I. GROUP NARRATIVES

Following are brief narratives describing the automation needs of each organization included in the 1990 Task Force Study. Using the list below, identify the group to which your organization belongs (e.g. the Computer Services group includes Computer Services staff, the Computer Center, machine room, etc.), and then turn to the appropriate narrative (arranged alphabetically by group name). Because of the college's recent reorganization, some offices are now in different groups, but the data remains equally valid. Find your office according to the old organization.

Affirmative Action

Athletics and Recreation Group
      Athletics
      Director's Office
      Leisure Ed
      Recreation

Auxiliary Services Group
      Bookstore
      Conferences
      Director's Office
      Food Service
      Housing
      Housing Maintenance
      Security

Budget Office

Campus Planning

College Relations Group
      Assoc Director/Alumni/Development
      Director's Office
      Grants
      Graphics
      Information Services
      Institutional/Market Research

Computer Services Group
      Computer Center
      Machine Room
      Residence Halls
      Staff

Controller Group
      Accounts Payable
      Auxilliary Enterprises
      Cashier
      Controller's Office
      General Accounting
      Payroll
      Purchasing

Student Accounts

Cooperative Education

Deans Group
      Communications Building Support
      Deans' Office
      Faculty
      Lab Building Support
      Program Secretaries
      Residence Halls-Student
      Tacoma
      Vancouver

Educational Support Group
      Director's Office
      KEY Special Services
      Learning Resource Center
      SPLU Lab
      Third World Services
      Upward Bound

Employee Relations

Facilities Group
      Building and Grounds Maintenance
      Central Repair
      Central Services
      Custodial Services
      Director's Office
      Energy Management

Institute for Public Policy

Internal Auditor

Library Group
      Administrative Services
      Media Services
      Technical Services
      User Services

President's Group
      President's Office

Student and Enrollment Services Group
      Academic Advising
      Admissions
      Career Planning and Placement
      Counseling Services
      Director's Office
      Financial Aid
      Health Service
      Registrar
      Student Activities

Athletics_and_Recreation_Group

This is a very interesting area because they were one of the first
areas to try to computerize their operations. Although not completely
successful at automating, the staff remains enthusiastic about the
concept and want to be fully involved in anything to do with computers
and automation. This area has special needs for managing its Leisure
Education Program (registration, production of mailing lists and class
lists), its equipment checkout (they would like a system similar to
Media Loan and Lab Stores), and scheduling of recreation and athletic
events. They also need on-line access to several systems including the
student database, room scheduling and Health Services. The number of
terminals in this area is based on the new gym being approved and built
by 1990.

Auxiliary_Services_Group

The most noticeable thing about this entire group is the need for
administrative systems. The approach being taken is to look for fully
developed systems on micro's. These systems will probably work well
when maintained by an outside interested party (Bookstore).
Maintenance of other micro systems is not apt to work so well -- may
even prove to be an impossible situation. Office automation is almost
a secondary issue, although the area could benefit more than most from
electronic mail due to their geographic dispersion.

Security and the Bookstore could use off-campus data communications.
Security needs access to the State Department of Licensing, National
Crime Net and Washington State Crime Net. The crime net access is
dependent on Security getting police department status. The Bookstore
could use wide area electronic mail to communicate with some vendors.

Several areas could benefit if room scheduling could be read by
multiple users--especially Conferences and Housing Maintenance.

There is a striking similarity between the system needs of Housing
Maintenance and Facilities. Both areas have several large inventories
to control, and both areas need frequency of repair tracking. Some
joint effort might be productive.

Housing management has an interesting mix of problems. For some
categories there is a total lack of automation. Where automation does
exist, there are some notable deficiencies in meeting the unique needs
of Housing. Functions that have no automated help include student
billing calculation, room maintenance history, room inventory and room
assignment. System deficiencies include inaccurate accruals in the
accounting system, no refused admission data from student records and
fund holds generating invalid overdue notices/charges from student
accounts. All of these problems are compounded by the large
turnover/room changes each quarter. Housing tracks approximately 580
beds.

Budget Office

The budget office has had an IBM PC for over a year and makes heavy use of word processing and spread sheets. With office automation one would expect some transfer of these functions to a mainframe to take advantage of the easy communications. On-line data entry for Position Control/Form B is the principal custom need at this time. One would expect on-line access to OFM databases to be of growing importance in coming years.

Campus Planning

Basic office automation is the only requirement here. Computer aided drafting is of interest but is thought to be too expensive for the probable amount of use. Training in the use of terminals has often been mentioned as a campus-wide need and was mentioned once again here.

College Relations Group

College Relations is heavily involved with word processing. One of their major products is college publications. The two CPT word processing systems are heavily used and have been very successful additions to their resources. Institutional Research also is using Miniword successfully and the Compugraphics typesetter in Graphics is working well.

Alumi/Development - the major function of this office is fund raising. Record keeping for Alumni and Donor information is an important function as well as access to the student database. Personalized fund raising letters produced via the CPT are an important product. The current Alumni/Development system is being converted from a batch system to an on-line system and is being integrated with the student database.

Grants - access to word processing equipment is a critical need of this area.

Graphics - this office has primary reponsibility for the final preparation of high quality publications for the college. The Compugraphics typesetter is a sophisticated microcomputer system with communications capability and specialized software. An additional Compugraphics workstation is a high priority for this area.

