COMPUTER LABORATORY

ANNUAL REPORT

1992/93

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Section 1 Introduction.

Planning was the dominant activity in the Computer Laboratory and at the Management Committee during 1992/93. The preparation of a strategic plan for Information Technology in College complementing the academic and organisational outcomes of the CARC Report and the concurrent preparation of the computer related element of College's submission for European Regional Development Funding took place in an atmosphere of considerable pressure as the existing service struggled to keep pace with user needs. While much groundwork was completed by the end of the year, much remained to be done and it is clear that a detailed plan will not emerge until well into 1993/94. However, the new level of funding needed should be put in place for 1993/4 to enable the taking of prompt action once the technical details are defined and it is of the utmost importance that developments which are essential to maintain critical core services which are at risk due to ageing equipment and increasing volumes of data are not delayed pending the outcome of the planning process.

An early highlight of the year was the opening of the new Beckett II Microcomputer Laboratory in the Arts Building. This facility consists of a teaching area equipped with 24 Apple Macintosh machines and was heavily used during the year. Furthermore, additional funding allocated by the Deans made possible the replacement of the "dumb" terminals in Room 4066 of the Arts Building by Apple Macintosh units during the summer and the planning of a new PC laboratory in the O'Reilly Institute to serve the large number of students now using the Hamilton building.

The Computer Shop had a difficult year as falling prices and margins in the computer trade generally removed much of the advantage associated in the past with educational discounts. While the unit remained viable, the value of sales fell due to falling prices although the volume of goods handled continued to increase with a consequent increase in the sales and administrative workload.

Some further progress was made in expanding the College data network by extending the fibre optic backbone to a number of buildings not already served but financial constraints did prevented the installation of distribution facilities within buildings and much remains to be done. It is anticipated that this will receive a high priority in the planning process.

During the year, also, the Laboratory's Technical Unit was strengthened by the appointment of a Chief Technician and of an additional Technician bringing the total strength of this unit to four. Two additional programming staff were also appointed to deal with the growing complexity of systems software and to cope with the backlog of work in the information systems area. These new appointments are a very welcome recognition, by College, of both the importance of the role which Information Technology now plays in Trinity and of the enormous pressure on the Computer Laboratory's resources.

Section 2 Use of Services

In quantitative terms, the Laboratory's activity is again expressed in financial units in the following tables, which show how the cost of running the Laboratory relates to the principal services offered and to the main categories of user served. These tables are based on actual recurrent expenditure as recorded in the College accounts but are analysed, in this report, under sub-headings for which the accounting system cannot make provision. It must be emphasised, therefore, that much of the analysis is based on estimates rather than on measurement. While usage measurement software is in place for all mainframes and for some network activities, it is not feasible to record most microcomputer activity or use of the Local Area Network by individuals.

It should also be pointed out that, in addition to its annual recurrent budget, a sum of £42,500 was received from the Dean's Capital Equipment Grant for the provision of microcomputer facilities and this amount is additional to the figures included in the following tables.

TABLE 1 - OVERALL COST OF SERVICES

	Central Computers	Micro.	Comms.	Total
Academic Users	452999	223407	219230	895635
	(29.0%)	(14.3%)	(14.0%)	(57.4%)
Academic Services	115713	85656	76214	277583
	(7.4%)	(5.5%)	(4.9%)	(17.8%)
Administration	165173	147325	75451	387950
	(10.6%)	(9.4%)	(4.8%)	(24.8%)
Total	733885	456388	370895	1561168
	(47.0%)	(29.2%)	(23.8%)	(100.0%)

TABLE 2 - OVERALL COST - PAY v NON-PAY

	Academic	Academic Services	Admin.	Total
Pay Costs				
- Central Computers	151254	85477	108305	340713
- Microcomputing	147394	64177	125847	337418
- Communications	93497	49193	49557	192247
Total Pay Costs	392144	198848	279386	870378
Non-Pay Costs				
- Central Computers	301745	30236	61191	393172
- Microcomputing	76013	21478	21478	118970
- Communications	125733	27021	25895	178648
Total Non-pay Costs	503491	78735	108564	690790
Total Cost	895636	277583	387590	1561168

2.1 Central Computing

The following tables summarise use of the central machines which, for brevity, are identified by their network names. The machines themselves are described in Appendix A.

