INFORMATION SYSTEMS IN UNIVERSITY ADMINISTRATION

University administrators agree that a comprehensive information system is essential to the effective operation of a university. Few, however, are certain exactly what is meant by that phrase. And, even among scholars who are knowledgeable about both administration and information systems, there is no consensus on the limits within which such a system can operate effectively.

Although this problem has always existed, the opportunities for data manipulation presented by the computer have enlarged the scope of information systems and, as a result, widened the divergence of opinion on their place in higher education. Yet any information system that is of value in administering institutions of higher learning, with their constantly increasing load of data, should become more efficient with automation. Therefore, this article will deal primarily with automated information systems in universities.

FUNCTIONS OF AN AUTOMATED ADMINISTRATIVE INFORMATION SYSTEM

The functions of an automated information system for college or university administration could be classified in many different ways. John Caffrey and Charles J. Mosmann group them under three headings: transactions, control, and planning.

Transactions might be described as record keeping and processing human transactions. They encompass such activities as preparing paychecks, paying bills, registering students, and scoring tests. It is obvious that the day-to-day use of these data is not the concern of the higher levels of administration.

The control function establishes procedures to ensure that administrative systems of a wide variety are operating properly. Many of the control functions are designed to provide data for what has been called "administration by exception." When figures for any operation seem to exceed previous determined limits, the divergence is noted by the system and brought to the attention of higher level administrators.

The planning function is regarded by some experts as the most valuable in the administration of higher education. Caffrey and Mosmann, for example, call improved forecasting "an almost elementary benefit."

They point out that the greatest value of the use of the computer is in the techniques of simulation and modeling which make possible improved program design.

Many activities in each of these areas overlap the others. For example, data generated by the billing payment function could be utilized in the control function. Similarly, exceptions pointed up by the control function may need to be introduced into the planning function—and if a computer is used, a new model of the institution might be created. The transactional data base can be used to explore alternative ways of solving problems in the planning function.
TRANSACTIONS

TRANSACTIONS are the most straightforward functions in the automated information system. Many of them have been computerized for more than a decade. The simplest to initiate are probably data involved in payroll accounting, personnel, student records, and maintenance scheduling.

Class scheduling or sectioning might also fall into this category for small institutions. In larger universities, however, class scheduling is really central to university management. As J. S. Folkes of the University of Technology, Delft, points out, it determines not only space utilization and faculty workload, but also the entire educational program.

Purdue University began to automate sectioning in 1957 with its freshmen agricultural and engineering students. The next academic year, sophomore sectioning was used for all undergraduates. It has been estimated that, ten years later, although many universities are investigating or in the process of implementing a computerized sectioning system, not more than a dozen large schools are actually using the computer for sectioning.

Martin Faulkner points out that, in addition to the speed with which the computer can produce conflict-free sections in a well-constructed time schedule, it may be even more valuable in pointing out conflicts inherent in the time schedule. Manual sectioning will often not uncover inherent conflicts because of the mass of data to be manipulated.

Indiana University began to use the computer for registration in its May 1967 preregistration for the first semester 1965-66. The procedure that first term was not without its problems, one of the largest of which was the attempt to handle drops and adds in roughly the same manner as the registration. For the second semester, drops and adds were handled in a one-day field house operation (Indiana's earlier procedure) and then processed through the computer. That one and other procedural changes indicated by the experience of the first term resulted in a much more efficient—though still not bug-free—registration for the second semester. By April 1966, however, the Associate Registrar could report, "During the past year, all operations in our office have been placed on the computer. All reports and records, beginning with admissions and continuing through the print-out of the student's permanent record, are now generated by the computer."

Edwin D. Smith, the Registrar, and Harold W. Wright, the Manager, Systems Data Center, at Syracuse University have both good and bad words to say about their student information system. They point to some recent improvements in speed—between 1967 and 1968, the time lag between registration and generation of the information; and to the need to continue to maintain some parts of the manual system so that, for example in an emergency, a student can be located immediately, even though the information in the computer has not yet been printed out. A valuable by-product of the system has been improved accuracy of the data. Students realize the extensive use that is made of the data collected and make a genuine effort to bring corrections or changes in status to the attention of the proper authorities. Mr. Wright warns, however, "The lofty feeling of maintaining a Utopian position by constructing a 'cure-all' Information System should be approached with caution."

In 1968, Sweden will begin to use the computer to fill vacancies in its higher professional schools, faculties, and university courses whose enrollments are limited. At Swedish universities, only entry to the faculties of theology, law, arts, social sciences, and natural sciences is unrestricted. Admission to some of the basic courses in the social and natural sciences is limited also, however. Centralized processing of applications for admission to the three institutes of technology in Sweden was begun in 1965. The large number of applications to be processed for all areas of higher learning and the concern of the officials of the educational system to give students the broadest freedom of choice in selecting their educational programs have led to the design of the new mechanized admission procedure for all of the national institutions.

The University of Alabama handles its dormitory assignments by means of a computer. James C. Wilder, the Director of Men's Housing, says the computer "... makes it possible for us to spend less time in assigning a student to the type of accommodations he has requested, while still giving him what he wants."

The Wisconsin State University System uses the computer to inventory physical facilities, study space utilization, and project space needs of the campuses of the state institutions. Begun in 1966, "The project," says David R. Witmer, a member of the Board of Regents, "takes the mystery and politics out of the projection of space requirements." The input factors must be acceptable to the Universities, the Board of Regents, the State Building Commission, and other groups concerned. Utilization data, for example, are monitored concurrently from the class master schedule cards actually used at the Wisconsin State Universities. The system was soundly conceived and well organized before it was computerized. Witmer believes that the key to success is getting answers to small, operational questions—e.g., What facilities does an industrial technology program require? What kinds of laboratories? How many students should each laboratory support? What equipment is needed? How many square feet does all this require?—instead of asking "How much money is needed to build a new technology building for University X?"

Educational Facilities Laboratories and Duke University are sponsoring a study dealing with computer aids in planning and staging construction of campus physical facilities. The products of the study are expected to be:
1. Flowcharts of a campus planning process.
2. Description of sources and techniques for collecting data.
3. Demonstration of computer programs, documented to show logic and data requirements.
4. Case studies using computer programs.

Another objective of the study is to incorporate such non-scheduled activities as those in libraries, dormitories, and unions into the physical plant planning. These represent one of the largest and surely the most difficult of the campus planning problems. Although the study will result in a set of specialized programs suited to Duke University, the logic and processes will be applicable to many universities.

According to Carl Roeseler, Director of Computation at Yale University, about two and one half years were spent analyzing Yale's budgeting and accounting operations before they were computerized. The system, which became operational early in January, will be expanded to include personnel records, the admissions function, student records, and purchasing. Another two and one half years are expected to elapse before the system is complete. Remote terminals have been installed in the offices of the provost, treasurer, comptroller, grant and contract administrator, and in budgeting and accounting.

CONTROL

The specifics of the use of the control function are probably not as important as the primary reason for it. When universities move to a computerized information system, the system operators often seem to be about to bury the administration in a paper pyramid. Many administrators come to empathize with the little girl's evaluation of a long, technical book, "It contains more information on the subject than I would ever care to have."

In other, more mature phases, report Coffey and Mottmann, "the administrator learns more about the characteristics of the system and demands that reports be more readily understandable, with only the summary facts he requires for decisions, planning, and control."

It is often at this stage that certain crisis criteria that result in exception reporting are built into the system.

For example, an ideally constructed financial accounting system should provide for daily processing of all transactions as well as exception reporting, resulting in close control of all revenues and disbursements. And the ideal total information system should give the
president . . . facts which are current, dependable, comprehensible, accessible, and bound to come to his attention when he needs them, whether or not he knows he does."

**PLANNING**

Perhaps the most exciting and certainly the most controversial aspect of the total information system is its planning function. Some specialists seem to believe that if enough of the right kinds of data are put into the computer, the only responsibility left to the university president is to do what the computer tells him to do.

Some other experts, who agree in principle, insist that the data generated by colleges and universities are too amorphous to be defined with sufficient rigidity for a completely mechanized operation. An example they often cite is the problem of splitting faculty time—or should it be effort?—between graduate and undergraduate teaching.

Dr. James Miller, who is Vice President for Academic Affairs at Cleveland State University and Vice President and Principal Scientist of EDUCOM, finds the basic problem not really related to modern information systems at all. He says, "Perhaps the most difficult practical problem in establishing an information system is not selecting hardware or software but setting up procedures for capturing and controlling the data at the source or as near to it as possible."

René Lachene of the Institute of Applied Economics and Mathematics in Paris has even deeper reservations about the use of operations research techniques in educational planning. He writes, "It may in fact be asked whether the mathematical instruments at present available are not appreciably more elaborate than the concepts available in the educational field and whether they do not require a considerable mass of information which does not exist."

On the other hand, Richard Judy, who is the Associate Professor of Economics at the University of Toronto, perceives the task as more amenable to quantification and the results as less doctrinaire than M. Lachene does. "The task of economists, systems analysts, and operations researchers is to assist educational decision-makers to specify their objectives, to identify alternatives, and to help to estimate the probable costs and utilities of those alternatives. The task of weighing the respective costs and utilities of the alternatives, and of choosing from among them, must remain the responsibility of authorized decision-makers."

Several of the participants in the Symposium on Operations Analysis of Education, sponsored by the Office of Education and held in Washington last November, urged adoption of operations research techniques but only for what Dr. James G. March called "mini-analysts." He defined these as investigations of the side consequences of novel ideas. Dr. Merrill M. Flood recommended the construction of "toy models" because the state-of-the-art limits operations analysis to low order problems.

Carl Koeterler recommends the use of models when the result sought is an approximation rather than an exact answer. He places Yale's well-publicized analysis of its investment of endowment in this category. For other planning, he suggests research on raw data, with decisions based on that research made by experienced administrators. Model building does require administrators to consider all of the elements on which the ultimate decision must be based. For this reason, modeling has merit but models themselves should not be used to reach final decisions.

Whatever basic philosophy motivates the doors, however, much exciting work is being done in the area of educational planning with the use of a total information system. And most people working in the field, regardless of their discipline, regard the computer as a vital tool in fulfilling the goals of an information system.

Judy says the first step in model building is conceptual specification. In other words, the model builder must describe the most important interrelationships in the university system. He must show how total enrollment is successively transformed into departmental teaching loads, faculty, office, secretarial, and administrative requirements. That abstract description must then be expressed in mathematical terms that can be represented as a parameterized computer model. Routines for altering parameters must be designed.

Judy's assumption is, of course, that the policy decisions reflected in "total enrollment" and "departmental teaching loads" have already been made, along with decisions on what faculty at what level are needed to reach the institution's objectives. On the other hand, Charles E. Young, Administrative Vice Chancellor, UCLA, describes the University of California system as being "... having the theory of a total system in mind . . ." He believes that "Organizational objectives should generate systems and not be the outcome of systems. In this we find the greatest challenge to applying this approach to problems of higher education . . . in the field of education we enjoy remarkably little unanimity regarding objectives and productive ways to attain them."

A study, conducted by representatives of eight universities and funded by the National Science Foundation and the National Institutes of Health, seems to go further than the position taken by Dr. Young. It reports, "The conclusion seems inescapable that different components of the university system are at different stages along the road toward the development of analysis. So far as an average can be struck, the total seems to lie at some point between the description and the model-formulating stages. Whatever that point may be, an efficient scheme for collecting and communicating information should assist in this development, and this is one of the basic reasons that an information scheme for a total university system is desirable and imperative."

Taking the middle road, Lachenne writes, " . . . the authorities do not want to alienate their freedom and powers of decision to the advantage of rigid procedures as represented by a model. They should bear in mind, however, that rigid procedures can singularly lighten part of their task and enable them to discover relationships or quantities they knew nothing of."

However, undetermined about the extent of their commitments, the proponents of an information system seem to agree that not only cooperation, but also concern from all levels of university personnel, are essential to the proper functioning of the system. Judy seems to express the opinion of most when he writes, " . . . it is important that members of the university community who are involved with the various activities should be informed and, to an appropriate extent, exercise control over the value of those variables of the model which immediately affect their activities . . . the faculties and departments [should] be properly appraised of the ingredients of the model to the extent that those ingredients may affect them. To do otherwise would engender hostility to the model, suspicion of its results, and destruction of its usefulness."

The ideal course, then, would seem to be to develop a total information system with the input data clearly defined, and having the approval of the faculty and staff concerned. Provision should be made for periodically updating the data. The system should also have model building and simulation capabilities. Those who use this system in the planning function should be high-level administrators who appreciate the value of the system yet are fully aware of its limitations.

These criteria may seem to indicate that an effective total information system must wait for Utopia. A more realistic attitude would suggest that the best way to begin is to cooperate—but to commence with full awareness of the imperfection of the instrument. As colleges and universities gain experience with their own information systems and, hopefully, communicate both their successes and failures, they may begin to realize the potential of a powerful new instrument for scientific management of higher education.

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*Ibid., p. 55.
News & Notes

SAMUEL N. ALEXANDER

On December 9, Samuel Alexander, Chief, Information Technology, National Bureau of Standards, died in Washington, D.C. Mr. Alexander was the Bureau's liaison with EDUCOM. He had, in fact, been an active participant in the EDUCOM conference on Document vs. Digital Storage on October 30 and in the Council meeting, October 31 and November 1 in Pittsburgh.

At its meeting, December 13, the Board of Trustees approved the following memorial resolution:

WHEREAS Samuel Nathan Alexander was a forward-looking public servant who served the people of the United States with skill and devotion for more than twenty years, and

WHEREAS His contribution changed the whole course of computer science and computer use in the fifth and sixth decades of this century, and

WHEREAS He was a valued counselor and devoted friend of the Interuniversity Communications Council (EDUCOM), and

WHEREAS His scholarship and attainments, his warmth and integrity won for him the affection and respect of the entire organization, therefore be it

RESOLVED that this Board conveys its sympathy and regret, and directs this memorial statement to be included in the permanent records of the Board.

A STUDY OF THE COMMON ELEMENTS IN CONTINUING PROFESSIONAL EDUCATION

The EDUCOM Task Force on Continuing Education has prepared a proposal for funding a study, in the summer of 1969, on continuing education. The study will attempt to look at the whole area of life-time learning for professional practitioners in order to develop a body of knowledge unique to learning by adults. Historically the universities, jointed increasingly by professional associations, voluntary agencies, and industry have attempted to cope with the rising tide of knowledge by enlarging their commitment to continuing educational activities. But it seems that such activities are built more upon a sense of urgency to do something than upon any generally shared body of information about what is needed and what can be done with a target population of practitioners. In fact, there is a widespread impression that continuing education is very largely episodic rather than continuing. It seems to be built upon a model designed for academic instruction rather than continued learning, and it is clouded by the availability of particular communications methods rather than by clear definitions of purpose.

Each profession and each institution pursues an independent course, rarely looking at the experience of others, rarely sharing, collaborating, or even communicating their successes and their failures.

If continuing education is regarded as a process of learning, there should be a common set of principles and procedures that would be helpful when applied to the content of any professional discipline. The summer study is geared to explore the educational issues, rather than the content problems, that beset all professions. It is hoped that out of such a joint study there will emerge a common set of guiding principles, a set of specific studies to clarify some of the perplexing issues, and a continuing dialogue from which all may learn.