Information Services - this office is heavily oriented toward word processing. They are currently using communications between the CPT and the Compugraphic extensively. They would like to communicate news releases to newspapers and other media.

Institutional Research - this area performs a variety of research tasks for the college and is heavily involved in the enrollment planning. Need for accessing the student database is extensive. A system based on a microcomputer such as the IBM PCXT would provide the office the resources to do studies that are currently difficult to do on the HP 3000. Some specific needs are: graphics, downloading segments of the student database, software such as SPSS/PC, and spreadsheet capability.

Computer Services Group

Computer Center - with increasing numbers of students and faculty wanting access to the academic computer from their own homes and offices, there will be considerable interest in increasing the percentage of ports dedicated to outside lines. With an upgrade to 96 ports, no more than 60 terminals might actually be in the Computer Center. These would be used almost exclusively on the academic computer.

Residence Halls - this title covers two categories of use. The first is 45 microcomputers provided by the college for the use of students in the dorms, mods, and perhaps ASH. These would be primarily for non-programming "homework": word processing, spreadsheet, and database applications, plus access to library circulation, catalog information, and events scheduling.

The second category represents an estimate of how many students, in the residence halls and elsewhere, might, by 1990, own their own microcomputers. The estimate is 500. These users would be in the same position as the high-use faculty, wanting terminal emulation, but presumably for access to fewer on-campus systems.

Staff - this area has developed an appreciation for office automation tools through using electronic mail and word processing on the Data General's CEO office automation system. It also needs programming and analysis tools to support whatever system it's working on. This area will grow in staff to support new data processing systems development and an expanded student body.

Controller's Group

The Controller's area needs the expected collection of office automation tools--electronic mail, word processing and spreadsheets-- especially spreadsheets. There is also a need to upgrade our off-campus data communications capability to serve several functional areas within the Controller's office--as well as other campus offices.

The State Department of General Administration is developing purchasing-oriented databases that are likely to be indispensable for future work. This database will be located at Service Center #1.

The payroll system has been run off campus at the Community College Computing Center (Redmond, WA) for some time. The terminals in the payroll office are dedicated to payroll alone. What would be new is allowing the payroll office to access local office automation utilities with the same terminals used for payroll. That entails some arm wrestling with the WCCCC system about the need for a protocol converter at their end. The unexpected implication of this is that access to a

components of these applications are run off campus, new communications equipment will be needed. The communications requirements for heavy use of off-campus computer centers will all have similarities to those already described for the payroll system -- multi-use terminals, PBX (Micom) for computer/multiplexor/communications controller selection and leased high speed lines to the target computer center(s).

Most of the college's financial systems have data interfaces with state regulatory agencies and especially with OFM and the State Treasurer. The data interfaces and other processes must often be changed because of new laws and regulations from both the state and federal level. The rate of change is not expected to lessen. At the present time, the data is sent to the regulatory agencies on tape. Evergreen gets feedback from the regulators on paper--at present.

Student Accounts - they will need two additional terminals, one for the manager of the area and the other would be a second terminal for the NDSL area.

THE NDSL staff has asked for an interface to the United Accounting Services. Initially, it would be no more than a line to UAS's computer system. In the future there may be a need to develop a more sophisticated interface between UAS and the student accounting system.

Student Accounts has a history of being in a state of continual change. There is no indication that the future will be any different. Therefore, Computer Services should be prepared to respond to those requests in a timely manner.

Cooperative Education

Cooperative Education has been expecting an automated system for student internships for several years now and still has hope for the development of one. In addition, they need complex word processing capability plus database management tools to manage their "internship bank." Electronic mail is very important to this office because of its physical distance from the main college administration and faculty. This area now has an IBM PC and is doing basic word processing.

Deans Group

Communications Building Support - this area has need for office automation tools such as word processing, electronic mail and calendar-keeping as well as special microcomputer applications to support theatre productions--light plotting, show lighting, project management, ticket printing, and self-designed graphics for show brochures. It is also desirable to be able to schedule Communications Building room resources through the central room scheduling system. General inventory is a big need because this area stocks costumes, costume materials, scene building materials and musical instruments.

Deans Office - this group includes the four academic deans and their immediate clerical support, plus the Assistant Director of Graduate Programs and the Adult Learning Coordinator. Word processing/ electronic mail and access to student records are very high on their list of important applications. Their present Syntrex word processor is used all day. They want to develop a faculty database

which would include many elements about each faculty member such as teaching history, payroll information, name and address to be used to produce various reports.

Faculty - there are no doubts in the minds of faculty presently using computers that the number one faculty priorities are word processing, communications and electronic mail, three distinct applications that are all in fact one for them. They want to be able to write evaluations and send them electronically to their program secretaries for editing and formatting for the official forms. They want to be able to send text files to the print shop. The faculty stressed the importance of having printers available for their use in their own office areas, that is that printers in their areas would not be only for their program secretaries.

Faculty appear to fall into two groups: one, active users who already or who will in the next year or two, own their own microcomputers, and two, other users who may never own their own micros but who will eventually tie into the system primarily for some word processing and electronic mail. Wide variation exists within a general trend towards greater and greater recognition of the value and use of the machines in a variety of disciplines as well as for word processing and electronic mail. The more active users include those who will want access to the academic computer for programming or other instructional purposes such as common databases.