TABLE 3 - USE OF CENTRAL SYSTEMS BY USER CATEGORY

System	User Category			
	Academic	Academic Services	Admin.	Total
VAX1	346634	744	1316	348694
LIB1	0	114969	0	114969
ADVAX1-4	0	0	163857	163857
UNIX1	53182	0	0	53182
UNIX2	53182	0	0	53182
Total	452999	115713	165173	733884

TABLE 4 - ACADEMIC USE BY FACULTY

Faculty	VAX1	UNIX1	UNIX2	Total
Arts (Humanities)	9078	98	0	9176
Arts (Letters)	9772	38	36	9846
B.E. & S.S.	18370	0	68	18438
Engineering	106974	18797	11879	137650
Health Sciences	9538	12	1	9551
Science	192902	34238	41198	268338
Total	346634	53182	53182	452999

VAX1, the VAX6230 system, still remains the main central machine for academic users and is the only one offering a VMS service and continues to be heavily loaded. Proposals to upgrade it before the beginning of the 1993/94 academic year were not accepted pending the outcome of the new Information Systems Policy Development Group's deliberations. It is anticipated that the machine will come under even greater pressure during the coming year with noticeably slower response times and greater pressure on disc allocations.

Software accounts for an increasing proportion of the cost of both central and microcomputer systems. A number of developments aimed at optimising the effectiveness of spending in this area were initiated during the year and, while the results of these have been modest so far, their potential for future benefit is substantial. The first of these is a pilot development funded by the HEA for the establishment of CHEST (Ireland), a central unit modelled on the UK Combined Higher Education Software Team, which negotiates licence terms centrally on behalf of all the colleges. So far, this has resulted in several agreements covering both mainframe and microcomputer products. In the case of VAX1, for example, it permitted the acquisition of the ARC/INFO GIS software. The Laboratory is also reviewing the usage of a number of other existing VAX packages with a view to redeploying the funds involved more effectively.

The recently enhanced library DECsystem-5000, LIB1, coped satisfactorily with its increasing workload. Some interruption of service arose from equipment failures affecting a high-capacity disc storage unit on the machine and these resulted in considerable operational difficulties for the Library. Digital replaced the offending unit, which was under maintenance contract, with a newer and more reliable unit.

The administrative MicroVAX systems were very heavily loaded. The main new development was the acquisition of a personnel software system to meet the needs of the Staff Office and installation of this commenced during the year. ADVAX1, the student administration machine which was upgraded in 1992/3, coped well but the smaller ADVAX3 and ADVAX4 systems were badly congested as usage grew. The ADVAX4 overload was alleviated by a reallocation of tasks between it and ADVAX1 but this was not possible in the case of ADVAX3 which suffered particularly from the implementation of the new personnel system and the introduction of a new release of the payroll software and it became necessary to upgrade this unit as a matter of urgency.

2.2 Microcomputer related Services

The second BECKETT microcomputer laboratory in the Arts Building went into service early in the academic year and was formally opened by the Provost on 11th November, 1992. It has proved to be very satisfactory and provides an Apple Macintosh teaching facility to complement the PC based installation in the adjoining BECKETT I room. As part of this project, the Apple Macintosh Plus machines in the Arches were replaced by LC II units networked to the same server as those in the new BECKETT II room to provide compatible facilities for individual use.

During the year, an additional grant of £42,500 was received from the Deans towards the cost of the third phase of the three stage development plan of which BECKETT I and BECKETT II constituted the first two parts. This was used to replace the terminal in Room 4066 of the Arts Building by networked Apple Macintosh LC IIIs and to provide a PC work area in the O'Reilly Institute for use by students in the Hamilton Building. The 4066 project was completed by the year end and work had commenced on the Hamilton laboratory with the expectation that it would be operational in November.

As mentioned earlier in the Report, several special software licencing arrangements are under negotiation under the auspices of the CHEST (Ireland) initiative and while the only one which had been taken up at the year-end was the PC version of ARC/INFO, it is anticipated that several others will be signed during the coming academic year. While site licence arrangements such as these offer major savings to College, they do carry an administrative overhead. Arrangements with each manufacturer differ in detail but all require the Laboratory to maintain detailed records of all copies of the products issued to College users and most require the work of duplicating the machine readable media be done locally and that routine reports be submitted. Documentation is frequently not included and must be purchased separately. Finally, it is expected that when the HEA pilot funding for CHEST (Ireland) ends during the 1993/4, it will be necessary for the colleges to contribute financially if the initiative is to continue.

The sale of microcomputer equipment within College is mentioned in more detail in Section 3.1.

