouth Corporation
Borland International
Cabletron Systems Inc.
Cadkey
Caere
Camber-Roth
Cambridge Group Inc.
Campus Technology Products
Chipcom Corporation
The Chronicle of Higher Education
Cisco Systems Inc.
CLARIS Corporation
Commodore Business Machines
Coopers & Lybrand
Course Technology, Inc.
Cray Research, Inc.
Datability Software Systems
Data Research Associates Inc.
Data Switch Corporation
Dell Computer Corporation
Digital Equipment Corporation
Dragonfly Software
Eastman Kodak Company
Edutech
Enable Software, Inc.
EVEREX
1st Desk Systems, Inc.
Falcon Software, Inc.
Farallon Computing
Follett Software Company
Fujitsu America, Inc.
Gandalf Data, Inc.
Gartner Group, Inc
GTE Education Services
Hayes Microcomputer Products, Inc.
Hewlett-Packard
High Performance Systems
IBM Corporation
INGRES Corporation
Information Associates
Information Builders
Informix Software, Inc.
InstaPlan Corporation
Interleaf
John Wiley & Sons, Inc.
Joiner Associates, Inc.
Key Computer Laboratories, Inc.
Kinko's Academic Courseware Exchange
Lahey Computer Systems
Learn-PC Video Systems
Lifetree Software, Inc.
LiTel Telecommunications Corporation
Logitech, Inc.
Lotus Development Corporation
MT Xinu, Inc.
MacWeek Inc.
MacroMind, Inc.
Magna
Maxwell On Line
MCI
McGraw-Hill Publishing Company
Microsoft Corporation
Network General Corp.
NeXT, Inc.
Niles & Associates, Inc.
Northern Telecom, Inc.
Northern Wire & Cable Inc.
NOTIS Systems, Inc
Novell, Inc.
Nynex Corporation
Oracle
The Oryx Press
Paperback Software International
Pergamon Software, Inc.
Persoft, Inc.
Personal Bibliographic Software, Inc.
Peter Li, Inc.
Pro/Tem Software, Inc.
Proteon, Inc.
Quark, Inc.
Quicksoft, Inc.
Radius, Inc.
Realtime Learning Systems
Robbins Communication, Inc.
Scholastic Inc./Electronic Learning
SCT
SilverPlatter Information
Software Publishers Association
Solutions Unlimited
Sony Microsystems Company
SPSS Inc.
Sun Microsystems, Inc.
Symantec
T.H.E. Journal
Telematics International
Texas Instruments Incorporated
Toshiba American Information Systems, Inc.
Transarc Corporation
True BASIC, Inc.
US West Communications
Ven-Tel, Inc.
Vestra-Subco, Inc.
Vitalink Communications Corporation
Wadsworth Publishing, Inc.
The WATCOM Group, Inc.
West Publishing Co.
The Whitewater Group
Wolfram Research, Inc.
WordPerfect Corporation
Xerox Corporation
Zenith Data Systems

1990 Corporate Associates Program Calendar

January 1990

5 Materials distributed for Spring Special Offer Announcement

16 Application materials for EDUCOM '90 distributed

February 1990

5 Materials due for Spring Special Offer Announcement

19 Application deadline for first-round assignment of EDUCOM '90 space and activities

TBA Advisory Council meeting

March 1990

2 Deadline for preliminary conference flyer copy

April 1990

6 Mailing of Spring Special Offer Announcement

17 CAP Advisory Council Meeting

18 CAP Seminar

May 1990

4 Mailing of preliminary conference flyer

31 Deadline for final conference flyer; participation must be arranged by this date to be included.

June 1990

1 Deadline for payment on reserve demo space at EDUCOM'90

2 Materials distributed for *EDUCOM's Directory of Members, Programs, & Projects*

July 1990

13 Mailing of conference brochure

16 Material for *EDUCOM's Directory of Members, Programs, & Projects* due

August 1990

September 1990

4 Deadline for conference Final Program; participation must be arranged by this date to be included.

October 1990

14-17 EDUCOM'90, Atlanta, GA Host institution--Georgia Institute of Technology

16 *EDUCOM's Directory of Members, Programs, & Projects* mailed.