The members of the first group are already active with their own micros and stress need for significant priority on terminal emulation to enable their own micros--of many manufacturers and operating systems-- to act as terminals for sending text files to program secretaries and accessing the academic computer, as well as ultimately being part of a campus-wide electronic mail system.

Lab Building Support - this is a complex area with many different needs. It contains the Lab Stores, woodshop and metalshop, all of which carry equipment and materials inventories that need a better method of organization. Preventive maintenance scheduling for scientific and other equipment is also needed. This area orders all academic supplies and would like on-line purchase order capability plus tracking capability to see how their P.O.'s are doing in the system. Because the staff is located throughout two buildings, electronic mail as a means of communication is also important. The INTEL and IBM AT microcomputers are part of this area and will require an additional staff person for programming and support of this equipment.

Program Secretaries - Increasing our student enrollment to 3,000 by 1990 would necessitate the opening of another building for faculty (the seminar building) and hiring new program secretaries. Because of their widely-spread physical locations of the secretaries and administrative services, the program secretaries can use several tools to make their days more productive--complex word processing, electronic mail with document transfer capability and on-line access to student records. Clearly, an electronic-based evaluation system coupled with automated equipment would liberate the program secretaries from the current inefficient use of their skill and time.

Residence Halls - this title covers two categories of use. The first is 45 microcomputers to be provided by the college for the use of students in the dorms, mods, and perhaps ASH. These would be primarily for non-programming "homework": word processing, spreadsheet, and database applications, plus access to library circulation, catalog information, and events scheduling.

The second category represents an estimate of how many students, in the residence halls and elsewhere, might, by 1990, own their own microcomputers. The estimate is 500. These users would be in the same position as the high-use faculty, wanting terminal emulation, but presumably for access to fewer on-campus systems.

Tacoma - the present administration in Tacoma does not have a high interest in office automation, but the advantage, especially of electronic mail to the main campus, seems striking. Terminals in Tacoma would also work to equalize access to student records and provide improved library support through on-line access to circulation, catalog and information search facilities. At this time, Tacoma does not type its own evaluations of students and office automation would presumably make this possible.

The primary interest of Tacoma is in a ten-to-twelve station microcomputer laboratory for teaching programming and training, and for homework in word processing, spreadsheet and database programs. They would not expect to have these terminals communicate with the Olympia campus.

Vancouver - the Vancouver campus is expected to grow to 250 students by 1990 and will develop a management program that will be heavily computer oriented. A new facility is currently under construction that will have extensive computer facilities. These facilities will be used jointly by Evergreen and Clark College.

In the administrative area the program secretary needs access to the student database for program lists and the current status of the Vancouver students. Electronic mail would be very useful for communication with the main campus.

The Faculty of TESC's Tacoma campus need most of the resources that are required for faculty on the main campus. Access to electronic mail, library search and word processing would be useful.

Educational_Support_Group

This area now has an IBM PC on which to do word processing and other small database applications with Framework software. Because of their physical separation, both within a building and among other buildings, electronic mail is another very important productivity tool. On-line access to student records is needed, as are enhancements to the student database to include information on TESC students in KEY and other programs/groups involved with ESP. This area will add staff in several programs to serve the increased student enrollment.

Employee_Relations

This office could benefit greatly from word processing equipment. They are currently using Computer Services word processing services.

A second area of need is a more integrated Payroll/Personnel system.
They are currently maintaining personnel history information, employee
names and addresses, and affirmative action statistics on a batch
system run at WDPSC. This involves duplicate coding of the documents.
This office should explore moving personnel database to the Community
College Payroll/Personnel system and accessing the information via
terminals even though it may be more costly and may not provide the
information in the format to which they have become accustomed.

Facilities Group

This office has identified four major applications for implementation:

    1) Supply Inventory
    2) Service order/cost accounting
    3) Preventive maintenance
    4) Purchasing.

Each of these systems would involve multiple users. The four systems
would have to be integrated to some extent.

There is a need for several small, single-user database systems.
Vehicle billing and trip summary are examples of such systems.

Communications within Facilities and with other departments will be a
challenge. This is due to their size and distribution of their
personnel.

There is a need for an expansion of the existing scheduling system.
Currently, only a single staff person has access to the data on line.
The managers of the communications building and the lab building would
like to be able to schedule the space assigned to them. Conference
scheduling would be facilitated by the staffs being able to access the
scheduling information on line.

Institute for Public Policy

This office has enjoyed the use of an IBM PC for about a year for heavy
word processing and some spreadsheet applications. Their need for
complex word processing capability continues as the main application.
They interact very little with other TESC offices (except the Provost)
so their use of electronic mail on campus may not be extensive. They
have need to contact outside agencies (Legislature) and search services
(Library Search) to gather information for their many reports and
publications. No staff growth is foreseen in this office.

Internal Auditor

This office would be one of the heaviest users of word processing,
spreadsheets and databases on campus. This projection is made with some
assurance since the auditor currently uses a PCXT at her home. The
auditor wants access to all on-line systems at Evergreen. To meet such
a need would require extensive training in addition to making the
hardware available.

Library Group

This is a vast area. It now has an on-line circulation system called ALIS, built on the Washington Library Network (WLN), and which links together Evergreen, the Washington State Library and the six-county Timberline Regional Library system. This consortium has its own agenda for computerization and expansion apart from the college's. The developer of the circulation system, Data Phase, is working on a second stage which will provide for an on-line catalog which may--or may not --be the source of the Library's long-dreamed of on-line catalog.