One of the projects to be completed before the be
beginning of the conference is the development of a diagnostic test. It is generally conceded that, if sufficiently strong motivation could be provided for the professional to continue his education, more practitioners in all fields would make the effort to stay abreast of new developments. It has been hypothesized that if each professional could take a self-administered test which would involve the use of the computer, his own shortcomings would be pointed out to him and his motivation to continue to study would be strengthened. At the same time, the analysis of the computerized data would enable scholars in the field of continuing education to determine the kind of information—a general sense—that is needed by the average professional practitioner. For example, it has been suggested by some studies that it is not the new knowledge, but rather a loss of the basic knowledge which he learned in his professional training, that distinguishes the out-of-date practitioner from the newly graduated professional.

Representatives of at least ten professions will be included in the summer study. These would include the several health professions, engineering, education, possibly librarianship, social work, public administration, and others. Another of the questions which it is hoped the summer study will answer is whether problems of overlapping or interlocking responsibilities of different professions which work together can be dealt with more effectively by uniprofessional education. An excellent example, of course, is the problem of continuing education in the several health professions.

STUDY OF AUTHOR LANGUAGES

EDUCOM has recently received a grant of $10,000 from the Office of Naval Research to study the author languages used in assembling and entering materials into the computer for computer-assisted instruction. There are currently some forty to fifty projects exploring instructional use of computer systems. Hundreds of new projects will soon be selecting hardware and software for operational systems. A proliferation of incompatible languages, only superficially different, may impede coordinated development in the exchange of instructional materials in this new technology.

The Task Force on Educational Systems and Technology has established a small panel of recognized experts in the field to study computer-based services. The panel plans to prepare a report which will describe, review, and evaluate author languages and support systems, and recommend guidelines for future developments. A beginning has already been made on this study.

The ultimate purpose of the study is to assemble a set of documents which will:
1) categorize significant aspects of author languages and support,
2) describe present and proposed author languages within this common frame of reference,
3) assemble examples of coding and execution with each language, and
4) identify additional requirements of the authors which are not met by existing languages.

NEW TELEVISION SERIES AVAILABLE

THE NATIONAL CENTER for School and College Television, which develops and supplies television materials to institutions of higher education, has announced a new collection of such materials. The series deals with subjects in the humanities, the social sciences, and the natural sciences. It presents the equivalent of the first two years of a basic college curriculum. The material was created by the Commission on Extension Courses and the U.S. Navy, and the series was produced by Boston's Educational Television Station, WGBH-TV. The professors were drawn from the faculties of the universities that are members of the Commission on Extension Courses.

The Commission, established in 1910 by President Lowell of Harvard, includes, in addition to Harvard, Tufts University, the Massachusetts Institute of Technology, Boston College, Boston University, Boston's Museum of Fine Arts, Wellesley College, Simmons College, the Lowell Institute, the Massachusetts Department of Education, and the School Committee of the City of Boston.

Herman B. Wells, President of the Indiana University Foundation which sponsors NSCET, said, "These television series constitute major resources that will have particular value for the nation's developing colleges. As well, these materials will make valuable contributions to established institutions of higher education both here and abroad."

Edwin G. Cohen is NSCET's executive director.

LEHIGH TO STUDY INTERACTIONS BETWEEN MAN AND COMPUTER

THE NATIONAL SCIENCE Foundation has awarded a grant of $598.150 to Lehigh University to study ways to make the computer more responsive to man's needs. The project, entitled "Prototype Retrieval System Development Within an Information Resource Laboratory," is directed by Professor Donald J. Hillman, chairman of the department of philosophy and director of the Center for Information Sciences at Lehigh.

The study involves a complex of computers, both at Lehigh and at Penn Center in Philadelphia, that can "talk" to each other over telephone lines as well as respond to human commands. Thousands of technical documents are being stored in the memories of the computers in Philadelphia, after the text of the document has been "read" and analyzed by a computer at Lehigh.

The dialog between the human user and the computer, as the user "browses" through the stored documents, will be investigated at Lehigh. It is hoped that, as a result of the study, communication between man and machine can become much more sophisticated. As a result, the computer will become more adaptable to everyday service to man.

The user will sit at the teletype terminal at Lehigh and, via telephone lines to Philadelphia, converse with the computer there as with a research librarian. A major goal of the study is to program a set of responses appropriate to almost any reasonable question the user might pose. The user will not only get the de-
The Ohio State University
Division of Computer and Information Science

PLEASE NOTE:

The Division of Computer and Information Science is passing through a transition period as far as its course listings are concerned. All of the courses offered by the Division are shown in the Time Schedule under Computer and Information Science. However, because the 1967-68 Bulletin was published before these courses were approved by the Council on Academic Affairs, some of the courses currently offered by the Division will be found listed under Mathematics in Book 14, University Academic Policies and Course Offerings. In particular, the undergraduate courses in computer programming and numerical analysis currently shown in the Bulletin under Mathematics are listed in the Time Schedule under Computer and Information Science.

The official abbreviation used by the Registrar for the Division of Computer and Information Science is: COMP/INF. Students planning to elect courses in the Division should use this abbreviation on their schedule cards.

While we realize that this is a confusing situation, we ask that the faculty, administrative staff, and students of the University bear with us until the publication of the 1968-69 Bulletin. In the meantime, a pamphlet listing all courses currently offered by the Division is available on request at the Division office, 400 Caldwell Lab., ext. 5813.

T. W. Hildebrandt, Associate Chairman
Division of Computer and Information Science
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EDUCOM
Bulletin of the Interuniversity Communications Council (EDUCOM)

JORDAN BARUCH: NEW EDUCOM PRESIDENT
Jordan Baruch: New EDUCOM President

JORDAN BARUCH, formerly General Manager of the MEDINET Department of General Electric, is the newly elected President of the Interuniversity Communications Council. He took office on 1 February. Dr. Baruch, who is on leave of absence as Vice President of the Cambridge-based consulting, research and development firm of Bolt Beranek and Newman, will maintain headquarters in Boston, Massachusetts. He succeeds Edison Montgomery, who resigned to take up the position of Vice Chancellor of the University of Pittsburgh. Mr. Montgomery will remain with EDUCOM as Treasurer.

With a B.S. and M.S. in Electrical Engineering from the Massachusetts Institute of Technology, Dr. Baruch received his Doctor of Science Degree in Instrumentation there in 1950. Since then he has been on the faculty of MIT at various times as Lecturer and Assistant Professor in Electrical Engineering. In 1958 he helped form Bolt Beranek and Newman and became Vice President for Research when the firm was incorporated in 1955. Initially working in the field of acoustics, he holds several patents and is the author of numerous papers on methods and systems.
THOUGHTS ON TAKING OFFICE
Jordan Barnuch

Edison Montgomery, who has been president since June 1966, resigned in order to take up the demand-
ing position of Vice Chancellor, Finance, of the Uni-
versity of Pittsburgh. Fortunately, he will be able to
handle EDUCOM’s finances, which are administered
from the University, and he was elected Treasurer by
the Board of Trustees at the February meeting.

Stepping into the post of the first president of the
young Council, Edison Montgomery found a mem-
bership of 37 universities and an organization which
was realizing that its role was to be a focal point
for the application of technology to education in its
broader aspect. As he leaves, there are 88 member
institutions with over 200 campuses, holding about
two-thirds of the student population of the United
States and Canada. Three of these come under a new
category—consulting membership—emphasizing ED-
UCOM’s expanding scope and its interest in linking
the academic community with knowledgeable organ-
izations outside its periphery.

Another example of growth during Mr. Montgom-
ery’s term is the establishment last year of a research
office in the Washington, D.C. area. It now has a pro-
fessional staff working on studies in conjunction
with both the government and private agencies. Less visible
is the work of the task forces and committees which
he encouraged patiently and determinedly. This has
led to a series of proposals which, when implemented,
will move EDUCOM noticeably along the way to its
goal of an educational network.

Edison Montgomery’s chief contribution to EDU-
COM, however, has been the acceptance of its value
by the academic community, which he has brought
about by his personal communication. From his home
office in Pittsburgh he will be able to see both the
value and the acceptance increase.

As a start, let me try to present a concise defini-
tion of EDUCOM’s raison d’etre.

EDUCOM’s function is to facilitate the extra-
organizational communication of the uni-
versity.

I have chosen the word “facilitate” because it means
“to make easy or less difficult.” Many existing groups
are already engaged in providing communication
among universities, between the universities and other
important segments of the educational community,
and between the universities and the world at large.
The interlibrary loan program, educational television
stations, jointly sponsored television networks, profes-
sional societies, government agencies and segments
of private industry are all currently active in providing
such communication. Despite this variety, many of
the university’s needs for external communication re-
main unmet. These unmet needs are EDUCOM’s challenge.

Clearly, with such diverse groups already expending
a high level of effort, EDUCOM’s activities will have
to take many different forms in meeting this challenge.
These activities may cover the spectrum from the
catalytic (acting as a meeting sponsor) to the activist
(operating a computer network). In each case, how-
ever, it must be the goal of “facilitating . . . extra-
organizational communication . . .” rather than some
internal desire to conduct meetings or to operate hard-
ware that must provide EDUCOM’s motivation. In
that way we will maintain our service orientation re-
gardless of our mode of activity. In this definition, I
have used the term “extra-organizational communica-
tion of the university” rather than “interuniversity
communication.” The former is more indicative of the
increased intellectual activity going on in govern-
ment, bascins, the arts, as well as in the universities,
and it covers EDUCOM’s role in bringing all of these
areas into fruitful contact with one another. In other
words, it means the communications of the university
with those sources of information outside of its own
physical boundaries which can provide it with infor-
mation which will affect its own internal functioning
as an educational institution. This need for commu-
nication is emphasized by the dispersion of scholarship
over a wide range of activity outside of purely aca-
demic pursuits. However, this same dispersion also
means a wider circle of resources on which a univer-
sity can draw.

At the same time that the sources of scholarship are
becoming dispersed, so are the “students.” The pace
of technological change and our increasing concern
for the individual’s self-fulfillment through education
leads to a social need for extra-university education.
Continuing education for the physician, artist, engi-
neer and other practicing professionals: renewed edu-
cation for those whose learning period was inter-
rupted; and reeducation for the individual in a dis-
atisfying career all impose requirements not easily
met in the isolated university but which may be aided
by extra-organizational communication.

We do not, by this wider definition of communica-
tion needs, mean to disparage the need for inter-
university communication but only to place it in its
broader context. We have, however, excluded intra-
organizational communication from our definition.
This area is too close to the university’s own adminis-
tration to be a reasonable activity for any external
organization such as EDUCOM, except in an ad-
visory role.

Because facilitation is the broad philosophical goal
of technology, implicit in our definition of EDU-
COM’s role is EDUCOM’s involvement with develop-
ing technology. While much of EDUCOM's facilita
tion will be technological, much will also be organiza-
tional, financial, catalytic, exhortive, political, con-
ceptual and educational.

NETWORKS
Because communication among many nodes auto-
matically implies some form of network, it seems de-
sirable that we in EDUCOM establish a common view
of the nature of such networks. For ease in analyzing
our activities, I have chosen to break down communi-
cation networks into three categories:
1) The need-resource or natural network,
2) The physical network,
3) The organizational network.

The Natural Network
The natural network depicts the distribution of
needs and resources among a set of nodes. It illus-
trates a set of interconnections that could produce
the transfer desired. For example, if four universities
chose to lend each other computer programs (solid
links) and books (dashed links), the natural network
might look like Figure 1.

![Figure 1](image)

Center 1 needs books that 3 and 4 have and programs
available at 2 and 3. It has, as a resource, books
needed by 4 and programs needed by 3, etc.

Such a network is simply a pictorial expression
of various desires and resources. It does not express any
wires, paths or the actual flow of such resources. The
arrows between nodes are there solely for visual con-
venience and need not correspond to any actual transfers.

The Physical Network
The physical network is a structure or assemblage
of parts capable of conveying some subset of the re-
sources shown in the natural network. Two physical
networks, as shown in Figure 2, might consist of
wires interconnecting 1, 2 and 3 for the exchange of
programs and a shuttle bus that makes the circuit
trip with books.

![Figure 2](image)

The actual configuration of any network is dictated
largely by history, cost, time of response required, ma-
terial or medium to be carried, and other similar de-
sign considerations.

The Organizational Network
It frequently comes as a surprise to find, first, that
an organizational network is necessary and, second,
that it need not follow the lines of either the natural
or the physical network. The organizational network
is basically concerned with the flow of network meta-
information. Billing, cost accounting, instructions,
standards, performance data and data concerning the
shape of the networks themselves are all carried on
the organizational network. Such a network might
have a fifth node connected directly to the other four
(as would be the case if a separate entity existed to
manage the physical networks) or it might have lines
running just from 1, 2 and 3 to 4 if 4 was the system
administrative agent.

EDUCOM'S ROLE
EDUCOM has a major role to play in each of the
above three networks. In the natural network, defini-
tion of the network, stimulation of network growth
as new technology is developed, value determination
and liaison with the other networks all combine to form
EDUCOM's role.

The work of EDUCOM in the natural network is
concerned with APPLICATIONS AND UTILIZA-
TION. Its tools are symposia, visits and meetings to
define needs; educational programs to introduce new
technology; an extensive publication program to en-
sure optimal growth of network utilization; and staff par-
ticipation in those EDUCOM panels concerned with
applications.

Because EDUCOM's work is facilitative in nature,
a major role in the natural network will be to un-
cover any shortcomings, gaps and cost mismatches be-
tween existing physical or organizational networks
and the natural network. Further, EDUCOM's educa-
tional and documentation facilities may well be useful
in mediating the services of those physical and organi-
zational networks that are not under EDUCOM's
direct operating control.

It is in the organizational network that EDUCOM
will have its greatest immediate impact and where
it can lay the groundwork that may make the differ-
ence between failure and success of future physical
networks.

Many of the present operating solutions to the nat-
ural network are ad hoc associations. Frequently,
their ad hoc nature makes any expansion of service—
either by adding new members or new services—ex-
tremely difficult. Many groups, such as the inter-
iversity library loan program, function smoothly but
have, because of their structure, limited connection to
other organizations.

In computer technology, for example, there are
many user groups, JUG, SHARE, ECHO, DECUS,
etc., but they are primarily educational groups sharing
experience rather than sharing service capabilities.

EDUCOM can, in its organizational role, play a
major part in changing this situation. Purposely through
organizational activity, it should be able to facilitate
the sharing of actual computational service.

The area of EDUCOM that deals with the activities
of the organizational network, I have broadly labeled
"RESOURCE ADMINISTRATION." In this area
will lie the responsibility for operating any physical
networks EDUCOM may own, for distributing publi-
cations, for managing the consulting clearance house
function, and for supplying administrative manage-
ment skills where requested by groups of our members.

The physical network represents one of the greatest
questions facing EDUCOM at the moment, and one
that cannot immediately be answered. It is clear that
there are portions of the natural network now being
served either poorly or not at all. There are also ele-
ments of technology being developed whose introduc-
tion would offer great opportunities for expanding
and serving the natural network. Hierarchical data
bases, multi-accessed computer nets, electronic-video
recording, graphics, video microscopes, and a host of
other such developments offer great potential applicability to the educational community.

Some of these techniques may best be utilized within
small groups; some require massive capital outlays.
In any case, all imply additions or extensions to pres-
cent physical networks.