November 1990

December 1990

EDUCOM '90

Preparing for the Renaissance:

Computing and Communications for Technology, Science, and the Arts

October 14-17, 1990 * INFORUM * Atlanta, GA

Hosted by Georgia Institute of Technology

Featured Speakers Include:

Jimmy Carter
Former President of the United States

Steven Jobs
President and Founder, NeXT, Inc.

John Portman
Chairman, The Portman Companies

EDUCOM conferences have traditionally been important forums for educators and corporate representatives who are concerned with campus computing strategy and policy, telecommunications, distributed computing, networking, microcomputers, advanced workstations, and computer applications in all aspects of teaching, research, and administration. EDUCOM'90 invites policy-makers, administrators, and faculty to examine the role of information technology in bringing about a new integration of technology, science, and the arts and a new spirit of intellectual excitement.

You are invited to join discussions organized around strategic and tactical issues of...

* Policy
* Management
* Instruction and Research
* Technical Development

...and to help pave the way for a reintegration of technology, science, and the arts in the century ahead.

Registration forms and hotel information will be available in Spring, 1990.
For further information call EDUCOM at 609-520-3340
or via BITNET: CONF@EDUCOM

EDUCOM'89

25th Anniversary Conference

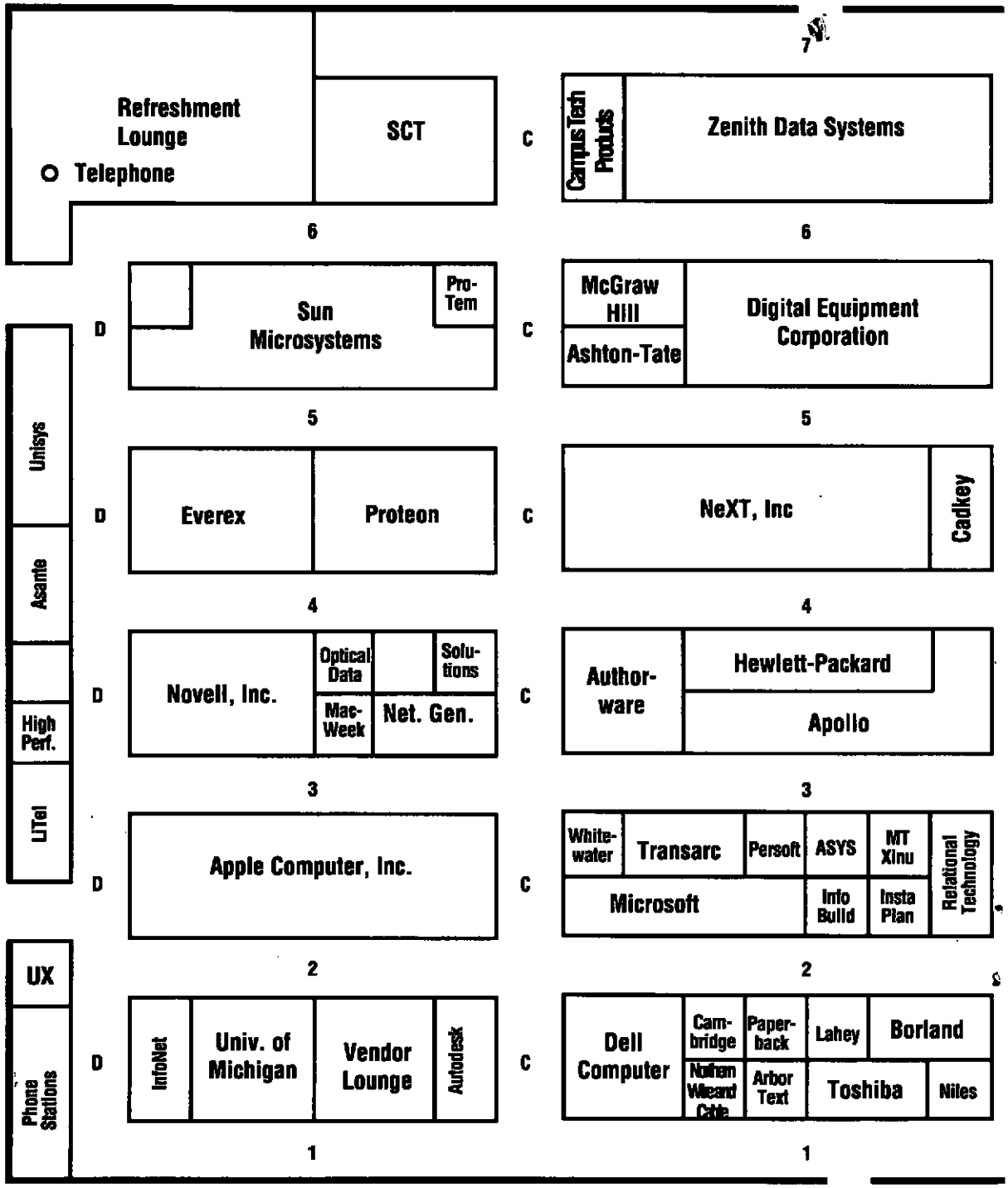
CORPORATE PARTICIPATION

Lessons from the Past, Strategies for the Future

University of Michigan, Ann Arbor

October 16-19, 1989

EDUCOM '89
Corporate Associates Demonstration Area and Software Showcase
Track and Tennis Building (South End)



Corporate Associates Demonstrations

Corporate Associates Demonstrations are being held at the Track and Tennis Building at the following times:

Monday, October 16
4:00pm - 6:30pm

Tuesday, October 17
12:00noon - 5:00pm

Wednesday, October 18
12:00noon - 5:00pm

Thursday, October 19
8:00am - 11:00am

Shuttle buses will run between campus conference sites, hotels and the Corporate Associates Demonstration Area at approximately 15 minute intervals. See Conference Transportation page 4 for more details.

AT&T
Networking and connectivity in the university environment is the theme of the booth. Demonstrated will be AT&T hardware and software partnering with university software developments.

Addison-Wesley Publishing Company (184-187)