It is already possible to provide on-line access from all over campus to information about whether a given book is in the system and if so, whether it has been checked out or not. The reference desk now has this capacity with user privacy protected by security codes that prevent access to information on specific borrowers. Only the circulation desk itself has this information. The on-line catalog would access basically the same database with cross-references by subject.

Computerized library services are, for better or worse, expanding at a rapid rate throughout the country. Basic reference sources are abandoning printed formats for on-line information. DIALOG, owned by Lockheed Corporation, is the best known example. Access to the catalog and circulation data from all over campus and reference information from certain academic offices is much desired.

While the library at this time has few terminals or microcomputers, it is very interested in obtaining many more not only for improved access to the on-line sources indicated above, but also for keeping track of physical materials in media services, media loan, reference and other locations.

It is important that library services be extended as effectively and efficiently as possible to the satellite campuses in Vancouver and Tacoma, again through on-line communications networking.

President's Group

This area plans a physical consolidation to include Affirmative Action and the Assistant to the President. A skilled typist would serve the whole area, freeing other employees and especially Affirmative Action, which has no clerical employee, for higher level responsibilities. Affirmative Action is especially plagued by lack of access to personnel and student data which currently must be compiled into reports, by hand, from printed copy. This area has a large number of documents typed in draft and then retyped by a secretary.

Student and Enrollment Services Group

This group has been the focus of systems development during the past three years with the development of the student database. The student database has been developed to serve the majority of Student Services' needs. The most critical need of this area is additional terminals to access the database and additional computer resources to maintain acceptable response times. Most of the areas also have need for word processing capability.

Academic Advising - word processing capability is highly desirable for this area since they are continuously preparing written advising information. On-line access to students' academic history is also useful.

Admissions - access to word processing from several work stations is the highest priority for Admissions. Additional work stations to access admissions information is also important. The Xerox memory typewriter must be replaced with a word processing work station.

Career Planning and Placement - a new system is being developed for this area in conjunction with the development of the Alumni/Development system. Provisions for storing data on employment and graduate school history are the needed enhancements to the system.

Counseling Services - the systems needs of this area are similar to the needs of Health Services. Access to student records is important as well as maintaining client records. A PC is attractive for client records because of the confidential nature of the records.

Financial Aid - a new on-line Financial Aid system has been implemented recently. This system satisfied the basic needs, but could be enhanced to be more comprehensive when dealing with requests for missing information. Word processing capability is also an important need.

Health Services - this area does not currently have access to the student database but needs to verify that students are currently registered. This is done via phone or from reports. Health Services performs all of the services of a small medical clinic and needs systems to do the following: medical records, pharmacy, inventory, billing and accounting. Access to student records and student accounting via terminal are critical needs. A medical records system on a PC could probably satisfy their unique internal systems needs.

Registrar - additional terminals and improved response time are the two most important issues. In the long range, an improvement in the way evaluations and transcripts are prepared is the major issue.

Student Activities - forty-five separate organizations plus KAOS and the CPJ, which report directly to the Dean of Enrollment Services, make up the Student Activities area. Budget issues, from keeping track of 45 different budgets to KAOS and CPJ mailings/billings highlight this area's needs. Many hours are also devoted to walking to different offices, from Facilities to the Communications Building to College Relations, to complete arrangements for events. On-line access to events scheduling and room information would help greatly. Because students are more often out of their student offices than in them, message leaving, taking, and picking up can be chaotic. This is especially true in KAOS where 140 volunteers work and must know what is going on.

Vice President/Business Group

This area is not presently a high volume user area and indicates no strong need for office automation. It would benefit from being part of an electronic mail and calendaring system but would not in itself justify their institution. The principal beneficiary of a network

tie-in would be the administrative assistant who has a regular daily need for access to student records, payroll and personnel information and the budget/accounting system.

Vice President/Provost Group

This area could well use a skilled typist to free the secretary for many other duties. If it could not have one for itself alone, the office could share one, which would also eliminate the need for redundant labor in Computer Services' Central Word Processing. The administrative assistant researches and drafts a large amount of documents re-typed now by the secretary. This area copies and hand delivers a large number of documents which could be sent electronically.

II.   ALL-CAMPUS DATABASES/APPLICATIONS

In addition to the specialized databases and applications to be used
only in certain offices on campus, the Task Force has identified a
number of others which could and should be made available campus-wide
or nearly campus-wide, from all locations, student, staff, and
faculty.   These include both static documents, which contain
information which changes less often than once a week but often enough
to merit on-line access or which is significantly more accessible for
being on-line, and dynamic databases, whose contents changes frequently
or whose complexity is so great that on-line access greatly increases
the database's useability.

Proposed Static Documents Include:

Application/Database	Office Responsible for Up-Dating
Schedules of Building Hours	Facilities
Evergreen Administrative Code	General Accounting
Faculty Profiles	Academic Advising
Grant Opportunities	Development
Job Openings	Personnel
Training Opportunities	Personnel
Valid Account Codes	General Accounting

More significant in their likely impact on the campus are dynamic
databases and applications including an on-line Student Directory
maintained as part of the Student Database already existing, a similar
Faculty/Staff Directory, and most significantly, an on-line Library
Catalog/Circulation system and an on-line Campus Events/Happenings
system.