2.3 Communications

2.3.1 Internal Communications

Financial constraints allowed the making of only modest progress in the task of extending College's internal data network. Central funds were again used mainly for the extension of the fibre optic backbone to a number of buildings not already connected including the Luce Hall, Botany, Zoology, Chemistry and Biochemistry. A second fibre optic link connecting the O'Reilly Institute to the west end of College via the Broadwalk side of the Rugby Ground was installed for the purpose of coping with increased traffic and of ensuring the availability of a limited service in the event of the failure of the existing cable on which most computer based activity, including the Library service, was dependent. In general, the reliability of the network was significantly higher than during the previous year due largely to the increasing level of experience of the technical staff who maintain it. The Gandalf PACX data switch, first installed in the 1970s and which played a major role in College's internal data communications infrastructure since that time, was finally withdrawn from service in 1993 when most of its remaining terminal lines were connected to Ethernet terminal server ports.

2.3.2 External Networking

Use of external network links, largely for E-mail, continued to grow rapidly not only in Trinity but in all the HEA funded colleges. The HEANET service through which most of Trinity's external traffic is routed outgrew the 64 kbps EIRPAC Virtual Private Network on which it had been based since 1991 and was replaced by a new service using on 128 kbps DASSNET digital lines leased from Telecom Eireann and linked to a central hub at a Network Operations Centre with specially recruited staff funded by the participating colleges and the HEA and located in UCD. HEANET now has a full-time staff of three people, two at the NOC and one based in the HEA offices and this has eased the pressure on computer services staff in all colleges who were running the network on a voluntary part-time basis. It is anticipated that traffic will outgrow this system by the time the contract for the operation of the NOC expires in 1994 and it expected that proposals will be sought for the provision of a further enhanced replacement facility before the end of 1993. Trinity continues to use an independent link for most of its international Internet traffic in the interests of performance and reliability but it is anticipated that this can be reviewed during the coming year in the light of improved performance of the HEANET Interned link. The Laboratory is also participating, on a pilot basis, in Telecom Eireann's Dublin Metropolitan Area Network project.

Section 3. Other Activities

3.1 Sale of Equipment and Supplies

The downturn in the Computer Shop's revenue, predicted in last year's Report, materialised during the current year with the value of sales falling to £762,039 from £912,253 last year. Of greater concern is the fact that there was also a fall in the Shop's margin which is necessary to maintain its self-funding status. Moreover, the reduced turnover arose from the sale of an increased number of units and reflects the spectacular drop in prices in the personal computer market. The Shop is still self-supporting and there is very strong support from the computer user community for its continued presence in College. However, there is a distinct possibility that it may need subsidisation from other sources in future if the situation were to deteriorate further.

3.2 Sale of Services

Sale of services decreased sharply from last year's figure of £28,589 which was due largely to the activities of one user. Traditionally, this account heading reflected sales of mainframe time but this has fallen to almost negligible proportions as former customers acquire their own facilities. While access to network services is a potentially saleable service, HEANET policy precludes the carrying of commercial traffic and licencing problems could also arise if this were offered commercially.

Section 4 Future Developments

Much of the Computer Management Committee's efforts during the year were concerned with the development of a strategic plan for information systems in College and a document entitled "A Strategy for Information Technology Services in Trinity College" was submitted to the Board in Trinity Term. This document made clear that significant planning remained to be done before a comprehensive range of new facilities were implemented and made proposals as to how this should be carried out. Arising from this, it was decided to establish an Information Systems Policy Development Group to undertake this planning during the 1993/94 academic year and approved the appointment of an Information Systems Project Officer to co-ordinate the work. At the time of writing, an appointment has been made to this position and the consultative process on which plans must be based has commenced.

The strategy document calls for a high level of integrated planning to identify the full range of activities in College which can benefit from IT and the specification of College-wide fully coherent services to meet the needs of both staff and students. It is not possible in this Report to pre-judge the outcome of the ISPDG's deliberations but it can be assumed that networking, student facilities, integrated administrative systems and access to library facilities will feature high on the agenda.

It is, however, important that development does not stop completely while this planning proceeds. It is essential that certain steps be taken to ensure the continuity of critical services in the face of growing data volumes and ageing equipment and, while every effort must be made to anticipate the main thrust of the strategic plan, some replacement of equipment and software must take place to safeguard essential applications.