Addison-Wesley Benjamin/Cummings publishes Student Edition software packages: educational versions of leading professional software programs which are standards in their field.

Over 1,500 microcomputers are designated for student use.

Ameritech
Ameritech will be demonstrating live ISDN University and Healthcare applications including data conferencing between a professor, student and grant manager, teleradiology and more.

Apollo Computers, Inc.
Apollo will demonstrate its compatible family of UNIX® - based workstations networked to multi-vendor campus sites. A suite of applications for research and instruction will be shown.

Apple Computer, Inc.
The Apple Exhibit demonstrates "cures for the common curriculum." Multimedia tools for integrating sound and visuals will be featured as well as information access solutions. Academic projects developed by your colleagues will be exhibited.

ArborText, Inc.
ArborText will be exhibiting The Publisher, a powerful CALS-oriented publishing system. Version 3.0 of The Publisher is X Windows-based and features more than 100 enhancements including hypertext links, outlining and real-time links to other applications.

Asante Technologies, Inc.
Asante manufactures Ethernet and Token-Ring networking and communications products for the Macintosh II, IIx, IIce, SE and SE/30. Asante will demonstrate connectivity between IBM and Macintosh in an Ethernet environment.

Ashton-Tate
Ashton-Tate will present software solutions which meet faculty demand for high quality word processing database, spreadsheet and graphics products for DOS and Macintosh environments.

ASYS

Authorware, Inc.
Authorware offers you a unique opportunity to design your own courseware through a hands-on session with Authorware Professional. You can develop a short course with no prior experience!

AutoDesk, Inc.
AutoDesk publishes a complete line of CAD software programs that run on desktop platforms. AutoCAD®, its flagship product, supports 3-D wireframe and also 2-D drafting techniques.

BRS Information Technologies
BRS/On Site helps maximize your area network and build an electronically unified campus. Users will have local access to the most current information in their fields at a fixed cost.

Banyan Systems Incorporated
Banyan will exhibit VINES Networking software. Their internet works personal computers, mini computers, mainframes and other computer resources with LANs and WANs.