Of all of the above static and dynamic databases and applications, only
the database for the Student Directory now exists, in the Registrar's
records.   With it, as with the Faculty/Staff Directory, the campus
could have up-to-date information on telephone numbers, addresses, and
mail stops.

The Library Catalog/Circulation system would enable students, staff,
and faculty to search the college's library catalog, (including the
entire regional library system), for books, and to know where the book
was located and whether it was in or checked out.   A full on-line
system would enable cross-referencing by subject, author, and title
just as provided now on traditional catalogs; but much faster and
without having to be physically present in the library itself.

For both future planning and current information, hardly an office on
campus and almost no member of the community does not at some time and
often frequently want to know what is going on when and where.
Happenings provides information on events once they have been
scheduled. It does not provide information for more than a week ahead,
is limited by its paper medium, and still leaves planners ignorant of
potential conflicts when many events must be planned months or more in
advance.

III. SUMMARY REPORTS

Included in this section are two reports which summarize information
from the full statistical reports produced by the Task Force. Report
Number 1 summarizes the number of terminals currently being used and
projected to be used by each group, plus the number of associated usage
hours. Report Number 2 summarizes the applications currently being
used and projected to be used by each group, plus the number of
associated usage hours for each application. These figures reflect the
scope and functionality of an all-campus system.

To locate individual groups on the reports, use the following Group
Code Definition list. Find the group name (the list is arranged
alphabetically) and then the code number to the right of the group
name; e.g., the College Relations group is number 5. The reports are
organized numerically by code number (in ascending order). Note that
the decimal points are omitted on the reports.

Fuller definitions of the applications on Report Number 2 can be found
in Appendix B, Application Definitions. Appendix B is organized by the
major headings: (1) CF - Mainframe/Custom Software; (2) UF -
Mainframe/Utility Software; (3) DF - Mainframe/Information Database;
(4) CM - Micro/Custom Software; and (5) UM - Micro/Utility Software.
The definitions are listed numerically and alphabetically under the
appropriate major heading; e.g., CF53 (Position Control/Budget) appears
under the CF - Mainframe/Custom Software heading.

Full statistical reports produced from data collected by the Task Force
are available on request from the Director of Computer Services.

IV. BENEFITS

Electronic Mail

All areas attest to the amount of telephone roulette carried out just on campus with short messages for which direct telephone contact is not necessary but paper messages to secretaries inadequate. As soon as a telephone message gets over a couple of phrases, the likelihood of its communication plummets.

Meetings can be set up without direct oral communication. Even without a calendaring system in one's office automation package, this can be accomplished by electronic mail without people talking with each other.

Many administrators and other persons need to review each other's documents before distribution or mailing. Often, they write documents jointly. This work could be accomplished much more rapidly and efficiently through electronic mail.

Many messages and documents are distributed slowly and imperfectly to faculty and staff via campus mail. Often, the recipient does not--or cannot--know the information before it is too late to act upon it.

In the best of circumstances, campus mail, hand delivery, and telephoning cannot match electronic mail for speed.

Many offices spend from three to eight hours a week allocated in various combinations to hand delivery of mail, copying and addressing correspondence, and arranging meetings.

The Olympia and Vancouver campuses would benefit greatly from remote electronic communication reducing their isolation.

The Student Activities area and especially KAOS suffer from difficult messaging problems, KAOS needing to keep 140 volunteers up-to-date on station activities.

The offices of the Provost and the Vice-President for Business would also make heavy use of electronic mail.

The Assistant to the President has, for working with the legislature, an on-going need to be up-to-date on campus news.

Facilities personnel, like Academics', is widely dispersed. Direct communication is often difficult, face-to-face communication too infrequent. While not perfect, electronic mail is at least as personal as the telephone and more personal than no communication at all.

Word Processing

No one who has done it can imagine doing it any other way. It is especially useful in the working relationship between secretaries and

administrators. Documents may be corrected or modified without complete
re-typing, freeing the administrator to make changes she or he might
otherwise be reluctant to make and freeing the secretary from the sense
of wasted labor.

Those offices with administrative support personnel frequently have
documents drafted by administrators for administrative assistants and
secretaries and by administrative assistants for secretaries to type.
Re-typing of nearly complete documents is now common.

A word processing system combined with spread sheet, database, and
graphical capabilities will allow easy integration of these display
methods into a single document.

Faculty and program secretaries look forward to avoiding the waste of
retyping many documents but especially evaluations. With electronic
mail, the faculty can draft evaluations and mail them to their program
secretaries for editing and formatting on the official forms.

Equipped with electronic mail and teltone boxes, faculty, staff, and/or
administrators could have conference calls while viewing documents
simultaneously.

Other Office Automation Functions

Many other utilities in the office automation area, while not having
major campus-wide significance, could greatly enhance the quality and
efficiency of the work of specific areas. These utilities include
spread sheets supplementing an on-line budget system, project
management programs, graphics, and database packages.

Use of the calendar lookup and meeting scheduler capabilities of the
calendar function would reduce the time now spent by support staff in
negotiating mutual meeting times for administrators. Plus, it could
help keep a volatile calendar under control by ease of making changes.