EDUCOM clearly has an area of responsibility that I
have called "RESOURCE DEVELOPMENT." In
that area it must direct the transfer of those evolving
techniques and devices to the service of the natural
network. Its own engineering and study projects, its
collaboration with and participation in member insti-
tutions, its research projects, and symposia to help focus
work going on in various organizations are all reason-
able EDUCOM activities in this area. Should such
developments appear best administered by EDUCOM
after they have reached operational status, they will
naturally pass into RESOURCE ADMINISTRATION.

ORGANIZATION
EDUCOM has traditionally functioned in the past
largely through the efforts of its Board of Trustees
and its individual Task Forces. The President and Vice
President worked desperately to coordinate, en-
courage, fund and document the efforts of these sev-
eral groups. In this effort they have been assisted by
a small staff which is almost entirely occupied with
specific projects to which EDUCOM has made a commis-
nation. Now, as we increase the pace at which we expect
EDUCOM's work to proceed, we will try to organize
our activities to permit such growth. Needless to say,
my first concern is defining my own role. Generally,
the role of president in an organization such as EDU-
COM, dedicated to creative activity, is to provide lead-
ership and stimulation, to allocate the organization's
limited resources wisely, and otherwise stay out of
the way.

In the area of resource allocation, he is, of course,
charged with carrying out the broad policies of the
Board of Trustees. In the area of leadership, his role
is to provide both intellectual and technical stimula-
tion, and to provide any integration needed across
the various activity areas. Integration can best be per-
formed by making sure that the organization is com-
posed of excellent people who share in and under-
stand the overall goals. This is now the case, and I
hope we can keep it that way. Stimulation and techni-
cal guidance require a much broader capability than
any president will be able to provide alone. In EDU-
COM, the prime resource for this task has been the
member institutions as represented by the Board and
the "task forces." The Board will continue to set the
overall technical direction of EDUCOM, as well as
being its major cross-disciplinary sounding board.

Webster, in defining "task force," places special
emphasis on the fact that a task force is put together
networking notes

This space will be used to report, as a matter of information, plans for development of, or establishment of networks in various media outside of EDUCOM research programs.

At the coming HemisFair 68 International Exposition in San Antonio, RCA will show an electronic classroom system. After the fair, the system, based on a Spectra 70 computer and television displays, will be put to use by the Inter-American Education center as the nucleus of a system for serving fourteen counties in Texas.

The American Institute of Physics, with funding from the National Science Foundation, has begun a two-year program leading to a national information system in physics and astronomy. A staff of more than 50 computer, scientific and professional personnel will work on the system.

In New York, an experiment in linking educational television, the telephone and an IBM 360/40 computer is being conducted at IBM's Mohanick Lab. Seventy parochial school teachers at various locations watch taped lectures, then use telephones to be quizzed by the computer and to have their answers evaluated. Progress will be matched against that of a control group which does not interface with the computer.

A commercial information-processing network will be established by Clark Equipment Corp., headquartered in Michigan. Called the Advanced Information Development System, it will link terminals at 12 plants with some 200 Telquads at other locations. Base equipment is the UNIVAC 1108 system.

The State of Washington Department of Institutions is planning a data collection and communications network based on remote terminals already installed at institutions throughout the state. It will incorporate existing business applications programs.

The Institution for Research in Learning and Instruction is working on a CAI network for SUNY-CUNY campuses. At present, terminals are in operation at ten locations, with programs available in German, French, and Statistics, serving almost 600 students.

TITLE IX—NETWORKS FOR KNOWLEDGE ACT

On 5 February Representatives Perkins of Kentucky and Green of Oregon introduced H.R. [5067] in the House. The purpose of the bill is to amend the Higher Education Act of 1965, along with other acts bearing on education. It is termed the "Higher Education Amendments of 1968." While all of the provisions are of interest to the academic community, the one which most directly relates to the function of EDUCOM is Title IX—Networks for Knowledge Act of 1968.

It begins by stating, "To the end of stimulating colleges and universities to share to an optional extent, through cooperative arrangements, their technical and other educational and administrative facilities and resources while maintaining their respective institutional identities, and in order to test and demonstrate the effectiveness and economies of such arrangements, preferably on a multi-institutional basis where appropriate and feasible, the Commissioner is authorized to make project grants for all or part of the cost of planning, developing, or carrying out such arrangements."

Specific project areas which may be funded include the establishment and joint operation of closed-circuit television or equivalent transmission facilities, as well as the establishment and joint operation of electronic computer networks and programs. Also covered is access to specialized library collections through development of systems and the utilization of suitable media for electronic or other rapid transmission of materials. Costs which may not come from grant funds are those for operating administrative terminals or student terminals, those for an institution's own use of the central computer facilities, or those for line-access costs.

The bill proposes the sum of $8,000,000 for fiscal '69 and 'necessary' sums for the next four fiscal years. It has been referred to the Committee on Education and Labor, and hearings have begun. White House interest in the passage of the Networks for Knowledge Act is evident from previous statements made by President Johnson. At the signing of the Public Broadcasting Act last November, he said, "So I think we must consider new ways to build a great network for knowledge—not just a broadcast system, but one that employs every means of sending and storing information that the individual can use."

"I have already asked my advisors to begin to explore the possibility of a network for knowledge—and then to draw up a suggested blueprint for it."
 meetings and conferences

Apr 8-9  Computerized Storage and Retrieval of Educational Information  Albert Pick Motel  Nashville, Tennessee
S/C  Association for Educational Data Systems  1281 16th Street, NW  Washington, D.C.  20036

Apr 30-  Spring Joint Computer Conference  May 2  Atlantic City, New Jersey  S/C  AFIPS  515 East 47th Street  New York, N.Y.  10017

May 1-3  National Convention of the Assn. for Educational Data Systems  Fort Worth, Texas  S/C  AEDS Convention Coordinator  1281 16th Street, NW  Washington, D.C.  20036


May 21-23  Annual Convention of the National Microfilm Association  Conrad Hilton Hotel, Chicago  S/C  NMA  Prince George Street  Annapolis, Md.

**S/C** identifies the Sponsor or Contact

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**EDUCOM MEETINGS**

**Held**

Jan 29, Chicago. Committee on Health Sciences of the Task Force on Continuing Education. EDUCOM research staff presented an analytical report of medical information network design elements. Dr. Kelley West, Chairman.

Feb. 5, Washington, D.C. Seminar on Proposed Copyright Legislation held by the Task Force on Legal and Related Matters. Discussion centered around the work of the National Commission on New Technological Uses of Copyrighted Works (S.2236) and prospects for a moratorium on the provisions of S.2236 which affect computers until the Commission report is submitted. Prof. Arthur Miller, Chairman.

Feb. 8, New York. Quarterly meeting of the Board of Trustees. New slate of officers approved.


Feb. 27, Bethesda, Md. Advisory Committee to the National Agricultural Library Study on Bio-Agricultural Networks. Initial meeting to comment on progress and advise on direction.

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**BECKER TO HEAD ASIS**

Joseph Becker, Director of Information Science at EDUCOM's Washington office, has become President-elect of the American Society for Information Science. Formerly called the American Documentation Institute (ADSI), the fifty-year-old organization recently changed its name to reflect both its growth and its expanded scope.

**EIA SEMINAR FEATURES EDUCOM**

The Electronics Industries Association featured a panel of EDUCOM-related speakers at its "Washington Week" Spring Conference seminar on "Evolution of the University Communications Network." The March 4 meeting was moderated by Joseph Becker, Director of Information Science at EDUCOM's Washington office. Dr. Thomas Kream spoke on the Educational Information Network, and Allen Kent of the University of Pittsburgh also addressed the members of EIA's Industrial Electronics Division.
new members

Six new universities have been accepted for full membership in EDUCOM by the Board of Trustees on a basis, pending approval of the Council:

A. College of Georgia
B. Florida State University
C. Technological College
D. University of Michigan
E. Naval Medical School of the National Naval Medical Center
F. England Board of Higher Education

Institutional members have been approved as Consulting Members by the Board of Trustees:

1. University of Minnesota
2. University of California
3. University of Illinois

EDUCOM now has 85 member institutions, plus three consulting members.

calendar of meetings

COUNCIL

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BOARD OF TRUSTEES

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DENTAL CLINIC PROJECT

One of the interesting projects at the Computer Center is one which maintains grade and sales records for the Ohio State Dental Clinic. This is a continuing project and consists of several programs.

The Dental Clinic programs were designed and coded by Dr. Roy Reeves, the Computer Center director; and the first processing occurred in the summer of 1963. Since that time several staff programmers have expanded the system. Currently, programmers Susan Bibb and Jack Mauersberg are maintaining the programs. Mr. Ernest J. Roush, assistant to the Dean of the College of Dentistry, and Mrs. Lucille Kring, data processing analyst, are the Dental Clinic representatives.
College of Dentistry students of three levels--junior, senior, and graduate--are customarily assigned to a certain amount of practice in the Dental Clinic. Complete records must be kept on the work each student does. For any one project, the student will be graded -- and also, because the Dental Clinic is an outpatient clinic, the charges made to the patient must be recorded.

Each student earns a large number of grades during the two years he spends in the Clinic. A grade will be one of two types: (1) a progress grade which is given at various stages of a requirement, or (2) a completion grade, issued when the requirement is finished. (A "requirement" consists of any given task to which a student might be assigned; requirements cover all areas of dentistry.)

A student with a number of active projects might receive as many as three or four grades a day. In fact, there were some 40,000 grades among the almost 400 dental students for Winter Quarter alone. The need for automated record keeping is obvious!

Efficient collection of all this data is a necessary part of the whole system. Both the grades and charges for a project are recorded at the Clinic on an NCR42. It serves as a cash register, bookkeeper, and recorder and punches all pertinent information on paper tape. Periodically, these paper tapes are brought to the Computer Center and the information is converted to card form on our IBM 1620.

Two types of cards are produced--grade cards and sales analysis cards. The sales analysis cards are used as data for a separate program which produces financial and inventory statements. This aids the administrative function of the Dental Clinic.

The grade cards constitute the data for several reporting programs. They are also used, of course, to update the files on each student. A "current quarter" file and a "grand master" file are maintained, each on magnetic tape. The current file consists of the grades earned by each dental student during the current quarter. It is updated periodically during the quarter.

At the conclusion of each quarter, the information on the current quarter file is added to each student's records on the grand master file. The grand master, then, is the accumulated record of all grades earned by a student since he entered the Dental Clinic at the beginning of his junior year in the College of Dentistry.

Two types of reports can be produced on request--the detail report and the accumulative report. A detail report is produced from the current quarter file; a resume of a student's current grades, sorted by department (area of dentistry), is printed. The accumulative report is of a similar format, except that all of a student's grades since he entered the Dental Clinic are printed. The accumulative report is produced from the grand master file.

It is possible to be selective on these reports by requesting output only on a specified group of students and/or a specified grade type. For example, the Clinic may want a report on "seniors, type 2 grades, accumulative" or on "juniors, type 1 and 2 grades, detail (current)."
Besides entering grades and producing reports, other file maintenance is necessary. Students who graduate or drop out must be deleted, and new students must be entered into the files.

At the end of each quarter, massive reports must be produced under the imposition of a deadline because the Clinic in turn must meet the all-University deadline on issuing grades. These final reports are around 3000 pages long (7-8 pages per dental student) and are printed on 4-part paper. Just separating and bursting this output is time-consuming, not counting the large amounts of computer time for execution and printing!

The Computer Center is pleased that we have been able to accommodate the Dental Clinic during the last five years. This is just one example of the many campus needs we serve.

**MACHINE UTILIZATION STATISTICS**

The following table shows the number of jobs processed on the 7094 during January and February. These were the first two months of Winter Quarter.

<table>
<thead>
<tr>
<th></th>
<th>January</th>
<th>February</th>
<th>Total</th>
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<tbody>
<tr>
<td>Classroom (including formal course work, classwork authorizations, and Computer Center Seminars);</td>
<td>7,646</td>
<td>13,269</td>
<td>20,915</td>
</tr>
<tr>
<td>Research (including sponsored and unsponsored research);</td>
<td>6,221</td>
<td>6,426</td>
<td>12,647</td>
</tr>
<tr>
<td>System maintenance and development.</td>
<td>188</td>
<td>304</td>
<td>492</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>14,055</td>
<td>19,999</td>
<td>34,054</td>
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</tbody>
</table>

Winter quarter enrollment in computer courses (the classwork category above) reached a total of 1,643 students. Incidentally, our heaviest work load on record occurred toward the end of Winter Quarter when the 7094 processed a total of 5,820 jobs for the five-day week.
REASSIGNMENT OF JOB NUMBERS

A recent User Bulletin was issued by the Computer Center announcing the reassignment of customer job numbers. Effective April 1, the Computer Center reassigned customer job numbers to reflect the realignment in departments and colleges caused by the recent reorganization of the University.

With approximately fifty departments affected in the reorganization, the reassignment of job numbers for almost one-half of the more than 1700 active research users of the Computer Center facilities was required. Also affected are several hundred students who utilize the computers under the classwork authorization program.

To minimize the inconvenience to our customers created by this changeover, the Computer Center is maintaining lists at convenient locations in all Branch Centers. These lists give the old and the corresponding new job numbers of all customer accounts. By referencing his old job number, a customer may readily find his new job number.

We are sorry for this inconvenience, and we appreciate the cooperation we have received in making this changeover as smooth as possible.

PROGRAM LIBRARIAN AND REPORTS SECTION

A division of library responsibilities at the Computer Center has resulted in the establishment of a Reports Section for the production and distribution of documentation, and of a Program Libraries area for the development and maintenance of the Program Libraries.

Inquiries on library programs (OSUSYS RELLIB or IBLIB) should be directed to Jim Randels, Supervisor of Program Libraries (ext. 8810).

For writeups of certain programs, the Reports Section (Ruth Decker, ext. 8753) should be contacted. The following writeups are available without charge (unless needed in quantity) from the Reports Section:

Section VII, IBSYS
Section IX, IJOB Library, IBLIB
OSUSYS Job Structure and Job Control Cards
Analog to Digital Converters
FACANA MR90
FAROTS OSLP
GPP TRC90
IA94 VARMAX
LSMLGP 1460 Utilities
NEW PROJECTS

The following is a partial list of projects initiated at the Computer Center during February and March. The college, department, project description, and project supervisor are given.

Agriculture

Agronomy, Correlation of Highway Engineering Data with Soils Mapping Data Including Central Tendency and Variance Analysis, L. Wilding.

Engineering

Agricultural Engr., Analysis of Statistical Properties of Forces on a Tillage Tool, G. Schwab.

Mathematics and the Physical Sciences

Geology, Calculation of Indexes of Affinity Between Conodont Form-Species and Initial Grouping of Extraction of Recurrent Groups, W. Sweet.
Physics, Experimental Determination of Infrared Absorption by Gases, J. Shaw.
Astronomy, Monte-Carlo Applications to Radiative Transfer, G. Collins.

Pharmacy


Social and Behavioral Sciences

Economics, Analysis of Relationship Between Municipal Fiscal Structure and Industrialization, J. Weicher.
Psychology, Personality Research on Defensiveness, W. Kania
Psychology, A Study of a Community's Knowledge and Attitudes Toward Slow Learners, R. Jones.

Special Services

Institute of Polar Studies, Gravity Maps of Antarctica, C. Bull.
STAFF ACTIVITIES

New personnel joining the programming staff recently include (Mrs.) Carol Estep, Mr. Madhukar Golhar, Mr. Robert Grehl, Mr. Yau-tang (Tom) Lin, and Mr. Wayne Neely. Carol has been a programmer for the Human Performance Center here at Ohio State for the last five years.