Bell Atlantic Corporation
Bell Atlantic.....providing total on/off campus data connectivity.

BITNIC
Visit the BITNET booth to learn about the BITNET, CSNET and the organization which operates both. Learn how to gain more benefit from your membership or how to become a member.

Borland International
DOS-based software including professional business applications such as Quattro Spreadsheet, Paradox RDBMS, as well as the DOS language compilers Turbo Pascal and Turbo C.

Cadkey Inc. ♿
Cadkey will demonstrate its complete line of 3D mechanical and architectural computer-aided design and rendering software under DOS and Unix operating systems. There will be demonstrations of voice-driven CAD suitable for people with physical disabilities.

Cambridge Group
The Cambridge Group, an association of higher education professionals, is pleased to introduce the Z88, an "Affordable Portable," to colleges and universities for the first time at EDUCOM.

Corporate Associates Demonstrations

Campus Technology Products Co.
Campus Technology distributes over 200 microcomputer software and peripheral products at educational discounts up to 80% off. See demos of Wordstar, SuperCalc, Wingz, SmartWare, Adobe, Enable.

Claris Corporation
Claris Corporation will be featuring its graphics-based applications software for the Macintosh. These include MacWrite II, MacDraw II 1.1, FileMaker II, MacProject II 2.0, Claris CAD and SmartForm Designer.

Data Research Associates
ATLAS—A Total Library Automation System—integrated library automation system including circulation, MARC database management, acquisitions, online public access catalog and other specialized applications.

Data Switch Corporation
Data Switch, leading supplier of channel extension and host networking systems for connecting IBM environments, presents solutions for remoting terminals/printers, peripheral resource sharing and interconnecting physical or logistical CPUs.

Dell Computer Corporation
Dell designs, develops, manufactures, markets, services and supports Dell Personal Computers and sells personal computer products including software, printers, monitors, peripherals and accessories.

Digital Equipment Corporation
Digital will demonstrate its network management capabilities, X windowing techniques and leading university-developed applications on workstations including Project SOCRATES software. Find out about The Education Initiative and other programs.

Dragonfly Software
Dragonfly Software will display Nota Bene, a scholars' tool which combines a full featured multilingual word processor with a bibliographic utility and a textual database.

Edutech
Edutech will show Apple Macintosh and IBM PC applications from the following leading software publishers: Sun, TOPS Division, Symantec, T/Maker, Allan Bonadio and MacroMind.

Enable Software, Inc.
Enable is a menu-driven, tightly integrated system that can support eight open windows at one time. Modules include word processor, spreadsheet, 2- and 3-dimensional perspective graphics, database management and telecommunications.

Everex Systems
Everex presents its full line of IBM and Macintosh peripherals as well as the STEP line of 286 and 386 systems.

Farallon Computing
Farallon will demonstrate PhoneNET System of products: Mackrecorder 2.0, Timbuktu 3.0, Timbuktu/Remote, Screen Recorder, repeater, Starcontroller, connectors and network management products and future networking plans.

Hewlett Packard
HP will demonstrate a number of leading edge applications for higher education on a range of workstations including high performance graphics systems as well as PCs.

High Performance Systems
High Performance Systems will demonstrate STELLA®, for model-building and simulation, and STELLAStack®, which uses HyperCard to create customized interfaces to STELLA models.

IBM Corporation
The IBM exhibit will highlight special educational offerings, advanced technology and multimedia application solutions for instruction, research and campus communications.

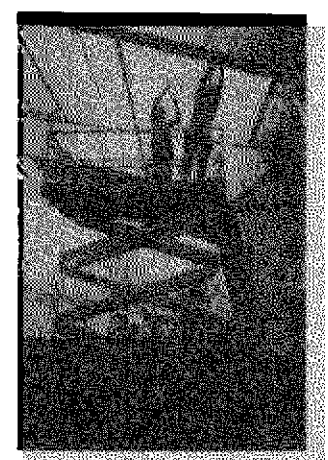
Information Associates
A single source distributor of information management solutions for higher education, Information Associates is the vendor institutions look to for hardware, software, tools and services.