On-Line Campus Events/Scheduling

Many different offices engage simultaneously in campus events planning.
Each would like to minimize conflicts with other planners but has
difficulty knowing what other units are planning, especially far enough
in advance to avoid conflicts. Scheduling, Facilities, Media Services,
Student Activities, the Theater and Arts area, College Relations,
Affirmative Action, Academics, Recreation and Athletics, Conference
Services, and others all have a piece of the whole without a conception
of the whole. A central system through which people could identify open
times, place tentative holds, and complete scheduling would enable much
more effective planning with much more efficient use of college
resources.

The ability to access an events system from any terminal on campus
would in turn enable members of the campus to know about and take
advantage of opportunities much more effectively. Not only could
planners avoid conflicts more easily, more people would be likely to
attend those events which did take place.

On-line Catalog/Circulation

This innovation would produce much easier access to library information for users on campus and off. Not only could they search for books in

the entire regional system, cross-referencing for subject, author, and title, they would then be able to know where the book was, whether it was checked out, and be able to order it. The search process would be faster. Students, staff, and faculty could all avoid time traveling to the library for books which were not there.

Expanded On-Line Access to Student DataBase

Student Activities, the Provost's Office, program secretaries, Affirmative Action, the Deans Area, and, to a certain extent, some individual users such as faculty all have a legitimate need to verify information on the student database, especially registration, especially at the beginnings and ends of quarters. It is important to know if a student is registered properly or registered at all. There is a not uncommon need to know addresses and telephone numbers. Much of this verification is now handled by phone calls to the Registrar's Office. Paper print-outs could probably be eliminated while providing better access to more accurate information.

The library circulation area also has a specific need for access to the database including Student Accounts in order to verify registration and addresses and bill students for late books.

Terminal Emulation

Whether or not the college chooses to establish a large number of microcomputers as work stations in its offices, there will be a great demand for terminal emulation for microcomputers privately-owned by students and faculty. As many as fifty faculty are likely to own microcomputers within the next five years and want access to the same systems they might access on campus, including electronic mail, the academic computer, the library catalog, and events/scheduling. As many as 500 students might be expected also to have purchased microcomputers by the time the college has 3000 students in the early 1990's. Whatever the advantages or disadvantages of working at home, the more efficient use of space -- and the reduced need for new space -- is a clear benefit derived from the ability of users to access the college's computers from their homes.

Budget/Accounting

Throughout the campus from the Deans Area and the Library to Facilities and Computer Services, there is a very high demand for on-line access to budget information. Budget unit heads want to be able to make purchase orders electronically but more important, track them through each step to Central Receiving in order to pick up purchases as soon as possible. The system would include Purchasing, Accounts Receivable and

Payable, and Budgeting. This development should greatly improve the capacity of the college and budget unit heads to plan and monitor expenditures, keeping budgets more accurately.

Individual units, especially in Student Activities, need automated billing programs.

Inventory

There is both a campus-wide need for on-line inventory control centered in Facilities and many specific needs in individual areas such as the Library, KAOS, Tacoma, and the Book Store. Facilities' requirement is mandated by law and would be integrated into the on-line Budget/ Accounting system.

Off-Campus DataBases

This may be the hidden wonder of computer communications over the next ten years. The college is now using the PLATO system of computer-assisted instruction out of California State University at Sacramento and the DIALOG information system developed by Lockheed Corporation. The Washington state legislative information system exists now as do state and national crime information networks. Many other state and national systems are likely to develop, enabling college personnel to communicate with other state agencies and institutions of higher education.

Specialized Microcomputer Applications

Like the specialized office automation applications, specialized microcomputer applications would be important to only a small number of offices but greatly enhance the quality and efficiency of their work. As Conference Services now has a system, the book store could use one to handle its purchasing and inventory. Parking, Security, Student Health Services, and Theater operations also could take advantage of unique applications.

On-Line Access to Room Scheduling

This would eliminate the telephone traffic between campus offices and the room scheduling staff person and help ease the current confusion that occurs about room reservations.

Faculty Database

Information on faculty (programs taught, payroll/contract information, personal stats, etc.) is currently kept in several different places or not at all. Having the information organized and available in one spot would be very helpful to the deans and their support staff who are often called upon to report the information in different ways for different time periods. A benefit from this probably would be reduced

clerical costs. This could be used by or integrated with personnel records and affirmative action.

Co-op_Ed_System

The same applies here as to the Faculty System. The current manual system is very time consuming and inefficient. Reduced staff burnout and need for student workers would most likely result from development and installation of this system.

V. CURRENT TRENDS IN COMPUTING

INTRODUCTION

This survey is limited in scope. It emphasizes only data processing/office automation, including inter-office communications. Information for this paper came from discussions with staff members, reading widely, and attending conferences and seminars. No attempt has been made to identify all information sources. This paper is not meant to be the final word on the subject, but to raise some issues for further discussion.

SUMMARY

Most of what is happening today can be summarized with one word: integration. Boundaries are disappearing between the user and the machine, between communications systems, between applications systems, between different size computers, and between vendors. This is only a continuation of past trends, but the pace seems to be accelerating. In the jargon of the economists, product cycles are growing shorter. Vendors want to sell rather than lease and earnings patterns are becoming more volatile. All of this is not to imply that utopia has arrived, however. Some large gaps still remain and the inertia of the installed base is very large.