Madhu came from his native India to Ohio State for graduate work and holds Masters Degrees in both statistics and computer science. Bob is on assignment at the Computer Center from the Mathematics Department, where he is finishing his Masters.

Tom is a graduate student in Electrical Engineering working on his Ph. D. He has previously worked as an electronics engineer for the General Electric Co. in Lynchburg, Va. Wayne is a student in computer science and is from Dayton. He has worked as a programmer for Systems Research Labs and for Bell Labs.

Two programmers, Terri Jelinek and Roger Kroetz, have left since the last issue of the NEWS.

There have been some changes in the assignments in the operations staff. Harold Lybarger is now at the Computer Center in the main machine room. Ray Salyer has moved to the day shift as machine supervisor of the Hagerty Hall Branch, replacing Harold. Two new operators have joined the evening staff--Mr. James Phelps at Hagerty Hall, and Mr. Dennis Amicon at the Computer Center.

Several of the supervisory staff headed for Houston and the SHARE meeting February 28-March 1. These included Roy Reeves, Bill Wagner, Oscar Fleckner, Ed Lassettre, and Earl Raley.

Systems programmer Jim Throckmorton has recently been appointed publicity chairman for the Central Ohio Chapter of the ACM (COCACM).

ADDITION OF SIMSCRIPT

The Computer Center has recently leased the 7094 SIMSCRIPT I. 5 compiler, IBSIM, from its authors, Consolidated Analysis Center, Incorporated. It was placed on our system March 18. IBSIM operates as a component of IBJOB (the other components are IBFTC, IBMAP, and IBCBC).

A description of the SIMSCRIPT I. 5 language is contained in the following publications:


SIMSCRIPT I. 5, Karr, Kleine, and Markowitz, CACI (1967).

The Computer Center has prepared a short users' guide to explain job submission procedures. It is available at the Robinson and Hagerty Branches, or from the Reports Section at the Computer Center (ext. 8753).
FIRST NEW EQUIPMENT ARRIVES

The first pieces of our extensive new system have arrived. They comprise the IBM 1130 which will ultimately be located in the auxiliary machine room in our new quarters at the Systems Engineering Building.

This particular 1130 is equipped with disc, card read/punch, paper tape read/punch, printer, and drum plotter.

Until moved to our new site, it is squeezed in at one end of the main machine room where it is undergoing extensive testing by IBM personnel and our systems staff. It is not currently available for public use.

IBM Systems Engineer Dave Erdner at the 1130 console.

MAILING LIST

If you are not already on our mailing list and would like to receive the NEWS, please return the form below. Also, any change of address information is desired so that we may keep the mailing list current.

Computer Center NEWS
The Ohio State University
1314 Kinnear Road
Columbus, Ohio 43212

NAME

MAILING ADDRESS

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___New Subscription  ____Address Change

- 7 -
COLUMBUS, O., June 26. -- Ohio State University has granted departmental status to the division of computer and information science effective Oct. 1. The new department offers Ph.D., M.S., B.S., and B.A. degrees.

Also the university's Computer and Information Science Research Center will continue its research program for the new fiscal year with a $365,800 National Science Foundation grant.

The grant will enable the center, one of two such agencies in the country, to fund additional staff and continue the development of research facilities, according to Dr. Marshall C. Yovits, chairman of the division of computer and information science and director of the center.

More than 150 students have declared majors in the undergraduate program, and there are over 100 in the graduate program. The first bachelor's degrees in the program were granted at the March 15 commencement. It is expected that the first Ph.D. will be awarded in about two years.

First established as a division in the College of Engineering in September, 1966, the newly-formed department offers academic programs in nine areas of interest, with a total of 34 courses, mostly at the graduate level.

Also taught are special sections of two advanced psychology courses for computer and information science students.

(MORE)
The center is an interdisciplinary activity drawing on the personnel of many university departments and laboratories, including biophysics, electrical engineering, linguistics, mathematics and psychology.

It cooperates closely with Battelle Memorial Institute, Chemical Abstracts Service, and Bell Telephone Laboratories in joint research projects and exchange of personnel. Nine joint appointments, including those with other university departments, supplement the nine-member, full-time staff, which is headed by Dr. Yovits.

Computer and information science reaches into many fields. The fundamental theory of information processing and the exploration of the limits of the abilities of computing machinery are topics in pure and applied mathematics.

The characteristics of physical machines and computer design are of interest in electrical engineering; the structure and interconvertibility of languages, in linguistics.

Computer and information science also shares in the organization and control of industrial and business operations; the investigation of artificial intelligence, closely allied to studies in psychology and biology; and the molecular transfer of information, of interest in chemistry and biology.

In the past many of these subjects have been pursued as parts of various separate fields, with the result that the broad underlying principles of information have gone unrecognized.

The program at Ohio State has been defined broadly to encompass most of the analytical activities frequently considered to be part of this discipline.

The approach has been chosen because it is felt that in order to generate the needed concepts, foundations, and generalized techniques, it is necessary to analyze a number of different areas of computer

(MORE)
and information science.

The department emphasizes the following areas of research:

- General theory of information
- Information storage and retrieval
- Theory of automata, finite state machines and computability
- Artificial intelligence, self-organizing and adaptive systems
- Pattern recognition
- Computer programming, including systems programming
- Theory, design, and application of artificial programming languages and translators
- Digital computer organization and functional design
- Numerical analysis and mathematical programming
- Man-machine interaction and systems, particularly in a conceptual sense
- Computational and mechanical linguistics, semantic analysis, machine translation of natural languages
- Management information, including logistics information systems, theory of organization, information as a resource
- Information processing, transmission, and communication in biological systems
- Social, economic and psychological aspects of information and processing.
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<td>705-Special Group Studies</td>
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<td>I</td>
<td>Arr.</td>
<td></td>
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<tr>
<td>750-Modern Methods of Information Storage &amp; Retrieval</td>
<td>3</td>
<td>MWF</td>
<td>11</td>
<td>SE188</td>
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<td>W</td>
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<td>CL310</td>
<td>Rothstein</td>
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</tr>
</tbody>
</table>

**NOTES:**

1. 240 is parallel to 241 but emphasizes business data processing & statistical applications. It will be offered daytime during Su,A,W, and Sp quarters & will be offered evenings during A,W, and Sp quarters. Prereq.: Math 116, 121, or 150.

2. 540 is parallel to 543 but emphasizes business data processing & statistical applications. It will be offered daytime during Su,A,W, and Sp quarters beginning 1968-69, & will be offered evenings during A quarter beginning 1969. Prereq.: 240 or 241 or Engineering Graphics 200.

3. 541 will be offered daytime during Su,A,W, and Sp quarters & will be offered evenings during W quarter.

4. 543 will be offered daytime during Su,A,W, and Sp quarters & will be offered evenings during Sp quarter.

5. 550 will be required of all students declaring major programs in CIS during A 1968 or thereafter. It will be offered during A & Sp quarters. Prereq.: 240 or 241 or Eng,Gr.200.

6. 640 is parallel to 541, but emphasizes the mathematical analysis of numerical methods. It will be offered during A & Sp quarters. Prereq.: 240 or 241 or Eng, Gr.200, Math 255 or 556, and Math 550, or graduate standing & permission of instructor.

FOR FURTHER INFORMATION CALL 293-5973
Computers Granted Department Status

27 June 68

Ohio State University has granted departmental status to the division of computer and information science to become effective Oct. 1. The new department offers Ph.D., M.S., B.S. and B.A. degrees.

The University's Computer and Information Science Research Center will continue its research program for the new fiscal year with a $365,800 National Science Foundation grant.

The grant will enable the center, one of two such agencies in the country, to finance additional staff and continue the development of research facilities, according to Dr. Marshall C. Yovits, chairman of the division of computer and information science, and director of the center.

More than 150 students have declared majors in the undergraduate program, and more than 100 in the graduate program. The first bachelor's degrees in the program were granted at the March 15 commencement. It is expected that the first Ph.D. will be awarded in about two years.

New Department

First established as a division in the College of Engineering in September, 1966, the newly-formed department offers academic programs in nine areas, with a total of 34 courses, mostly at the graduate level.

Also taught are special sections of two advanced psychology courses for computer and information science students.

The center is an interdisciplinary activity drawing on the personnel of many University departments and laboratories, including biophysics, electrical engineering, linguistics, mathematics and psychology.

It cooperates with Battelle Memorial Institute, Chemical Abstracts Service and Bell Telephone Laboratories in joint research projects and exchange of personnel. Nine joint appointments, including those with other University departments, supplement the nine-member, full-time staff, which is headed by Dr. Yovits.
COLUMBUS, O., Nov. 29.-- Information scientists -- specialists in the use of computers, communications and information storage and retrieval -- are predicting this new field will spawn other fields, one of which could be information engineering.

This is the belief of the chairman of Ohio State University's newest department, Dr. Marshall C. Yovits, head of the department of computer and information science in the College of Engineering.

Yovits, a physicist, compares the evolution of information theory to the science of physics which, he says, gave birth to engineering.

In two years at Ohio State, Yovits has brought the study of information science from a small number of computer-related courses to full departmental status and approval of a doctorate program.

"No one is hanging an academic program solely around the use of a computer," he says. "We're not developing a discipline around a gadget.

"A computer, like a book, is a tool for handling information."

He insists that information science transcends physical mastery of the computer.

Simply, he says, it is the process of getting appropriate information to a decision maker but he admits that a universally accepted definition of "information science" is difficult to find.

(MORE)
"Even among professionals there is no clear agreement, and many don't understand it."

With professor of computer and information science, Dr. Ronald L. Ernst, training in psychology, Yovits has devised a model of a "generalized information system," consisting of four essential pieces.

In their model, there is first of all: information acquisition and dissemination -- the computer, operators and input and output. Second is decision making based on the output, or information. Third is execution of the decision in some observable action. Fourth is making data out of the action and feeding it back into the computer as more information.

"A general information system transforms information into courses of action and thence to a set of observable actions," Yovits said.

"The observable action is the goal of the information system and the only reason for the development or use of information."

He likens information science now to physics in the 19th century.

"Physics grew up with lots of little disciplines scattered around. When they were put together, the science of physics emerged. "When a science has anything to it, it becomes established. When it matures, you find engineers hanging onto it."

Yovits' team and the university's Computer Center cooperate. The primary teaching computer is also the main Center computer and Dr. Roy F. Reeves, director of the center, has a joint appointment as well in Yovits' department.

The center, called the "service" facilities for all Ohio State colleges, has its main computer, an IBM 360, across the street from Yovits' department headquarters. In effect, Yovits and Reeves draw straws for the 360's time but Yovits characterizes the arrangement as "friction free."

(MORE)
Yovits reports an equipment windfall, paid for largely by the National Science Foundation. A PDP-10, a highly flexible research-type computer, is due to be delivered to the department in July, 1969.

"You can get into the guts of it and work with it, put in extra equipment without messing up programs. You can hook almost anything into it," Yovits says.

The NSF is largely paying for the PDP-10, and Ohio State is providing a light pen and cathode ray display tube, more memory units and extra input consoles and output typewriters.

"Our program is quite broad, quite ambitious," Yovits says. "Already we're in the top 10 in the country, despite our age."

The department was formally created in October, 1968, with power to award all levels of degrees.

Although most major universities have similar departments, Yovits says they are usually narrow in scope. The program at Ohio State, he contends, is "fairly unique."

A graduate of Yovits' department may get a job programming; go to work for government or industry, setting up information systems ("the demand is tremendous"), or he may go into research.

Practically any company and most government agencies can use the computer graduate, he says. The salary is high and he is in heavy demand.

The students are non-engineers for the most part. Yovits guesses that of the 2,000 students in some kind of computer and information science class each year, about one-third are engineering majors.

"Most come from the arts, and elementary programming is the most popular course.

"It's only a matter of time before everyone -- at least, 90 percent -- take programming courses just as they take elementary math now," Yovits says.

"It's part of being an educated human being."
ANNOUNCEMENT

SYSTEM/360 ORIENTATION SESSIONS

The Department of Computer & Information Science

and

The Department of Engineering Graphics

Announce the scheduling of three orientation sessions, consisting of three lectures each, on the IBM System/360. Topics covered will include:

Lecture 1: Simplified JCL—how to get your problem into the machine.
Lecture 2: Features of Fortran G and Assembler F.
Lecture 3: Coding in Assembler F language.

Sessions are scheduled as follows:

<table>
<thead>
<tr>
<th>Registration Deadline</th>
<th>Lecture 1</th>
<th>Lecture 2</th>
<th>Lecture 3</th>
<th>Availability</th>
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<tr>
<td>Session 1</td>
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<td>December 2</td>
<td>December 3</td>
<td>December 4</td>
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<tr>
<td>Session 2</td>
<td>Dec. 13</td>
<td>December 16</td>
<td>December 17</td>
<td>December 18</td>
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<td>Session 3</td>
<td>Jan. 3</td>
<td>January 6</td>
<td>January 7</td>
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</table>

Persons attending these orientation sessions will be given an opportunity to submit problems to the System/360.

To register for one of these orientation sessions, call Ext. 5813 on or before the registration deadline for that session.

All sessions will meet at 4:00 p.m. in Systems Engineering Bldg. Room 198.

For further information, contact C. R. Foulk, Department of Computer and Information Science, Ext. 5813.
CONVERSATIONAL PROGRAMMING SYSTEM

Soon the Computer Center will make publicly available the Conversational Programming System, CPS. CPS is a timesharing system which runs on our System/360 Model 50. It is a means by which a number of people can use a large computer simultaneously while each has the illusion that the computer is responding to him alone.

Communication with the computer is done through terminals which look like ordinary typewriters. These are IBM 2741 keyboard terminals with dial-up capabilities. The "data conversation" is carried on telephone lines. For some users the nearly instantaneous response time will be a great convenience.
The following is a small program to compute true interest rate on the basis of the loan, amount of payment, and number of payments. After the program is successfully entered, execution is requested. CPS then asks for values for "loan," "paymnt," and "months." The answer is printed according to the "IMAGE" format (line 110). A repeat execution was requested and new values provided.

Although not shown here, this program could have been saved on a user file and reloaded at some later date for use again.
We will have a version of CPS technically known as CPS II. Most of the statements that make up the CPS programming language are quite similar to FORTRAN. They actually are identical to some in PL/1. With CPS II, one has the facility for character manipulating, private storage for programs and data, temporary file creation and usage, and subroutine capability.

There are two types of statements available: collect statements (where a collection of statements together are required to accomplish a computation), and direct statements (where a single statement is executed immediately--this is treating the terminal somewhat as a desk calculator).

It should be remembered that interactive systems such as CPS do not involve punched cards. The program which is typed directly into the computer is in the problem language. This problem language is maintained by the computer either in "card image" form or in "line" form. In order to refer to the collection of lines constituting the program--to modify, insert, or delete lines--there is a manipulative language. With this manipulative (file editing) language capability, one may maintain his program just as if he were handling a card deck of the program.

Even the beginning programmer should find CPS easy to master, since the language allows one to write programs in a fairly natural format. One can begin using CPS with only a few basic statements at his command and then expand his vocabulary as he develops proficiency in the language. CPS, operating conversationally, helps one learn by immediately responding when one has violated any of its rules of programming.

Note the program shown. The programmer has entered his program, received immediate diagnostics and corrected his errors, completed compilation, and proceeded with execution. Note where CPS has asked him for values for his input variables, and finally, notice that his computed answers are printed in a format he has requested.