Information Builders Inc.
FOCUS is the complete decision support, application development, database management system offering facilities for forms management, transaction processing, reporting and ad hoc requests, window development, graphics, statistics, financial modeling and spreadsheets.

InstaPlan Corporation
InstaPlan will be demonstrating its line of proven software for project management education and practical planning.

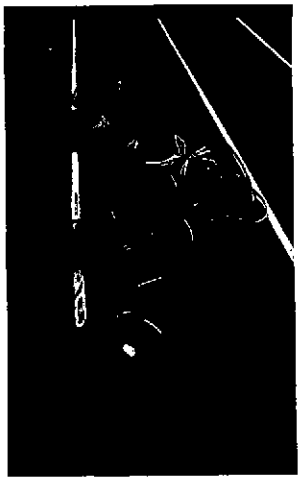
John Wiley & Sons, Inc.
Review the text and software packages that Wiley publishes for education: *Enable: Educational Version, Discovering Microsoft Works* for the IBM PC, and *Problem Solving* with Borland's Eureka.

Joiner Associates, Inc.
Jnet provides VAX/VMS to IBM VM and MVS mainframe connection for link to BITNET, electronic mail, bidirectional file transfer, remote printing and batch jobs.



The Track and Tennis Building has been completely networked for the Corporate Demonstrations with the support of DEC.

Corporate Associates Demonstrations



In preparation for EDUCOM'89, cabling has been added to the Corporate Demonstration area and other campus locations.

Lahey Computer Systems, Inc.
Lahey designs and produces FORTRAN Language Systems and development tools. Lahey's PC software has been acclaimed for its fast compilation speed and extensive list of mainframe features.

LiTel Telecommunications Corporation
LiTel Telecommunications Corporation is a regional long distance carrier serving businesses throughout the Midwest with cost-effective fiber optic telecommunications services including video conferencing.

Logitech, Inc. ♿
Logitech offers the best prices on the best products: award-winning computer mice, innovative hand-held scanner, modula-2 programming products and applications software.

Lotus Development Corporation
See the new Lotus 1-2-3, Lotus Agenda, Lotus Free Lance Plus, Lotus Magellan, Lotus Manuscript and other new products from Lotus.

MacWeek, Inc.
MacWeek is the only weekly publication for corporate users of Macintosh and other graphic workstations. MacWeek features latebreaking product news, reviews, how-to's and opinion columns.

McGraw Hill Publishing Company
An exhibit of texts and software which span a wide variety of educational disciplines including accounting, business, the social sciences, science and engineering.

Microsoft Corporation
See the latest in CD-ROM applications and languages for Macintosh®, IBM® PCs, PS/2® and compatibles. Learn about education-specific templates and object-oriented programming.

Microwave Bypass Systems, Inc.
Microwave will display technology for extending Ethernet over microwave at 10 Mbps. MBS has installed LAN extension microwave links across the U.S. and in western Europe.

Mt Xinu Inc.
Mt Xinu is showing Mach, a new operating system technology which will be released to the educational community in January on DEC, Sun, IBM and other hardware.

Network General Corporation
The Sniffer LAN Protocol Analyzer monitors network activity, captures data packets and decodes them through seven layers of the ISO model into a complete "English" format.

NeXT, Inc.
NeXT will demonstrate the latest tools and technology designed to enhance the learning process.

Niles & Associates, Inc.
Niles will show EndNote and EndLink, its bibliographic software packages. Additional programs shown: Grant Manager and Personnel Manager—grant accounting and ordering software.

Northern Telecom, Inc.
Meridian SL-1/100 digital switching systems provide up to 30,000 lines using standard twisted pair wiring and offering high-speed simultaneous transmission of voice, data, text and graphics.

Northern Wire & Cable
Northern Wire and Cable provides electrical and electronic wire and cable, connectors, assemblies, components, LAN integration products and related value added services nationwide.

Novell, Inc.
NetWare 386 provides high performance, protocol and hardware independence, and development tools. Universities demonstrate how NetWare transparently serves campus-wide computer networks.

Optical Data Systems
Optical Data Systems is a leading manufacturer of twisted pair and fiber optic ethernet and token-ring networking products. Other products include Fiber T1 and TEMPEST.