THE USER AND THE MACHINE

Boundaries between users and computers are being reduced by two related trends. Most important is the dramatic increase in computer power for dollar spent. This trend cuts two ways. More people can afford access and specialists have more computing resources with which to develop "user friendly" machine interfaces. These friendly interfaces take the form of menu prompts, menu/graphics (Macintosh), mouse, touch screen and English like query languages—all with on-line interaction. It is said that voice input will be available in the future and that artificial intelligence methods will lower more boundaries.

Related to this boom in users has been a boom in computer related periodicals, books, consultants, educators, trainers and computer stores (retail outlets). Most large computer centers now have "information centers" to acquaint users with user friendly access to the mainframe and something resembling the retail store model to inform users about the micro end of the business.

All of which is to say: computer use is becoming easier and more available but it is still not a utility like a telephone.

MICROCOMPUTERS

Communications

Microcomputer communications was until very recently confined to running a program which made the micro look like a simple asynchronous terminal. Asynchronous communications is the lowest common denominator in the data communications world--a relic leftover from teletype days. It is slow and not terribly accurate, but almost all computers support some variation of it. Asynchronous micro communications programs have become more sophisticated allowing for auto dial, messaging and setting baud rates. Some of the best programs are written and marketed by leading modem manufacturers. The programs are tightly integrated with the modem. Modems are declining in price and increasing in power due to semiconductor chip technology. The near future will see still more features incorporated in modems, including security encryption, protocol conversion, and data compression.

Asynchronous protocol terminals (perhaps emulated on a micro) are not as limited as they used to be. Protocol converters on dial up ports on a mainframe allow the terminal to function in a full screen mode. Dial up line speeds still restrict the usefulness of this option, however.

Communications options on micros are not limited to asynchronous protocols. At some additional expense the speeds and features of synchronous terminals can be emulated by the addition of boards to the micro. Synchronous transmission makes more efficient use of the line (faster) and has more error checking features.

The early communication schemes treat micros as terminals, both synchronous and asynchronous. The next move is to treat them more like computers--which means defining them in network schemes.

Software

The dominant theme in the micro world is integration. After the success of word processing, spreadsheets, and, to a lesser degree, databases, these functions began to be thought of under one heading. On the micro, we saw the development of integrated packages which were developed and sold by one vendor and accessed and executed through one menu. This in turn led to the ability to integrate word processing, spread sheet and graphics data into one document. The integrators at this level are now the successful micro software companies of today. It appears that increasing integration may have its limits, however. Lotus's Symphony is not as successful as its lower level LOTUS 1-2-3. With integration, some marginal micro software houses went bankrupt or merged--the popular wisdom of the day is that the lone software genius can no longer have the same impact that the writer of VisiCalc had just a few years ago. Interestingly enough, VisiCalc (The original spread sheet program) is not one of the corporate survivors of this integration phase. Other companies who lost their niche (and their profitability) with this integration were the stand alone word processor companies.

MID-RANGE (MINI) COMPUTERS

Software

The integration of the popular micro packages did not stop at the micro level (single user). They were moved up to the next machine size (multi-user) where communication with multiple users and peripheral devices is possible. With the addition of electronic mail, document transfer and filing, calendaring and another feature or two, the whole thing became known as office automation. Office automation is not fully developed and is a major focus of competitive effort among the vendors of mid-range computers. At the present time Data General with its CEO is thought to have the most advanced (integrated) office automation system. This is not to say that the micro no longer has a place in the larger scheme of things. When a work station is heavily used for word processing or whatever, the speed of the micro is favored over that of the shared computer as long as the micro still has access to all of the other office automation functions on the shared machine. Note here that due to IBM's dominant position in the micro area, most mid-range vendors are adapting the IBM PC to be a work station on their system. This sharing of functions (integration) between machine sizes and locations also implies a network which needs a network architecture.

MAIN FRAME COMPUTERS

Competitive Position

Main frame vendors have provided network schemes for some time--for users of their systems. These networks provided solutions for sharing expensive lines, ports and computer time by distant users.

Early communications systems were custom crafted for one application at a time. They were monolithic craft-person dependent and almost impossible to change. Change might be nothing more than adding a user or two to a line. To deal with this complexity, layered (structured) network architectures were designed. While this was an advance in the state of the art, the different vendor solutions still didn't communicate with each other--without some extra design effort. Interfaces between different vendors' nets are called gateways. As IBM dominates the high and low end of the general purpose computer market, they also dominate the private network schemes. So, the smaller vendors write interfaces in their networks to talk with IBM's SNA. Gates are not commonly written between the smaller vendors' systems, nor does IBM try to adapt SNA for the smaller vendors. The popular opinion of the day is that the network schemes of the smaller vendors will evolve to look like IBM's SNA - i.e. SNA will become the industry network standard. Integration again--this time among vendors.

IBM's SNA is evolving to incorporate office automation functions and to become less dependent on one main frame. Implementation is dependent on both hardware and software products. Some recently added features are Document Content Architecture (DCA) and Document Interchange Architecture (DIA). These features have to do with composing, filing and mailing documents.

Some evidence of IBM's dominance - including office automation related networking follows:

- After IBM announced its Document Content Architecture (DCA) and Document Interchange Architecture (DIA) most of the smaller vendors scrambled to announce that they to would be able to transmit documents through SNA (IBM's System Network Architecture) networks using these document transfer standards. Documents using these standards don't have to originate on a micro, but they can.

- Multimate, a leading word processing program for micros, has announced its ability to transfer documents to larger machines using the IBM protocol.