Persons interested in using CPS should contact the Programming Supervisor, Mr. Dickson Call, at the Computer Center. A special account number must be assigned to the user so that when he attempts to sign on, CPS will accept him as an authorized user.

Currently there are three 2741 terminals available to the public. These are located in our Robinson Lab and Hagerty Hall Data Centers and in the auxiliary machine room on the fifth floor of Systems Engineering. We anticipate that others will be added in various locations around campus.

Any person interested in securing his own 2741 terminal should contact the Director of the Computer Center, Dr. Roy F. Reeves. Expenses associated with having the service include an initial installation charge, monthly rental charges, and costs incurred for computer time.

The CPS II manual is being reprinted currently. An announcement will be made when it is available in quantity. In the meantime, documentation will be provided at each terminal.
NEW PROJECTS

The following is a partial list of projects initiated at the Computer Center during early Autumn Quarter. The college, department, project title, and project supervisor are listed.

Agriculture


Arts

*School of Music*, Micro-Analysis of Musical Themes, C. Spohn.

Administrative Science

*Division of Research*, Analysis of Impact of Various Revenue Sharing Formulas, Ohio Local Governments, F. Stocker.

Education


Engineering

*Chemical Engr.*, Calculation of Molecular Weight Distributions in Polystyrene for Comparison with a Theoretical Model, R. Lynn.
*Industrial Engr.*, Reduction of Data from the Eye-Marker Camera, T. Rockwell.
*Mechanical Engr.*, An Investigation of New Techniques for Solving Heat Conductor Problems which are Non-linear, E. Johnson.
*Metallurgical Engr.*, Solutions of Cubic Equations Involved in Vaporization of Zinc Oxide, R. Rapp.
Engineering, cont.

Photography, Automating Film Library Procedures, B. Buccalo.

Computer and Information Science, Use of Time-Sharing Terminals in Connection with the Shannon Switching Game Study, L. White.


Biological Sciences

Population and Environmental Biology, Wants and Needs of Visitors to National Parks, R. Shew.


Biochemistry and Molecular Biology, Conformations of Biopolymers, R. Scott.

Genetics, Analysis of Response Surface Data from Arabidopsis thaliana, J. Griffing.

Medicine


Mathematics and the Physical Sciences

Astronomy, Calculation of Position of Astronomical Objects, A. Slettebak.


Chemistry, Computational Study of Molecular Collisions, R. Levine.


Geodetic Science, Alternate Representation of the Earth's Gravity Field, R. Rapp.

Geodetic Science, Distance Measurement Methods in Naval Operations, R. Adler.

Mathematics, Mathematical Experimentation in Elementary and Algebraic Number Theory, H. Zassenhaus.

Physics, Quantum Mechanical State Parameter Analysis of Nuclear Reactions Which Involve Polarized Projectiles, R. Seyler.

Social and Behavioral Sciences

Economics, Study of Mining Company Stores, J. Weicher.

Economics, Migration to Columbus: An Examination of Flows and Causes, J. Weicher.

Geography, Dynamic Aspects of Spectral Analysis as Applied to the Field of Geography, L. King.

Political Science, Cluster-Bloc Analysis of Legislative Roll Calls - 107th Ohio General Assembly, T. Flinn.

Psychology, Multidimensional Scalings of Personality Descriptions, M. Hakel.


Other

Institute of Polar Studies, Sampling for Natural Particulate Fallout at Plateau Station Antarctica, W. Hamilton.

Institute of Polar Studies, Analysis of Depth-Density Relationships in Snow to Depths of 40 Meters, H. Kane.
WE'RE A TOURIST ATTRACTION

Ohio State is planning "self-guided" tours of campus so that visitors may see
interesting aspects of the University without requiring an escort. The Computer Center
will be included as a point of interest on one of these tours, a walking tour of the
engineering complex.

With our new facilities it is now convenient for persons to view the machine area
without disturbing the personnel or general activity of the Computer Center. The large
computers in the main machine room may be seen through a series of windows along
the adjacent corridor. Explanatory information is posted at several points in the area.

STAFF ACTIVITIES

Math Analyst Bill Wagner and Systems Supervisor Ed Lassette attended the
SHARE-GUIDE general session October 30-November 1 in Atlantic City. SHARE is
an organization of IBM scientific users; GUIDE is its counterpart for commercial users.
This was the first joint meeting of the two groups.

On the evening of November 11, the local Central Ohio Chapter of the Association
for Computing Machinery (COCA CM) presented Dr. Bernard Galler of the University
of Michigan and national president of the ACM. The Computer Center was host for
the meeting. Dr. Galler spoke on U. of M.'s time-sharing system and demonstrated it
via dial-up facilities into their 360/67 at Ann Arbor. We used a closed circuit TV setup
so that everyone had a good view of the keyboard.

Dr. Paul Buerger has been added to our Systems Programming group. Paul's
degree is in astronomy and he has had quite a bit of computational experience. Sara
Hobson and Eileen Finney joined Operations as keypunch operators during November.
Sara is at Robinson Lab and Eileen at Systems Engineering. Beverly Roark has
resigned from Applications Programming and Libby Campbell from Operations. Both
are retiring to home and family obligations.

"POTLUCK LIBRARY"

The Computer Center has received many requests from users to act as a clearing-
house for information on the availability of programs belonging to other computer users
on campus. We feel this is a worthwhile service and may save many dollars of cost
and hours of effort if a customer is able to utilize a program that already has been
written by some other user.

We plan to maintain a cross-indexed directory of programs, listing key descriptors
of the program and from whom it may be obtained. To build an adequate list, we would
like to hear from those users who have programs they would be willing to share. Of
course the Computer Center cannot verify the quality or in any way guarantee the perform-
ance of the programs listed. We are interested, however, in maintaining the directory
and in helping as much as possible as a clearinghouse of program information. Please
contact Earl Raley (ext. 4843) or Fran Stout (ext. 2014) for further information.

(Although this is more officially called a Bank of Contributed Programs, acknowledg-
ment must be made to the University of Colorado as originators of the very appropriate
term "Potluck Library.")
MACHINE UTILIZATION STATISTICS

The following table shows the number of jobs processed on the 7094 during September and October. September is a vacation month; October represents the beginning of Autumn Quarter. (Processing on our 360/75 and 360/50 will not become really active until Winter Quarter. We will report statistics on these systems after they become fully utilized.)

(1) Classroom (including formal course work, classwork authorizations, and Computer Center seminars);
(2) Research (including sponsored and unsponsored research);
(3) System maintenance and development.

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<td><strong>23,912</strong></td>
</tr>
</tbody>
</table>

MAILING LIST

If you are not already on our mailing list and would like to receive the NEWS, please return the form below. Also, any change of address information is desired so that we may keep the mailing list current.

________________________________________
Computer Center NEWS
Systems Engineering Bldg.
1971 Neil Avenue
Columbus, Ohio 43210

NAME_____________________________________

MAILING ADDRESS_____________________________

____________________________________________

__________________  _______________________
Zip

___New Subscription
___Address Change

-7-
Computer Center
The Ohio State University
1971 Neil Avenue
Columbus, Ohio 43210

UNIVERSITY ARCHIVES
HITCHCOCK HALL
2070 NEIL AVE.
CAMPUS
THE SYSTEMS GROUP

Who is this mysterious Systems Programmer, this fellow who apparently knows everything, causes the system to operate the way it does, and generally lurks around unseen by the user?

Surely our customers sometimes feel like innocent victims of these systems programmers when a job fails for the fifth day in a row, the consultant finally suspects it's a systems bug, and he says he will have to check with someone in "Systems." To many of our users it is not clear what the function of the Systems Group is or who the members are.
Our Systems Group consists of seven full-time and two part-time programmers. Supervisor of the group is Mr. Edwin R. Lassettre who has been with the Computer Center for six years. Under him are Paul Buerger, Oscar Fleckner, Steve Kochl, Owen Miller, Marian Moore, Patricia Ratz, Gary Sabo, and Jim Throckmorton.

This group is charged with the maintenance and improvement of our various operating systems. These include OS/360 on our 360/75, CPS II on our 360/50, and IBSYS on our 7094. Not to be overlooked are the sophisticated programs which enable transmission from our five submittal sites to the major computers.

Although IBM supplies a version of all of these operating systems (called "software"), we are not able to use them without some modification. Our job load is somewhat specialized (a very large number of small student programs and fewer large jobs) and we are able to improve service by biasing the IBM-supplied software toward this sort of environment. This results in increased speed and a general streamlining of the operating systems.

OS/360 consists of a number of major components such as task management, data management and services, a number of compilers, an assembler, the linkage editor, and many other components. It all totals up to about 16 inches of stacked computer listing plus an additional 3000 microfiche cards.

Much of the system listing is provided by IBM on microfiche cards. Microfiche is the same concept as microfilm; reduced images of 35-70 pages of computer output are placed on one IBM sized plastic card. This card may be positioned in a special reader to select the desired page. The image is expanded and "projected" onto a semi-opaque screen. The microfiche reader unit suggests a TV set and the general effect is that of seeing the listing lighted by rear projection on the screen.

The members of the Systems Group have specific areas in which they specialize. Each is responsible for being thoroughly familiar with his assigned components, their coding and functions.
The responsibilities of the systems programmer also include locating and fixing errors as well as implementing corrections and additions sent by IBM. He is always watching for improvements that can be made in the coding and even may incorporate new features if desirable.

It is apparent that a good systems person must be an experienced programmer—knowledgeable in the hardware of his computer, able to read and generate efficient assembler language coding for it, and skillful in the overall complexities of operating systems. Furthermore, when an emergency catastrophe occurs, it is the systems programmer who is called. He is required to make a quick diagnosis and insert a quick "fix" to get things running again.

The systems programmer's work is never done. He nearly always is working under pressure. There are always new features to be investigated and added, corrections to be made, and improvements to be coded.

We are proud of our Systems Group. They have worked long, hard, and sometimes frustrating hours implementing our 360/75, 360/50, and 1130 Remote Job Entry (from terminals) operating systems over the past several months. And there is still much work ahead. Nevertheless, the fact that we are in reasonably stable operation with over half of our students assigned to the 75 testifies to the efforts of this team.

STAFF ACTIVITIES

Dr. Thomas Willke has joined the Computer Center staff on special appointment for Winter Quarter. Tom is an associate professor in the Department of Mathematics and is on the staff of the Statistics Lab. Tom will help us in our statistical consultation and at the same time hopes to become more familiar with computers, with programming, and with our collection of statistical applications programs.

New to Operations since early December are Anna Benetatos, O'Neil Chambers, Harold Lambert, and Robert Bell. Anna is a keypunch operator and submittal clerk at Systems Engineering, Neil is a computer operator at the Research Center, and Harold is an evening operator at Hagerty. Robert is on the third shift at the Research Center.

(Mrs.) Beverly Rutherford is the new secretary in the Reports Section. Wayne Neely and William Murton left the applications programming staff in December.

Dr. William Wagner, our Supervisor of Mathematical and Systems Analysis, spoke to the Central Ohio Association of Computing Machinery on the evening of January 23. Bill discussed our new facilities and demonstrated the Conversational Programming System CPS. Tours of our facilities were provided after the meeting.

Dr. Wagner also presented a technical seminar for our programming staff on MIMIC, an example in the use of an analog simulator, on February 3.

Jim Shaffer and Professor Charles Csuri of Fine Arts presented their paper "Art, Computers, and Mathematics" at the Fall Joint Computer Conference in San Francisco in December. The paper will be published in the Proceedings of the FJCC.
CPS II NOW AVAILABLE

CPS II, the Conversational Programming Language, is now available on our 360/50. CPS is a timesharing system, a means by which a number of people can use the computer simultaneously while each has the illusion that it is responding to him alone.

Communication with the 50 is done through terminals which look like ordinary typewriters. These are IBM 2741 keyboard terminals with dial-up capabilities. For some users the nearly instantaneous response time will be a great convenience. The CPS language is quite similar to FORTRAN; actually it is a subset of PL/I.

Currently there are four 2741 terminals available to the public. These are located in our Robinson Lab and Hagerty Data Centers, in the auxiliary machine room on the fifth floor of Systems Engineering, and in the Administrative Science Data Center (202 Hagerty Hall). We anticipate that other public terminals will be added in various locations around campus.

Terminals for departmental use have been installed by the departments of Chemistry, Industrial Engineering, Electrical Engineering, Medicine, and Mathematics.

Already this quarter there are ten courses which are utilizing CPS. These include four courses in Industrial Engineering, three in Computer and Information Science, and one each in Chemistry, Mathematics, and Business Organization. Approximately four hundred students are involved.

Persons interested in using CPS should contact Mr. Dickson Call at the Computer Center, ext. 4843. A special account number must be assigned to the user so that when he attempts to sign on, CPS will accept him as an authorized user.

Any person or group interested in securing their own 2741 terminal should contact the Director of the Computer Center, Dr. Roy F. Reeves (ext. 4843). Expenses associated with having the service include an initial installation charge, monthly rental charges, and costs incurred for computer time.

CPS II is accessible Monday, Tuesday, Thursday, Friday 10:00AM-9:30PM, and Wednesday from 12:00 noon to 9:30 PM. Manuals are on sale at University Bookstore in the computer science area.

S/360 GENERAL PLOTTING PACKAGE

The S/360 version of the General Plotting Package (OHCGPP) is now available for use on FORTLIB. The entries operate in a similar manner to the 7094 GPP although there are some changes.

Complete writeups were distributed with the February 1 update to the FORTLIB manual. Separate writeups are also available from 406G Systems Engineering.

Card output from OHCGPP may be used on either of our 1627 plotters. One plotter is on the 1620 in the Research Center; the other is on the 1130 in our auxiliary machine room, 508 Systems Engineering.
CONTINUING EDUCATION DIVISION COMPUTER COURSES

The Division of Continuing Education has added two computer-related courses to its curriculum. The first, a general survey course (non-technical), is being presented this current Winter Quarter.

The second is a beginning programming course scheduled for Spring Quarter. No prior experience is assumed and opportunity to write and test programs on one of our large computers is provided. The course will meet on Thursday evenings 7:30-9:30 PM, March 27-May 29. Course charge is $25.00; enrollment is limited to 40. For further information, call the Division of Continuing Education, 293-8571.

NEW PROJECTS

The following is a partial list of projects initiated during December and January. The college, department, project title, and project supervisor are listed.

Agriculture

Agricultural Economics and Rural Sociology, To Determine the Effect of Pre-Treatment on Feeder Calf Prices, P. Thomas.

Engineering

Civil Engr., A Study in the Warping of Curved I-Beams, M. Ojalvo.
Electrical Engr., Investigation of Radiation and Scattering by Thin Wires, J. Richmond.
Industrial Engr., The Development of Methodology for Evaluation Road Signs, T. Rockwell.

Veterinary Science

Veterinary Pathology, Steroid Analysis of Canine Tissues, E. Fowler.

Mathematics and the Physical Sciences

Astronomy, Calculation of Spectral Line Intensities of Planetary Nebulae, S. Czyzak.
Chemistry, Calculations of First-Order Rate Constants of Solvolysis of N-isobutyldienemethylamine, J. Hine.
Physics, Calculation of Electromagnetic Forces in Plasma Confinement, M. Pool.

Social and Behavioral Sciences

Psychology, Color Preference Test Exploratory Studies, C. Huelisman.