APPENDIX A

EQUIPMENT

The specifications of the equipment in service on September 30th, 1993, are as follows:

Digital DECsystem-5000: **LIB1**

1 x DECsystem-5000 Model 240 with 96 Mb of memory,
10.3 Gb of disc storage, and an Exabyte tape cartridge unit.

Digital VAX 6230: **VAX1**

1 x VAX6230 CPU with 32 Mb of memory, an Ethernet port.
2 x SA482 2.5 Gbyte disc storage unit
1 x RA60 600 Mb disc storage drive
2 x RA82 600 Mb disc storage drives
2 x TA81 Magnetic Tape Drive
1 x LA100 Console printer
1 x Houston Plotter
1 x Kaiser Optical Mark Reader
1 x Exabyte tape cartridge unit

Digital MicroVAX 3100: **ADVAX1**

1 x MicroVAX 3100 M90 with 128 Mbyte of memory, an Ethernet port,
and 3.2 Gbytes of disc storage and a CD-ROM reader

Digital MicroVAX 3100 **ADVAX3**

1 x MicroVAX 3100 M10E with 32 Mbyte of memory, Ethernet port,
and 2.1 Gbyte of disc storage

Digital MicroVAX 3100 **ADVAX4**

1 x MicroVAX 3100 with 20 Mbyte of memory, Ethernet port,
and 1.1 Gbyte of disc storage

ICL DRS 500/75 **UNIX1**

1 x ICL DRS 500/75 Processor with 32 Mbytes of memory, 1500 Mbytes
of disc storage, Ethernet port, magnetic tape cartridge drive,
and half-inch magnetic tape drive.

ICL DRS 500/75 **UNIX2**

1 x ICL DRS 500/75 Processor with 32 Mbytes of memory, 1200 Mbytes
of disc storage, Ethernet port, and magnetic tape cartridge drive.

Communications

It is estimated that several hundred terminals and microcomputers, most of which belong to user departments, have access to the College network. Many of these compete for the limited number of entry ports on the central computers via College's Ericsson MD110 Voice and Data telephone exchange. Most, however, including the public access Library terminals and those terminals which may be booked in advance and are located in the Terminal Rooms of the Laboratory, are connected directly to the Ethernet via terminal servers. Individual servers use only one communications protocol, either LAT or TCP/IP, but terminals attached to either type may access hosts using either by means of Xyplex protocol converters. The Laboratory is a node of HEANET which links the major HEA funded institutions and is connected to EIRPAC, Telecom Eireann's packet switched public network via a 64 kb/s line. A direct 64 kb/s line to UCD Computer Services and a connection to the international Internet are also available. Other direct lines link the Laboratory with off-site College locations including Pharmacy in Shrewsbury Road and the Library in Santry.

Microcomputers

The microcomputer laboratory located under the railway arches at the east end of College has the following equipment:

13 x 386-33 based PCs
16 x Apple Macintosh LC IIs
1 x Apple LaserWriter
1 x QMS Laser Printer

A microcomputer facility located in Beckett Room I of the Arts Building has the following equipment:

28 x 80386 based IBM compatible PC's with colour monitors
2 x Hewlett Packard LaserJet III printers

A complementary microcomputer facility equipped with 24 Apple Macintosh LC IIIs is located in the adjoining Beckett II room and 16 Apple Macintosh LC IIIs are located in Room 4066, also in the Arts Building. All these Apple machines are supported by an Apple fileserver.

A new microcomputer facility to be commissioned by November 1993, the Hamilton PC Laboratory, in the O'Reilly Institute will be equipped with 15 networked 486-66 based PCs.

The PCs in the Arches and Beckett I laboratories are networked to an 80486 based fileserver using LANMANAGER network software running on the main Ethernet cabling.

A selection of microcomputers and specialised peripherals are available to users in the Laboratory at 200/201 Pearse Street. These include the following:

1 x Apple Macintosh with CD-ROM
1 x Amstrad PCW8256
1 x Apple LaserWriter
1 x ICL 55SX PC
1 x Optical Mark Reader for test scoring.

A Prompt PC with Braille printer and VOTRAX voice output unit are located in the Disabled Students' Room in the Arts Building.