- It is widely held that the Apple Macintosh is a fine machine, and much easier to use than the IBM PC. Yet, it is meeting with limited success partly due to its inability to link with larger IBM machines.

- A recent poll of Wang's largest customers by an investment firm showed: Only 20% would increase their purchases from Wang by over 10% in the next few years. The users stated preference for their primary data processing vendor to be their office automation supplier strongly suggests a slowdown for Wang--and gains for IBM.

- Lotus Development Corp. (the leading PC spread sheet vendor) and Cullinet (The leading independent database vendor for IBM main frames) have joined in an agreement to develop a data transfer ability between the micro spread sheet and the main frame database.

Computer users prefer not to be their own systems integrators--which is to say they like their office automation, data processing and communications networks to be from the same vendor--or at least the structure should be from one vendor. As integration increases in the mid range some old boundaries (niches) are going to disappear. Most of the vendors will be under increasing pressure. Where the response is to imitate IBM, the pressure will be severe.

A review of the recent history of the plug compatible vendors and the PC compatible vendors would be instructive. First, the IBM plug compatible disk drive vendors:

Storage Technology used to be a major supplier of disk drives for IBM main frames. CDC and Memorex were/are also large suppliers. At the present time Storage Tech is bankrupt, or nearly so. The reasons are that they tried to develop a plug compatible main frame (IBM) and failed. They also failed to keep up with the pace of change in disks. CDC has announced that they are withdrawing from the plug compatible disk market and will take a multi-million dollar write off as a result. The primary reason was their inability to keep up with the rate of change set by IBM. Memorex, a subsidiary of Burroughs is still thriving. Some large Japanese companies selling through partly owned American subsidiaries are still very competitive.

In the main frame arena, Magnuson has gone bankrupt and Trilogy has given up. The force behind Trilogy was Gene Amdahl, the designer of the IBM 360 and the founder of Amdahl Corp. As mentioned earlier, Storage Technology also made an attempt in this arena. The principle survivors in this area are now Amdahl (which Gene is no longer a part of) and National Advanced Systems. Japanese companies own large interests in both. National's hardware is made in Japan.

To summarize, IBM already dominates the low end (micro) and the high end (main frame) markets - approximately 70% of each. The evidence of the day implies that they will also dominate the move to tie the two ends together with the mid-range departmental processor. This domination originates more from being the great integrators than from being the great innovators. Those best able to produce and sell IBM compatible hardware appear to be the Japanese.

QUALIFICATIONS

Forecasting trends is a difficult task--as the following contradictory aphorisms indicate:

- The best path to predictive accuracy is to identify the hottest market of the moment and confidently pronounce its eventual demise.

- The race does not always go to the swift or the fight to the strong--but that's the way to bet.

Government Action

The computer/communications thing is so pervasive that more government interest must be expected. Most governments in both developed and developing countries feel that national interests are at stake. News stories in recent months have included the following:

- Regulations regarding the percentage of local ownership of manufacturing facilities. (Mexico and India).

- Regulations regarding the lead time for publication of technical specifications of new products. (European Economic Community). This is the open architecture issue mentioned again down the page.

- Regulations limiting what data can be sent across national borders. (France).

- Regulations, both written and otherwise, regarding the importing of telecommunications equipment. (Japan/USA).

- Regulations specifying what micro systems may be used in the national education system. (Apple/France).

- Most national telephone/telegraph systems are owned by governments. These systems interface with each other using

national standards developed and published by an international standards committee named International Standards Organization (ISO). ISO is developing a standard called Reference Model of Open Systems Interconnection (OSI). This standard emphasizes digital rather than analogue transmission and is not yet fully developed. There is some debate in the computer/ communications community about the possibility of OSI re- placing SNA as the most widely accepted Network Architecture. The heavy betting at the moment is still on SNA with gateways to OSI where needed.

And finally, the reopening of anti-trust action against IBM is always a possibility. Not very likely under the present administration, but certainly possible in the future. This threat--along with other reasons --could also lead IBM to be more open about its systems specifications. Open Architecture its called. Aside from the anti-trust threat it should be noted that much of the PC's success has been attributed to its open architecture. This encouraged the independent development of add-on circuit boards, peripherals and software. It is hard to predict where this one may go.

The Japanese

Many people think of the Japanese as being very good copiers and manufacturers, but lacking in creative design skills. This may have been true in past years but the picture is changing. Their fourth generation project (or is it the fifth?) is being taken seriously. Their design skills in semiconductors are improving. There is no consensus about how the Japanese will affect current market positions, but few doubt that their efforts will be increasingly noticed.

The Limits of Integration

While it is undoubtedly true that the theme of integration and the elimination of old boundaries is alive and well, it is also true that not all of the computing in the world is going to be done on one enormous communicating network.

Some forecasters claim that the future will see the generic work done by the giants IBM, AT&T and the Japanese--and a host of custom integrators to do the unique jobs. Some have claimed that the primary reason for the General Motors/EDS merger was that GM wasn't happy with the generic solutions and so bought their own custom integrator.

Bringing the issue closer to home--it is clear why electronic mail and document transfers should lead to the demise of stand alone word processors. It is not quite so clear why the addition of spread sheets (and maybe report generators) to the menu should lead to the demise of a vendor with a great database program that doesn't interface with the office automation network--or is it?

The point is, not all niches will be lost but it is difficult to describe their future borders.