Other State Users

MACHINE UTILIZATION STATISTICS

The following table shows the number of jobs processed on the 7094 during November and December, 1968. November represents the end of Autumn Quarter; December represents largely the final examination period and vacation time.

(1) Classroom (including formal course work, classwork authorizations, and Computer Center seminars);

(2) Research (including sponsored and unsponsored research);

(3) System maintenance and development.

<table>
<thead>
<tr>
<th></th>
<th>November</th>
<th>December</th>
<th>Total</th>
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</thead>
<tbody>
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<td>Classwork</td>
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<tr>
<td>Research</td>
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<td>10,147</td>
</tr>
<tr>
<td>System Development</td>
<td>19</td>
<td>35</td>
<td>54</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>18,565</td>
<td>8,370</td>
<td>26,935</td>
</tr>
</tbody>
</table>

With the rising usage of the System/360 computers, the days of heaviest usage on the 7094 are probably over. It is interesting to note the growth of 7094 usage over the last several years, however.

<table>
<thead>
<tr>
<th></th>
<th>1966</th>
<th>1967</th>
<th>1968</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classwork</td>
<td>67,266</td>
<td>80,245</td>
<td>92,397</td>
</tr>
<tr>
<td>Research</td>
<td>50,241</td>
<td>65,647</td>
<td>78,862</td>
</tr>
<tr>
<td>System Development</td>
<td>3,255</td>
<td>3,148</td>
<td>2,144</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>120,762</td>
<td>149,040</td>
<td>173,403</td>
</tr>
</tbody>
</table>

The number of students enrolled in formal courses using the 7094 has increased from approximately 1100 in Autumn 1966, to 1995 in Autumn 1968. This increase may be seen in the following table:

<table>
<thead>
<tr>
<th></th>
<th>Winter</th>
<th>Spring</th>
<th>Summer</th>
<th>Autumn</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>1,300</td>
<td>1,548</td>
<td>599</td>
<td>1,491</td>
<td>4,938</td>
</tr>
<tr>
<td>1968</td>
<td>1,643</td>
<td>1,805</td>
<td>786</td>
<td>1,995</td>
<td>6,229</td>
</tr>
</tbody>
</table>

We will begin reporting statistics on S/360 usage in our next issue. More active S/360 usage began with the current Winter Quarter.
BRANCH TERMINAL STATUS

The transmission equipment in some of our terminals has been converted to provide service to the 360/75. The Research Center, Plumb Hall, and Robinson Lab have received IBM 1130 computers which will serve as remote job entry terminals. Our Hagerty Branch is retaining its 1401 with transmission facility to the 7094.

Although customer jobs for either the 7094 or the 75 may be submitted at any terminal, for best turnaround, 7094 jobs should use Hagerty or the Research Center, and 75 jobs should use Plumb, Research Center, Robinson Lab, or Systems Engineering.

Students enrolled in formal coursework using the 7094 are assigned to Hagerty; classwork authorizations for 7094 should use Hagerty or Robinson Lab (preferably Hagerty). Students in formal classes using the 75 are assigned to Robinson Lab. Other users of the 75 with research projects or classwork authorizations are encouraged to use the Systems Engineering terminal, or if on west campus, the Research Center.

The Systems Engineering Building is open until 10 PM Monday through Friday. Consultation hours at Systems Engineering are 8-12 AM and 1-5 PM Monday through Friday.

Consultation hours for Winter Quarter at the other branches are as follows:

<table>
<thead>
<tr>
<th>Branch</th>
<th>Hours</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Center</td>
<td>9-11, 2-4</td>
<td>M-T-W-Th-F</td>
</tr>
<tr>
<td>Robinson Lab</td>
<td>9-12, 1-4</td>
<td>M-T-W</td>
</tr>
<tr>
<td></td>
<td>8-10, 1-4</td>
<td>Th</td>
</tr>
<tr>
<td></td>
<td>9-12</td>
<td>F</td>
</tr>
<tr>
<td>Hagerty Hall</td>
<td>9-10, 2-4</td>
<td>M-T-W-Th-F</td>
</tr>
<tr>
<td>Plumb Hall</td>
<td>8-10</td>
<td>M-W-F</td>
</tr>
<tr>
<td></td>
<td>3-5</td>
<td>T-Th</td>
</tr>
</tbody>
</table>

MAILING LIST

If you are not already on our mailing list and would like to receive the NEWS, please return the form below. Also, any change of address information is desired so that we may keep the mailing list current.

---------------------------------------------------------------------
Computer Center NEWS
Systems Engineering Bldg.
1971 Neil Avenue
Columbus, Ohio 43210
---------------------------------------------------------------------

NAME __________________________

MAILING ADDRESS __________________________

________________________________________

________________________________________

________________________________________

________________________________________

Zip ______

___ New Subscription

___ Address Change

-7-
Release on Receipt

COLUMBUS, O., June 12.-- --Ohio State University will continue development of its Research Center in Computer and Information Science under a $365,700 National Science Foundation grant reported Thursday (6/12) to the university's Board of Trustees.

The grant was the largest of 49 agreements totaling $1,580,044 administered through the Ohio State University Research Foundation and contained in the monthly report to the trustees.

In addition, three industrial research contracts totaling $14,859 were administered through the Engineering Experiment Station.

One of two such agencies in the country, the Research Center utilizes staff and faculty from a number of different campus departments and laboratories. Director is Dr. Marshall C. Yovits, who serves also as chairman of the department of computer and information science.

Among research studies undertaken by the center are human information processing, information analysis, (MORE)
Research agreements - 2
information storage and retrieval, applied linguistics, artificial intelligence and biological information processing.

Another large grant through the Research Foundation was one for $82,900 from NSF to carry out low temperature research in the department of physics.

The project, under the direction of Dr. David O. Edwards, supports studies of the properties of helium-3 and helium-4 mixtures, including surface properties and the propagation of "second sound."

Ordinary sound is a pressure wave passing through a substance as alternate compression and rarefaction of the material. Second sound passes through helium-4 at high temperature as a temperature wave, alternately heating and cooling the material. But at low temperature, second sound passes through helium-4 as a wave of alternate high and low concentration of helium-3.

-rb-
COLUMBUS, O., Sept. 16-- The chairman of the newest department in the College of Engineering at Ohio State University is pleased with enrollment trends.

Dr. Marshall C. Yovits, chairman of the department of computer and information science, says undergraduate and graduate enrollment and faculty numbers are above his expectations.

Undergraduate students, those who will receive computer and information science degrees, have tripled, going from 100 in 1967 to 300 for the year 1969-70.

Faculty members, both full and part-time, now number 24, compared with 10 in 1967. There are now 14 full-time faculty. Graduate student enrollment has skipped from 32 to 89, to 114. Graduate degrees awarded have risen from seven in 1967, to 17, to an estimated 34 in 1969-70.

And general student interest in computers is up. Yovits reports that in 1967, the division taught 1,977 students.

(MORE)
In 1968, some 2,860 students received instruction in some phase of computers or information science. And, he estimates, for the 1969-70 school year, 4,000 students will sign up for the nearly 60 courses offered by the department.

Established first as a division, computer and information science was granted department status in October, 1968.

-cep-
CIS announces major programs changes

By Cherie Fichter
30 Nov '74

Changes in major programs for all Computer and Information Science (CIS) undergraduates will go into effect Summer Quarter, according to Donald Kalimy, counselor for CIS.

Changes include a reduction of the total number of hours required to graduate in all three colleges which grant CIS degrees — the College of Engineering, College of Mathematics and Physical Sciences and the College of Administrative Sciences.

Brought about to “better prepare students for industry and graduate school,” the changes basically put more emphasis on CIS courses and less on mathematics, Kalimy said. However, students who are planning to go to graduate school should build a strong math background, he said.

The approach is toward more ‘breadth’ in the major programs rather than an in-depth focus, Kalimy added.

The department will “use more flexibility to get that breadth,” he said.

College of Engineering

In the College of Engineering, the number of credit hours needed to graduate with a B.S. degree will be 198, 16 fewer than the current 214.

Other changes will include addition of 14 hours of required CIS courses, bringing the total to 44; dropping the Biology 100 requirement, and dropping two of three electrical engineering course requirements, making Electrical Engineering 500 the single requirement.

In addition, 19 hours of free electives will be dropped, and the 20 hours of technical electives must not include CIS courses. These electives should form “a concentration of study in a particular functional area.”

Physical sciences

The College of Mathematics and Physical Sciences grants B.A.s and B.S.s with a major in CIS. For both degrees, the total number of hours needed to graduate will be lowered from 198 to 190.

For the B.S. degree, a total of 44 hours in CIS will be required, instead of the present 35 hours.

Also, the math requirement will be changed from 25 to 10 hours beyond calculus, including linear algebra. In addition, the hours of free electives will be reduced from 10 to three.

For the B.A. degree, the number of required CIS hours will be increased one hour bringing the total to 30 hours.

Another change for this degree will be a reduction of five math credits, dropping the total to 10 hours beyond calculus.

Administrative science

In the College of Administrative Sciences, the CIS major will need 180 hours to graduate instead of the current 214 hours.

One hour of required CIS courses will be dropped, bringing the total CIS hours necessary to 25.

In addition, the 19-hour foreign language requirement will be dropped, and there will be a five-hour reduction in the 25-hour math requirement.
Computers don’t close out their own

By John DoBroka

The problems of overcrowded enrollment faces many departments at the University, but the Department of Computer and Information Science (CIS) has been able to solve this problem.

Marshall C. Yovits, chairman for CIS said, “Because of an increasing staff, if problems of overcrowding should arise, we are able to add more sections rather than close out students.”

Yovits said that enrollment in the department increases about 10 to 15 percent a year. In 1967, 542 students were enrolled in the department. The figure rose to 1,880 Autumn Quarter. Despite the constant rise in enrollment, Yovits sees no more problems occurring in the future.

With jobs becoming increasingly scarce in many areas, Yovits said the job situation in the computer field is very good and he sees no problems for quite some time. It is a constantly expanding field with so many opportunities for everyone, he said.

CIS has a full-time faculty of 20 members at the assistant professor level and above. This faculty is supplemented by staff members who have joint appointments with other departments, by staff from other departments who teach courses primarily for CIS students, and by adjunct staff people employed in off-campus organizations. These are currently about 14 supplemental staff members.

When the department first started in 1967 there were five full time faculty and five supplementary staff members.

Yovits said the department’s budget has increased because of an increasing enrollment. Budgets are determined by the load of each department.

Because of the continual rise in student enrollment, CIS has had to hire new staff members. Yovits said, “Our main concern is finding qualified people to fill these positions.”

Yovits also said that all students should take at least one course in CIS to acquaint themselves with computers.

Yovits has a very proud and optimistic attitude toward the department at Ohio State. “We have one of the best departments in the country and also one of the broadest in scope. We are continually looking in new areas to develop programs,” he said.
Easter computer system aids OSU

By Darrell Lowe

A much faster computer system with a greatly expanded “memory” is now serving University computer users.

Roy F. Reeves, director of the Instruction and Research Computer Center (IRCC), estimates 7,000 students from about 80 different departments use computers each quarter.

"AS FAR as the customers are concerned (people who use the computer), it is the same machine," remarked John M. Snowden, assistant director of IRCC.

Reeves said the only difference between the two types of machines is the new one is faster and has virtual memory capabilities.

"VIRTUAL MEMORY," Snowden said, "means it appears to the user he has a much bigger amount of core (memory) storage."

This feature is still in the test stage and is not available for general use on the system. Snowden added the earliest possible time virtual memory could be used is the summer of 1976.

THE NEW computing system, an IBM System/370 Model 168, was installed over Christmas break and began operation Jan. 2 in the IECC in Baker Systems Engineering Building. It replaces the IBM System/370 Model 165 computing system.

Rather than being leased from IBM as was the old machine, the new system is owned directly by the University.

Dwight F. Stobbs, director of Purchasing and Materials Management, quoted the price of the new system at $3,253,176.

University computer moves to new home

By Lisa M. Buerge 6-21-76

The computer which helps operate the University's libraries, student records, payroll and Computer Assisted Study was moved from Derby Hall to Lincoln Tower last week. The move was the first phase of a transfer of equipment and University administrative offices to Lincoln Tower scheduled for this summer.

Students will be directly affected by the computer shutdown in the libraries, where books and materials will have to be checked in and out by hand for at least one week.

Amy Eley, telephone center and circulation desk coordinator, said the library system has slowed down, but not because of its patrons. Many closed reserve books from the undergraduate library were returned shortly after the computer was mistakenly shut off, causing a backlog.

Carroll Notestine, director of University Systems, said the move to Lincoln Tower is being done so all administrative offices on campus are in one area. This will leave the main campus as a "prime" academic area.

Notestine said the University was hiring professional moving companies with specialized equipment to handle the move.
The scene is the fifth floor of Baker Systems Engineering on Nell Avenue. The entire floor consists of punch machines, video-display terminals and computer print-out nits. Students are busy on the enpunch machines punching computer cards. There is a student for almost every machine. Most of the students are slumped doggedly into their chairs. There is no noise, other than that of computers loudly banging away. It is 2 a.m.

Suddenly, a scream echoes down the hall. The students stop, look up and the machines stop rattling. The cream turns into hysterical, poradric laughter. The laughter tops. Silence. Only the humming of the computers is heard. Students turn, look at one another and shrug their shoulders. Then they return to their work.

There is a nonchalance about the situation that suggests normalcy. "Happens all the time," a student said. "Students listening to him nod in agreement. "Yeah," said another, "we're all crazy."

They are Computer Science 211 students.

Computer Information Science courses begin with data processing.

DiMaio talks to the computer: "Give me a right answer." The computer talks back. “Error. Error,” it says on the print-out sheet. Four O'clock. The sun will come up soon.

"You finished?"
"Nope."
"Five O'Clock."
"Finished yet?"
"No, not yet."

Days pass and the same students return every night to Baker Systems. By 3 a.m. students start to do strange things. Someone nudges the person beside him to check if she is still conscious, still awake, still alive. He quizzes her in on her environment, pointing to a video-display terminal. "What's that?" he asks.

"I don't know," she says.

"Who are you? What's your name?"
"Uh, well . . . it's um . . . " After a brief interlude of five seconds, she answers correctly. They continue their work.

"Error. Error," says the computer. DiMaio will beat the computer yet. "I think we all ought to get together and blow the hell out of this computer," he says. Eight students cheer his suggestion, but they do not blow up the computer.

There is an echo in the hallway. "God, I hate this computer. God, I hate this computer. God, I hate this computer!"

Somebody hates the computer.

"Around two O'clock," DiMaio said, "everybody starts turning a little flaky."

Rubberbands fly from room to room amid laughter. People run from room to room to avoid being hit.

"Warning," says the computer.

"Hey, DiMaio. Why don't you take a break?" a student asks.

"Break?" he says, "What's a break?" DiMaio laughs and shoots a rubberband. It bounces off the computer.

"Termination," the computer prints.

"I'll terminate you," says DiMaio.

Computer Science 211 is an introduction to data processing and computer programming. It is an introduction to electronic computers.

And long evenings at Baker Systems.

A student walks to a payphone in the hallway and dials a number. "I won't be home for breakfast," he says.

Students walking the halls have bloodshot eyes and are sprouting beards. One student is gazing at his computer print-out sheet.

**Steve Nash is a junior from Boston, Mass., majoring in political science.**
OSU hasn't given up searching

By David Lore

9-23-84

Ohio State University’s two-year quest for a computer science chairman will be turned over to a third faculty search committee this month.