Oracle
ORACLE is a distributed relational database management system based on the SQL database language. Complementing the ORACLE RDBMS are families of software productivity tools for systems builders, application developers and end users.

Paperback Software International
Paperback will demonstrate their popular business productivity software, including spreadsheet/DBASE program, VP-Planner Plus, and best-selling expert system development tool, VP-Expert.

Persoft, Inc.
Persoft, Inc. will demonstrate IZE, a family of exceptionally powerful software products that stores, rapidly retrieves and automatically organizes large amounts of textual research data.

Personal Bibliographic Software, Inc.
PBS provides the tools to access the world's scholarly literature from the desk top. PBS simplifies on-line searching, helps manage bibliographic information and transfers records

from on-line databases to the user's Pro-Cite database.

Pro/Tem Software, Inc.
Pro/Tem specializes in programs for managing bibliographies and research notes. We will demonstrate Notebook II™ and bibliography for the IBM and BIBLIC STAX™ for the Macintosh.

Proteon, Inc.
Proteon will demonstrate internetworking, high-speed LAN and token-ring products, including the p4100 and p4200 multi-protocol routers, OverVIEW network management and ProNET-80 high-speed network.

Quicksoft, Inc.
PC-Write Lite gives your students fast, simple word processing. PC-Browse offers text search and hypertext capabilities. Discover how Quicksoft products can meet your word processing needs.

Relational Technology, Inc.
INGRES integrates campus information across a wide variety of computers including Digital, IBM, UNIX and PCs. Based on industry-standard SQL, INGRES delivers the tools, power and access for campus information systems.

SCT-Systems and Computer Technology Corporation
See SCT's BANNER Series: Student, Finance, Alumni & Human Resources. Demonstrations and information on the full line of products and services will be featured.

SilverPlatter Information, Inc.
SilverPlatter's educational CD-ROM databases include ERIC—literature on education, A-V Online—audiovisual materials, LISA—information sciences, MathSci Disc—mathematical sciences, Peterson's Colleges and GRADLINE—college and graduate programs.

Solutions Unlimited
See SOCRATIC, a faculty tool for building computer-based training, tests, surveys and presentations. See low cost software and hardware solutions to building complex instruction/graphic systems.

Sony Microsystems Company
Sony offers a full range of open architecture systems—from the affordable NEWS 711 diskless workstation to the high performance dual 68030 server, the NEWS 1930.

Sun Microsystems, Inc.
Sun is a leading worldwide supplier of network-based distributed computing systems, including professional workstations, servers and UNIX operating system and productivity software.

T.H.E. Journal
T.H.E. Journal, the leading magazine in education technology for over 16 years, is offering a FREE one year's subscription to educators attending EDUCOM.

Toshiba America, Inc.
Toshiba American portable computers and printers offer cutting-edge technology to assist educators in the ever-increasing demand on their professions.

Transarc Corporation
Transarc is demonstrating its Unix-based distributed file system, which scales to allow transparent cooperation by providing a single file name space for users across a building or across thousands of miles.

Unisys Corporation
Unisys, a $10 billion company, is the leading worldwide supplier of commercial UNIX systems. Unisys will demonstrate and discuss their Open Systems and Interconnect products.

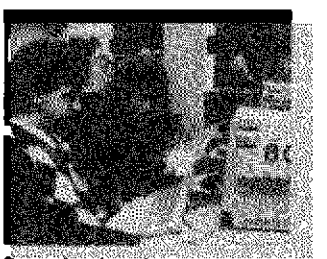
The Watcom Group, Inc.
InfoBench demonstrates a series of compatible tools featuring a common user interface and data sharing capabilities. Watcom's compilers and interpreters will also be demonstrated.

The Whitewater Group
Actor is a programming tool that allows you to develop Windows applications in record time. It is also an ideal introduction to object-oriented programming technique.

Wolfram Research, Inc.
Mathematica®, a system for doing mathematics by computer, will be shown at the following booths: Appollo, DEC, Hewlett-Packard, IBM, NeXT and Sun Microsystems.

WordPerfect Corporation
Developers of WordPerfect, the best selling word processing software, and other office productivity software: PlanPerfect, DataPerfect, WordPerfect Executive, WordPerfect Library and WordPerfect Office.

Zenith Data Systems
Zenith Data Systems will demonstrate some of the most current applications in education using the innovative technology in the company's complete line of desktop and portable computers.



Computers have become an essential part of University life.

Hospitality Suites/Software Showcase

HOSPITALITY SUITES

Most hospitality suites will be open from 12 to 5 pm for EDUCOM attendees. The hospitality suites will have catered functions in the evening hours.

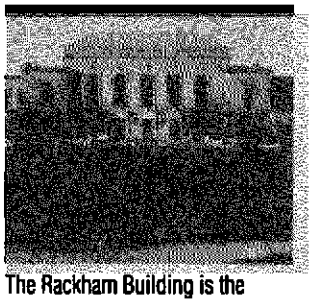
CAMPUS INN

Gartner Group, Inc — Suite # 1007
Monday - Tuesday 8 - 10 pm

Hewlett Packard — Presidential Suite
Monday 8 - 10 pm
Tuesday 12 - 5 pm, 8 - 10 pm
Wednesday 12 - 5 pm

Robbins Communications, Inc. — Suite #1107
Monday - Wednesday 8 - 10 pm
Thursday 8 am - 12 noon

Transarc Corporation — West Regency
Monday-Wednesday 4 - 10 pm



The Rackham Building is the center for the nearly 15,000 graduate students enrolled at the University of Michigan.

MICHIGAN LEAGUE

Apple Computer, Inc. — Vandenberg Room
Monday 8 - 10 pm
Tuesday 12 - 5 pm, 8 - 10 pm
Wednesday 12 - 5 pm

Digital Equipment Corporation — Kalamazoo Room
"Desktop of the 90s" Presentations every hour, on the hour, 9 am -3 pm, Tuesday, 9 am - 4 pm Wednesday, and 9 -11 am, Thursday. Advance registration requested. Hospitality hours:
Monday - Tuesday 8 - 10 pm.

IBM Corporation — Hussey Room
Monday 10 am - 5 pm, 8 - 10 pm
Tuesday 10 am - 5 pm, 8 - 10 pm
Wednesday 10 am - 5 pm
Thursday 8 am - 1 pm

NeXT, Inc. — Michigan Room
Monday 8 - 10 pm
Tuesday 12 - 5 pm, 8 - 10 pm
Wednesday 12 - 5 pm

RACKHAM

AT&T — East Conference Room, 4th Floor
Monday 8 - 10 pm
Tuesday 12 - 5 pm, 8 - 10 pm
Wednesday 12 - 5 pm

Northern Telecom, Inc. — West Conference Room, 4th Floor
Monday 8 - 10 pm
Tuesday 12 - 5, 8 - 10 pm
Wednesday 12 - 5 pm

Relational Technology, Inc. — Central Art Gallery, 3rd Floor
Monday 8 - 10 pm
Tuesday 12 - 5 pm, 8 - 10 pm
Wednesday 12 - 5 pm

Lotus Development Corporation — West Art Gallery, 3rd Floor
Monday 8 - 10 pm
Tuesday 8 - 10 pm

Zenith Data Systems — Assembly Hall, 4th Floor
Monday 8 - 10 pm
Tuesday 12 - 5, 8 - 10 pm
Wednesday 12 - 5 pm

REFRESHMENT BREAKS

Tuesday and Wednesday afternoons

Apollo Computer, Inc., Slusser Art Gallery, Art and Architecture Building, North Campus.
The University of Michigan Medical Center, (Tuesday only)
Unisys Corporation, Business School
Zenith Data Systems, Corporate Associates Demo, Track and Tennis Building

SOFTWARE SHOWCASE

Software Showcase '89 features the finest software programs and applications developed by university faculty, staff and students. Approximately 100 developers will display their microcomputer, workstation, mainframe and networking applications, including the 1987, 1988 and 1989 EDUCOM/NCRIPTAL Award winners, software developed at universities in the state of Michigan, and software from clearinghouse organizations from across the country. Located adjacent to the Corporate Associates demonstrations, the Software Showcase features a lecture/demo area in which software developers will give presentations about their software.