“We’re just going to have to go out with a whole new approach,” said Richard Wharton, administrative chief in the OSU College of Engineering.

“Computer science is very difficult to recruit in, because it’s just not that old a discipline.

“There’s just not a lot of people who have gone through the programs, and the demand for people who’ve made a name for themselves is greater than it is in any other area of engineering.”

The last regular chairman of the department of computer and information science was Lee White, who resigned in February 1983 to take a similar job at the University of Alberta.

Associate Professor Stuart Zweben took over as acting chairman when White left, but he’s was replaced this month by a new acting chairman, Associate Professor Anthony Petrarca.

Zweben said he decided to return to teaching when it became clear that neither he nor any other current faculty member would get the permanent chairmanship.

“Computer science is very difficult to recruit in, because it’s just not that old a discipline.”

“The department always looked on the chairman’s vacancy as an opportunity to get a well-known person with visibility outside of Ohio State but now, after two years, I think many people in the department would have felt comfortable with hiring somebody from the inside,” he said.

What OSU is looking for, said Engineering Dean Donald Glover, is a full professor with national and international standing in computer science.

But then, he added, so is everybody else.

“They’re very, very scarce, and when we do find the one we want, we’ll probably have to pay $70,000 to $90,000,” said Glover.

“We’ve got some good people (under consideration) but we just haven’t agreed on anybody yet.”

Glover hopes for an appointment by January, but faculty members think that’s optimistic. If the chairmanship remains vacant through this term, Zweben warned, OSU’s reputation in computer science could be affected with an adverse effect on faculty recruitment.

“This year, when somebody outside of Ohio State looks at our ad, they’re going to wonder why we’re searching for a chairman for a third year,” he said.

“They’re going to wonder what’s wrong with Ohio State.”

Petrarca, who served on the second search committee last year, said the panel advertised in professional journals and made personal contacts with 200 to 300 potential candidates. Six were finally invited to the campus, he said, and one was offered the job.

On Aug. 31, however, the candidate notified OSU that he had decided to stay at his own institution, with a hefty promotion.

“He got an offer he couldn’t refuse,” Petrarca said. The promotion, he said, put the candidate’s salary “well above” $90,000.

Petrarca said this will be the first time, to his knowledge, that an executive search company will be used at OSU to find a departmental chairmanship.

“It’s an uncharted course, and a number of us are not that certain that this is the right position to follow such a course,” he said.
COLUMBUS, Ohio -- Ohio State University's Department of Computer and Information Science on May 6 will officially unveil its new Laboratory for Artificial Intelligence Research.

The artificial intelligence (AI) laboratory, is located in room 400 of Caldwell Laboratory, 2024 Neil Ave. The laboratory will be equipped with seven special Xerox LISP workstation computers for use by researchers and by graduate students studying the principles of knowledge-based reasoning -- how knowledge of various types is used to solve problems.

"We're one of the few labs in the country sophisticated enough to do this well," says John Josephson, who is assistant director of the laboratory and a post-doctoral researcher. He holds a Ph.D. in philosophy.

"We're looking at the theory behind the ways experts make decisions and solve problems rather than just the technology involved," he notes.

The director of the laboratory, Balakrishnan Chandrasekaran, professor of computer and information science, says eight Ph.D. candidates in the department are specializing in artificial intelligence. In addition, he says several faculty, staff and graduate students are engaged in joint programs within the colleges of Medicine and Engineering.

--- more ---
The facility's opening ceremonies May 6 will be highlighted with a lecture by Allen Newell of Carnegie-Mellon University at 4 p.m. in room 131 of Hitchcock Hall, 2070 Neil Ave. Newell, one of the founders of the AI field, will give a talk titled "Cognitive Science: The Emerging Synthesis," which will discuss the relationship among AI, psychology, philosophy and linguistics.

The goal of AI, says Josephson, is to discover the principles of intelligence that underlie human and machine reasoning and to devise computer programs that can embody these processes.

One of the focuses of AI research is the development of "expert systems," computer programs that combine textbook facts with the judgment of experts in a given field. Such programs have potential problem-solving applications in dozens of fields, and several -- in medical diagnostics and in financial planning, for example -- are in limited use today.

Using a methodology known as knowledge engineering, AI researchers interview people working in a field to determine how they figure out problems they face in their work, such as how a physician diagnoses a patient's illness. Then the researchers incorporate this expert decision-making into computer programs.

Josephson says the demand for such skills is tremendous.

"There are very few people who can do this well, and the opportunities for these knowledge engineers is wide open," he says. "Many large companies are opening their own artificial intelligence laboratories."

Josephson points out that the human reasoning process is far more complex than the artificial intelligence which knowledge engineers now know how to design into computers.
The most exciting potential for AI, he adds, lies in the research opportunities for investigating the very nature of reasoning and intelligence.

The new laboratory is supported by grants from the National Science Foundation, the National Institutes of Health, the Air Force Office of Scientific Research, the Defense Advanced Research Projects Agency and Battelle Memorial Institute.

NOTE TO REPORTERS AND EDITORS: To arrange an interview or get more information on the laboratory, contact John Josephson at 422-0208 prior to May 6.
Lab aids computer reasoning

By Brian Bursack
Lantern staff writer

A group of OSU researchers want to give computers a mind of their own.

The department of computer and information science opens its new Laboratory for Artificial Intelligence Research today.

Researchers will use seven Xerox workstation computers to study how doctors, engineers and business consultants use their reasoning abilities to solve problems.

Balakrishnan Chandrasekaran, director of the laboratory, said today's computers only know what a programmer puts into them and through artificial intelligence will be able to reason and tell why it came up with a solution.

He said eight to 10 researchers and graduate students will be working on projects in the laboratory.

"I think the last few years have seen a significant increase in our understanding how the human mind works, particularly how human intelligence works," Chandrasekaran said.

John Josephson, research associate of the department of computer and information science, said artificial intelligence research seeks to capture the principles of human reasoning in computer programs.

"The basic perspective is that (human) decision-making is a form of computation," Josephson said.

If this is true, he said, then it should be possible to program computers to make decisions in the same way.

Josephson said researchers interview experts in various fields to try to determine how they make decisions.

"Our approach is to analyze a complex reasoning task into more primitive components," Josephson said.

After breaking down the complex task, researchers then use its components to develop a computer program capable of accomplishing the complex task, he said.

"The reasoning processes involved in medical diagnosis are not unique to medicine," he said.

Josephson said they will break down these processes and model them into the computer.

He said the implications of computer-assisted planning are enormous. "What we are talking about is the ability to capture pieces of isolated expertise from human beings, load them into computers and make computer experts," Josephson said.

These programs could then be mass-produced and be made available as consultants, he said.

"I would expect in the near future that if you want a tax adviser that you will get a computer program," Josephson said.

Chandrasekaran said the laboratory equipment costs about $500,000.

The laboratory and projects are being supported by grants from the National Science Foundation, the National Institutes of Health, the Air Force Office of Scientific Research, the Defense Advanced Research Projects Agency and Battelle Memorial Institute.

The opening ceremonies today include a speech by Allen Newell of Carnegie-Mellon University at 4 p.m. in Hitchcock Hall 131.
Communications system to transfer computer data

Computer communications will be the subject of a joint research project between Ohio State and a private communications company as part of a special Ohio Department of Development program.

The Ohio State Department of Computer Information Science and Morningstar Technologies Inc. will receive $80,000 from the state's division of Technological Innovation, approved Wednesday.

The money will be used to develop a Data Communications System allowing transfer of data between computers, said Sharon Hastings, investment analyst for the Edison Program.

Kent Stevens of Morningstar said the system will allow computers to reach a different group of computers than reached in the past.
Computer chief hired for OSU; others sought

By David Lore
Dispatch Science Reporter

Ohio State University has a new computer chairman after a 30-month search, but the departure of Provost Diether Haenicke today could delay top appointments in biotechnology, mathematics and physical sciences.

The new chairman in the department of computer and information science is Mervin Muller, senior adviser and director of computer operations for the World Bank in Washington, D.C. He will take over the OSU chairmanship Sept. 1.

Because of intense competition for academic computer experts, a series of acting chairmen have guided the OSU department since its last chairman, Lee White, resigned in February 1983.

HAENICKE LEFT OSU after today's Board of Trustees meeting to become president of Western Michigan University at Kalamazoo, Mich.

A 14-member search committee headed by classics Chairman Charles Babcock has been appointed to find a successor. Francille Firebaugh is the acting provost.

Haenicke's departure has contributed to delays in filling other top jobs at OSU, campus officials say.

In the College of Mathematical and Physical Sciences, acting Dean John O. Riedl Jr. has agreed to stay on another year. Riedl, the associate dean, was temporarily put in charge after Dean Colin Bull retired last winter.

A FACULTY search committee last month recommended three candidates for the permanent job, but Haenicke's departure and the withdrawal of one of the candidates has postponed a decision until next year, Associate Provost Anne Pruitt said.

The vacancy in the provost's office also could affect the long-delayed appointment of a director for the proposed OSU Biotechnology Center.

Creation of the center and employment of an "internationally recognized scientist" as director was recommended by a faculty committee in April 1983. The job was offered to a Purdue University chemical engineer last fall, but when he questioned the terms, the offer was withdrawn.

A SECOND search committee decided to recruit molecular biologists for the post. Several finalists are being interviewed, according to Pruitt, but an appointment to the post is unlikely until a new provost is in place.

In the College of Nursing, Acting Dean Grayce M. Sills has agreed to stay on another year while a second search committee screens candidates for the permanent job.

Sills is the second acting dean since the school of nursing became a college in 1983. She said recruiting has been difficult because the Ohio Board of Regents hasn't approved a doctoral degree program in nursing at OSU.

"We're confident of getting approval, but until then it's like trying to sell a pig in a poke," Sills said.

WHEN NORMAL faculty recruiting techniques failed in computer science, the College of Engineering hired an executive search firm to find candidates. It came up with Muller, but Acting Chairman Anthony Petrareca says he still isn't sold on the use of such firms for departmental-level hiring.

Muller, he points out, has excellent credentials but was not recruited on a college campus.

"Most academicians just get turned off when they're contacted by people like that," Petrareca said. "The firm did very poorly in recruiting academic people."

But Sills said she is frequently approached by search firms representing other campuses.

"It seems to be a coming thing, but Ohio State just has not done that," she said.
CIS department receives new $3 million computer system

By Donna J. Shackle
Lantern staff writer

Students taking computer courses will find writing programs easier after the installation of a $3 million instructional computer system.

About 500 computer stations will be set up, with nearly 70 installed by this fall, said Anthony Petrarca, acting director of the Department of Computer and Information Science.

The first stations will be used primarily by faculty and graduate students so they can adjust their courses to the new system, but some would be used by students, he said.

"A section of CIS 201 will use the new computers in the fall, and in the winter a section of CIS 221 students will use the computers," Petrarca said. "We plan to have all CIS 221 students using the systems by spring."

The installation will begin this fall and continue over the next three years, he said.

Most of the new work stations will be Apple Macintosh computers. More sophisticated equipment will be available for advanced CIS students, he said.

"The Apple Macintosh computers were chosen because they are at the forefront of technology," he said. "They make it easy to spot syntax errors because they highlight the error as the line is written."

Identifying and correcting complicated errors will become easier and will reduce the time spent searching for and correcting mistakes, he said.

A sum of $700,000 will be spent in the first phase of the three-year plan, said Richard Wharton, administrative chief in the College of Engineering.

Most of the work stations now in use will remain, but the computers in Baker Systems and Hagerty Hall, using WIDJET, are being phased out, he said.
Software research grant will link OSU, business

A $91,000 grant will enable Ohio State and Morning Star Technologies Inc. to develop highly sophisticated software packages, beginning today.

Ohio State and Morning Star will be working together to develop software packages that make it easier for computers to communicate with one another, said Sandra Mamrak, associate professor of Computer and Information Science.

The State Controlling Board unanimously approved the funding Monday.

"Under the contract, the State Development Department provides the initial funds and the business; in this case Morning Star must then match that dollar amount," said Ken Leech, spokesman for the department.

Morning Star Technologies, a software engineering firm, has put up $96,440 dollars for the project, mostly in employee work time, said Karl Fox, technical vice president for Morning Star.

"The company benefits because of the exposure and the program helps foster the development of high-tech products," he said.

"The students involved may also increase their employment chances after graduation by working on a practical project such as this."
Artificial intelligence lab

The Department of Computer and Information Science has unveiled its new Laboratory for Artificial Intelligence Research.

The artificial intelligence (AI) laboratory is located in Caldwell Laboratory. It will be equipped with seven special Xerox LISP workstation computers for use by researchers and by graduate students studying the principles of knowledge-based reasoning—how knowledge of various types is used to solve problems.

“We’re one of the few labs in the country sophisticated enough to do this well,” says John Josephson, assistant director of the laboratory and post-doctoral researcher. He holds a Ph.D. in philosophy.

“We’re looking at the theory behind the ways experts make decisions and solve problems rather than just the technology involved.”

Balakrishnan Chandrasekaran, professor of computer and information science and director of the laboratory, says eight doctoral candidates in the department are specializing in artificial intelligence. In addition, he says several faculty, staff, and graduate students are engaged in joint programs within the colleges of medicine and engineering.

The goal of AI, says Josephson, is to discover the principles of intelligence that underlie human and machine reasoning and to devise computer programs that can embody these processes.

One of the focuses of AI research is the development of “expert systems,” computer programs that combine textbook facts with the judgment of experts in a given field. Such programs have potential problem-solving applications in dozens of fields, and several—in medical diagnostics and in financial planning, for example—are in limited use today.

Using a methodology known as knowledge engineering, AI researchers interview people working in a field to determine how they figure out problems they face in their work, such as how a physician diagnoses a patient’s illness. Then the researchers incorporate this decision-making into computer programs.

Josephson says the demand for such skills is tremendous.

“There are very few people who can do this well, and the opportunities for these knowledge engineers is wide open. Many large companies are opening their own artificial intelligence laboratories.”

Josephson points out that the human reasoning process is far more complex than the artificial intelligence that knowledge engineers now know how to design into computers.

The most exciting potential for AI, he adds, lies in the research opportunities for investigation of the nature of reasoning and intelligence.
CIS equipment switch to improve instruction

Specically-designed computer-supported classrooms may arrive at Ohio State within five years.

Department of Computer and Information Science administrators and faculty have a vision of classrooms equipped with a personal computer workstation for each student and his or her instructor. Personal computers (PCs) are individual units.

Using PCs to teach computing is not a new idea. However, CIS proposes to network, or link electronically, the workstations so students and professors can exchange information through them.

The approach using personal computers as workstations is different from using a mainframe computer with terminals. More capability is located at the student's desk and the network provides additional support to them.

"We'll have to create a new kind of classroom," says Mervin E. Muller, chairperson of the Department of Computer and Information Science. "We think this is the next innovation in teaching computing at Ohio State."

The undertaking, called the Interactive Instructional Computing Facility, began this year. A five-year, $4.6 million project is being funded by the University and the College of Engineering. A $300,000 grant from the Ohio Board of Regents already has been used to purchase some equipment.

"If we want to use personal computers as free standing machines, there's no problem," Muller says.

"But we have more ambitious plans (to link student and professor). We really want to provide more educational help to students. That's going to take more effort than saying, 'Here's a PC, go do your thing.'"

The effort involves design development, testing and evaluation of each step of the project.