EDUCOM Staff, Future Events and Special Thanks

EDUCOM STAFF

Kenneth M. King, President

Steven M. Gilbert, Vice President

Michael M. Roberts, Vice President

Candice K. Willut, Vice President

Sue Ellen Anderson, Manager, Conferences & Seminars

Elizabeth C. Barnhart, Executive Assistant

Mary Kate Barone, Bitnic Administrative Secretary

James B. Conklin, Director-Bitnic

Joan M. Davis, Assistant Manager, Conferences & Seminars

Pauline E. Eden, Accounting Clerk

Pauline M. Eden, Manager, ESI

Maryellen Everett, Administrative Secretary/ Technical Specialist

Shirley A. Henderson, Manager, Finance & Administration

Michael Hrybyk, Bitnic Analyst/Network

Lynn Miranda, Administrative Assistant/CAP

Joyce Morris, Secretary/CAP

Wendy Rickard-Bollentin, Assistant Editor

Andrew Robinson, Bitnic Network Analyst

Ann Savoie, Manager, EDUCOM Consulting Group

Kathleen Schaible, Manager, Corporate Relations

Brenda Sinicki, Executive Assistant to the President

Sheldon Smith, Manager, Publications

Amanda Spiegel, Bitnic Executive Assistant

Angela Taylor, Computer Operator/Data Entry Specialist

Kimberly Vinch, Conference & Seminar Assistant

Angela Walsh, ESI Administration Assistant

Elaine M. Woods, Finance Assistant

FUTURE EVENTS

CAUSE89

"Managing Information Technology: Facing the Issues"
November 28 - December 1
Sheraton on Harbor Island, San Diego, CA
EDUCOM/CAUSE seminars to be held on November 28.
Contact CAUSE at (303)449-4430 or
via BITNET: CAUSE@COLORADO

National Net'90

March 14-16
Loews L'Enfant Plaza Hotel, Washington, DC
Contact EDUCOM at (202) 872-4200 or
via BITNET: NET90@EDUCOM
The third annual national networking conference, Net '90 will explore the theme, "National Research and Education Network: A Strategic Alliance." Join others from government, industry and higher education in defining the vision of tomorrow's information superhighway.

EDUCOM'90

"Preparing for the Renaissance: Computing and Communications for Technology, Science and Arts"
Make your plans now to join us in Atlanta, October 14 - 17. Hosted by the Georgia Institute of Technology, EDUCOM'90 will be held in the brand new INFORUM high-tech meeting and exhibit facility. John Gehl, Program Chair.

EDUCOM'91

The University of California-San Diego will host EDUCOM'91, October 16 -19. Conference headquarters will be the San Diego Marriott Hotel and Marina and the adjacent San Diego Convention Center. Hassan Aref, Program Chair.

EDUCOM'92

Baltimore's beautiful Inner Harbor will be the background for EDUCOM'92, hosted by The Johns Hopkins University, November 2-5.

SPECIAL THANKS

Special thanks are extended to: **AT&T, Apple, DEC, IBM, NeXT** and **Zenith** for sponsoring special events; **Ann Arbor Convention and Visitors Bureau** for many special services; **Apollo Computer, Inc., The University of Michigan Medical Center, Unisys Corporation** and **Zenith Data Systems** for refreshment breaks; **Apple** for the daily newspaper; **Apple** and **IBM** for computers and equipment for the pre-conference seminars; **Apple, IBM** and **NeXT** for production/ mail rooms; **IBM** for the da Vinci exhibit; **IBM** for the EDUCOM/NCRIPTAL Wall of Fame; **InfoNet Contributors** (see page 9); **MCI** for the EDUCOM'89 toll-free number and FAX service; **Microsoft** for providing Powerpoint to the concurrent speakers; **NeXT** for support of the EASI project; **Software Showcase Contributors; U-M News and Information Services** for news stories, press room coverage and support; and **Xerox Corporation** for photocopiers.

The Michigan Union will be one of the sites for EDUCOM afternoon sessions and meetings.

Corporate Associates Demonstrations