The first phase of the program is to provide the networked personal computers, Apple Macintoshes, for introductory 100 and 200 level courses and UNIX-based workstations for upper level and graduate students.

In lower level classes, students study beginning programming, data processing for business and problem solving. Higher level students continue to learn about programming, computer languages, system design, analysis and how professionals use computers in industry.

Two pilot classes are being taught with Macintoshes this quarter. A third is to begin summer quarter. By September, if CIS tests and evaluations are favorable, there may be 20 sections, according to Muller.

The next step is to link the Macs, he adds.

With Macintoshes, students select from a menu, or list of tasks, which lessens the number of commands they have to learn.

"Macintoshes enhance the ease of learning because the students won't get all caught up in the mechanics of using computing, the ergonomics of it," says Muller.

Two UNIX pilot sections involving 80 students are expected to begin in January. By winter quarter 1988, CIS may have 1,500 students using the machines.

UNIX-based workstations are connected to what's called a "file server." The file server provides a central storage service for instructional programs and data.

By the time IICF is completed, professors can leave their lesson plans on the file server so all students have to do is turn on their machines and ask for instructions.

"Mainframes rarely provide the support we expect from the IICF approach," Muller says.

The second phase of IICF involves letting students and professors interact through their machines.

Eventually, "we can imagine that the student who needs help can leave messages for the faculty member or actually exchange information with the faculty member or graduate assistant," Muller says.

UNIX-based workstations are more flexible and can allow professors to alter their instructions and receive feedback from students, both through the computers, Muller adds.

The Instruction and Research Computer Center provides facilities management for IICF.
New requirement for CIS admission

By B.P. Borgert
Lantern staff writer

Students interested in majoring in Computer and Information Science (CIS) will find being admitted into the department easier this quarter than it has been the past four years.

The CIS department lowered its admission standards from a 2.8 grade point average to a 2.6 grade point average, effective this quarter.

William F. Ogden, associate professor of computer and information science, said the 2.8 grade point requirement was instituted in the spring of 1983 because of a dramatic increase in enrollment coupled with a decrease in faculty.

Ogden said in the early 1980s, the field of computer science became very popular among students. The enrollment skyrocketed from approximately 500 to nearly 2,000 prior to the enrollment management program.

"We simply did not have the faculty to teach that many students," Ogden said. "The department was faced with having a mediocre program or precluding some students from being in the CIS program."

A major problem in the department of computer science is hiring and retaining enough qualified faculty to meet the growing number of students wishing to become CIS majors.

Ogden said recruiting CIS faculty is a difficult process because private industry and universities are vying for a limited number of graduating doctorates each year. Many of these doctorates opt for industry because of higher salaries, and less bureaucratic systems.

"There are approximately 200 Ph.D.'s graduating a year throughout the United States and private industry is taking at least half of those away from academia," Ogden said. "This created a massive demand for qualified instructors across the country, which in turn has made recruiting a nightmare."

However, the CIS department has steadily increased its faculty the past three years from 24 to 30, which led to the decrease in the admission standards.

As of fall quarter 1986, there were approximately 1,000 students in the CIS program.

Howard Harris, a junior planning to major in computer and information science, said "this is welcome news to me. It looks like this is something that is going to help me get into the department."

Harris said that the 2.6 grade point is a realistic and needed requirement in such a competitive field.

"I think it is a good idea to have a minimum requirement for admissions. The 2.6 grade point is reasonable and it provides an incentive to work hard and make the grades."

Andrea Posner, CIS coordinator of academic advisement, said there are three colleges at Ohio State that offer undergraduate degree programs in computer and information science: the College of Engineering, the College of Arts and Science and the College of Business. Only the College of Engineering and the College of Arts and Science are affected by the 2.6 grade point requirement for formal acceptance into the department.

Posner said the College of Business requires a cumulative grade point 2.0 or better for acceptance.

Students in the College of Business generally take fewer upper-level computer science classes, which are where the enrollment controls are needed, she said.
Role of humans stressed

By David Lore
Dispatch Science Reporter

An 80-year-old computer whiz kid told Ohio State University students yesterday that machines do not count nearly as much as people.

"The future of computers won't go anywhere unless we have trained people," retired Rear Adm. Grace M. Hopper said. The future, she said, depends not as much on microchips as it does on the human qualities of enterprise and leadership.

HOPPER, WHO retired from the Naval Data Automation Command in August, came to OSU to help celebrate the 20th anniversary of the OSU Department of Computer and Information Sciences.

Mark, she said, was her first love.

The Mark I, an 8-by-8-foot supercomputer, opened her eyes as it opened the computer age in 1944, she said. "I took one look at the beast, and I knew it was the biggest gadget I'd ever seen, and I've always loved a good gadget. So I knew I had to learn how it worked."

The pioneer computer changed her life forever. The then 38-year-old mathematics professor at Vassar College in Poughkeepsie, N.Y., became, as she proudly said, "the third programmer on the first computer in the United States."

Over the next four decades, she circulated through business, academia and the military, always trying to find new ways to get people excited about new machines.

SHE STILL lectures across the country as a consultant for Digital Equipment. Yesterday was typical. Unescorted, she flew...
Retired Rear Adm. Grace M. Hopper talks with students at OSU

from Washington to Columbus to be confronted by an overflow crowd of hundreds of students in Hitchcock Hall Auditorium. Calmly, Hopper helped them find room on the stage, delivered a hourlong speech, and took another hour to chat with Navy cadets, sign autographs and give interviews to the media.

Then, at 6 p.m., she headed to Port Columbus to fly home for a Pentagon lecture today.

Be eager for change and never be satisfied with the accepted or the routine, she urged her audience.

She also advised her listeners to know their machines but not to be used by them.

"No computer will ever ask a new, reasonable, intelligent question," she said. "That's up to human beings."

The trouble today is too many people are acting like robots at a time when the country needs leadership, she said. "I don't know how we lost it, but somewhere after World War II we went overboard on management and lost sight of leadership."

HOPPER commented on a variety of other subjects:
- President Reagan: "I think he's terrific; I'm a big fan of his."
- Lt. Col. Oliver North: "I think he's protecting his superiors. I think he's been used. Those people in Washington know how to pick on the military."
- Future shock: "I don't understand what all the alarm is about change. There's always been change since the day I was born."
- Number shock: "I didn't know what a billion was, and (today) I don't think most of the men up on the hill in Washington do either."

IF YOU want to succeed, do something, even if it makes people mad or nervous, she said. "If it's a good idea, and if you've walked all around it, go ahead and do it. It's much easier to apologize than to get permission."
Computer pioneer supports change

By Martin Malley
Lantern staff writer

The third programmer for the first computer in the United States, retired Rear Adm. Grace Hopper, spoke to a packed auditorium in Hitchcock Hall Thursday afternoon.

The lecture was part of a distinguished lecture series sponsored by the Department of Computer and Information Science, which is celebrating its 20th year anniversary.

Hopper, born in New York City in 1906, was the first woman to achieve the rank of admiral. She retired from the U.S. Navy in August, 1986 and is now a consultant for the Digital Equipment Corporation.

People are allergic to change, she said. “I can remember the days when people wouldn’t buy refrigerators because the only way to keep lettuce was on ice.”

Then people who say, “but we’ve always done it that way,” are the most dangerous, Hopper said.

One piece of advice Hopper gave was, if an idea is a good one, and you’ve walked all the way around it, do it. It is easier to apologize later than to get permission before, she said.

The first large scale digital computer in the United States, the Mark I, was 31 feet long, 31 feet high and eight feet wide, she said.

Computers have advanced so much that insurance companies carry policies on their data base, Hopper said, but the value of computerized information has not been determined.

Some information is good forever, some is good for a day and some is never good, she said.

The biggest problem with computers in the United States is loading all the data on one computer, she said. Because people could only afford one computer, they jammed in everything.

When a farmer had to move a big log, and one ox could not pull it, he did not try to grow a bigger ox, he just got another one, Hopper said.

Companies need to put different data bases on different computers, she said.

The biggest innovation in computers will be optical computers, she said. Computers that will run on photons instead of electrons.

Optical cables are already being used in phone lines.

These computers will be safe from an electromagnetic pulse generated by a nuclear explosion, she said.

After World War II, management teams were used to make most business decisions. Now a change is needed, Hopper said. The thing the country needs most today is strong leadership in business and in government.

You manage things, Hopper said, you lead people.
Hopper says information needs order

By Toni Robino

Without guidelines to determine what information is important in today's glut, we may be missing things that could have an impact on tomorrow's world, according to Grace Hopper.

Hopper, an 81-year-old retired rear admiral in the U.S. Navy, spoke Feb. 5 to a packed auditorium in Hitchcock Hall on the "Future of Computers, Hardware, Software and People." The program was sponsored by the College of Engineering.

Hopper learned to program the first large-scale digital computer, Mark I, in the 1940s and she remains an expert in the computer field, now working as a consultant for Digital Equipment Corporation.

"We spent the last 40 years talking about the tools. We've had endless seminars on the hardware, software, communications and training, but we've never critically looked at our data," said Hopper.

"Some information's good only overnight, some of it's good for a thousand years, and yet we have failed to define the criteria for the value of information."

She cited an article in Computer World magazine that said that some day corporate balance sheets will list information as an asset and give it a dollar value.

"I keep being told that I live in a world of change and that change is something very bad. I also keep getting told that I live in a world of information and that information is power," said Hopper.

Information, however, only is powerful if it can be used effectively to keep things running smoothly, improve things, or help things to move forward. Often, that means change, she said.

"Change has always been here. The one thing that's dangerous is those people who say, 'But we've always done it that way,'" says Hopper. Lack of new information can lead people to rely on the old, perhaps not as effective methods to accomplish tasks.

"For example, I can remember the days when people wouldn't buy refrigerators. The only way to keep lettuce fresh was on ice," she said. That was the way it was always done.

In addition to not assessing the value of accurate information, Hopper said society has not calculated the cost of inaccurate information.

"It's (information) a whole research field that we haven't touched that we need to do something about," she said.
Computer
and
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project is completed, it will enable students and faculty to focus more on intellectual tasks, and provide data management and other capabilities needed to enhance teaching, learning, and student-professor and student-student interaction.

Muller says CIS graduates can find jobs anywhere. In fact, he is concerned that some of the best students are too easily wooed away from graduate school into the work force, limiting their long-term professional development, and incidentally, making it harder for universities to find top-quality faculty.

The department recently added five new professors, specialists in such areas as parallel processing, communication networks, programming methodologies, artificial intelligence, and computational linguistics.

"Industry support of research is growing, but isn't necessarily keeping pace with the speed of expansion in the field," says Muller. The department performed $5.1 million in sponsored research this year, a $2 million increase over the year before.

Research in the department continues into the main areas of artificial intelligence, computer networking, and computer graphics. Researchers are also investigating PADRE, or paralleled and distributed research environment. It is a plan aimed at improving computer performance on real-world applications through the use of multiprocessors.

Muller
Departments receive grants to fund special projects, expand programs

By Yolanda L. Gonzalez
Staff Writer

Ohio State University received $45,000 in grants, Wednesday to use for special projects in the departments of Computer Information Science and Electrical Engineering.

The two AT&T Foundation Special Purpose Grants were presented by Jack Degan, campus executive director of AT&T, to Dr. Heinz C. Ko, chairman of the Department of Electrical Engineering and to Professor Merlin E. Muller, chairman of the Department of Computer and Information Science.

Computer and Information Science received $20,000, which is to be used to buy a large-scale color projector. This machine will display computer output of an instructional engineering workstation, a computer more powerful than the personal computer and smaller than the powerful computers.

"The projector will allow the instructor to show a whole class the output of the workstation," Muller said.

He said this tool, which will be use in the department's courses, will be a demonstration for other departments about how this new technology can be used to improve teaching.

Muller said he hopes this grant will help the department to catch up with AT&T's instructional program.

AT&T has a training program inside the company where they are using their own technology to teach employees.

The $25,000 received by the Department of Electrical Engineering will allow them to get more engineering workstations to promote research and teaching in the areas of Device Modeling, Circuit Design, and Electronical and Optical Computer Architecture.

"These computers will be more productive. It will help students to do research in a more efficient and productive way," said Ko.

Both departments presented a proposal to the campus management of the AT&T program, which were then submitted to the AT&T Foundation in order to compete for the grants.
Cuts in doctoral programs may save money

By Mark Gates
Lantern staff writer

The Ohio Board of Regents, the group responsible for the distribution of funds to state universities, hopes to save up to $2 million annually, mainly by cutting back doctoral programs.

The first three of nine doctoral programs were reviewed by the Committee of State Investment in Graduate and Professional Education. The three programs chosen were computer science, psychology and history.

The six fields that remain to be reviewed are English, education administration, chemistry, biological/biomedical sciences, physics and business.

According to the Board of Regents, the investment committee selected these disciplines because it suspected a mismatch between Ohio’s need for doctoral programs and its investment in them.

Separate external panels were established to review each discipline. Their recommendations will be the basis of the regents’ decisions.

The review was spawned by Ohio Gov. George Voinovich and the Ohio General Assembly in the last budget bill.

“The regents do have the authority to withdraw funds,” said Linda Ogden, communications administrator for the regents, “but the final decision to eliminate or alter programs is up to the universities.”

“The goal of the review process is causing the redirection of funding from areas of low priority to areas of high priority,” said E. Garrison Walters, vice chancellor for academic affairs and access.

“Doctoral programs in history were the most affected of the three reviewed areas.”

The Committee on State Investment found that, in general, the supply of doctoral programs in history significantly exceeds the demand for graduates, Walters said.

In addition, the external panel in charge of reviewing the history programs found there is no local or regional need for doctoral programs in history. Walters said the panel doesn’t expect this situation to change in the long or short term.

For OSU, the regents endorsed a recommendation to continue support for a comprehensive history program, but one that is significantly smaller, Walters said.

OSU’s history department was ready for this decision and had already had started to work toward the goal of downsizing its program, said Kermit Hall, dean of OSU’s college of humanities, of which the history department is a part.

“The leadership of the department has recognized that a smaller program is necessary. We need to use our resources more wisely in reaction to the market place,” Hall said.

At Ohio University, the regents want a more narrowly-focused program in contemporary history, Walters said.

The external panel reviewing the history programs suggested that all funding for the six other state funded programs be eliminated, he said.

“The regents have not yet decided to adopt the recommendations for the six programs. Any action on them has been deferred until Dec. 1, when a special session of the board will be held.”

Computer science, with departments at OSU, the University of Cincinnati, Kent State, and Wright State, was the second most affected program of the three reviewed recently, but it was affected positively.

“The respective external panel suggested and the regents agreed that although university research productivity is lacking, greater emphasis and possibly more funding needs to be initiated in computer science for the sake of the state’s economic future, Walters said.”

In the area of psychology, a panel noted that the job market for people with doctorate degrees is very large and diversified, Walters said.

Subsidies will be continued for the nine programs at the University of Akron, Bowling Green, the University of Cincinnati, Kent State, Miami, Ohio University, the University of Toledo and Wright State.

Ohio’s General Assembly has appropriated $1.5 million in incentives to universities to voluntarily withdraw programs found unnecessary.

“The decision to voluntarily withdraw an academic program is never easy,” Hairston said. “It involves making some difficult choices.”

The reviewing process is in progress for the remaining six fields. Recommendations for five or all six of them will be presented in February, Ogden said.

The regents also will review state funded law and engineering programs by a separate but parallel process, Ogden said.