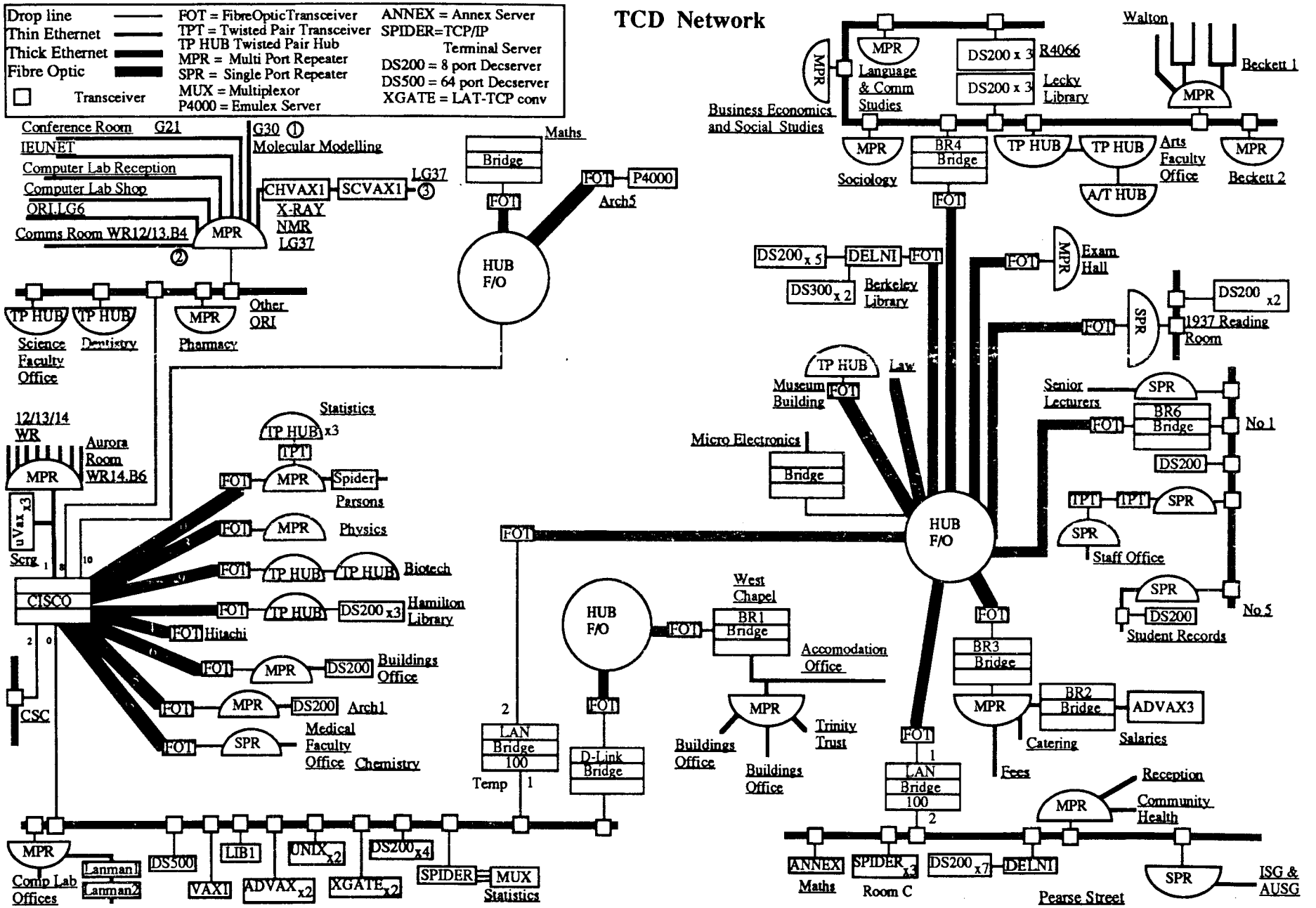

Figure A.1

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APPENDIX B

ORGANISATION

The Computer Laboratory is supervised by the **Computer Management Committee**, a standing Committee of the Board which is chaired by the Bursar. It is advised by the **Academic Users' Committee** and the **Administrative Users' Committee** which report to it and by working groups which it sets up from time-to-time. Two of these were active during the year, the **Microcomputer Policy Group** which is responsible for the planning and implementation of the three stage microcomputer development, and the **Computer Planning Group**, which has, until now, been responsible for long-term planning.

The Laboratory staff is organised as shown in Figure B.1. The functions of the main groups are as follows:

ACADEMIC USER SERVICES GROUP

This Group, comprised of programming staff, provides assistance to computer users by means of:
- an advisory service
- courses for users
- publications such as the Users' Guide and Computer Laboratory Newsletter.

COMPUTER SERVICES GROUP

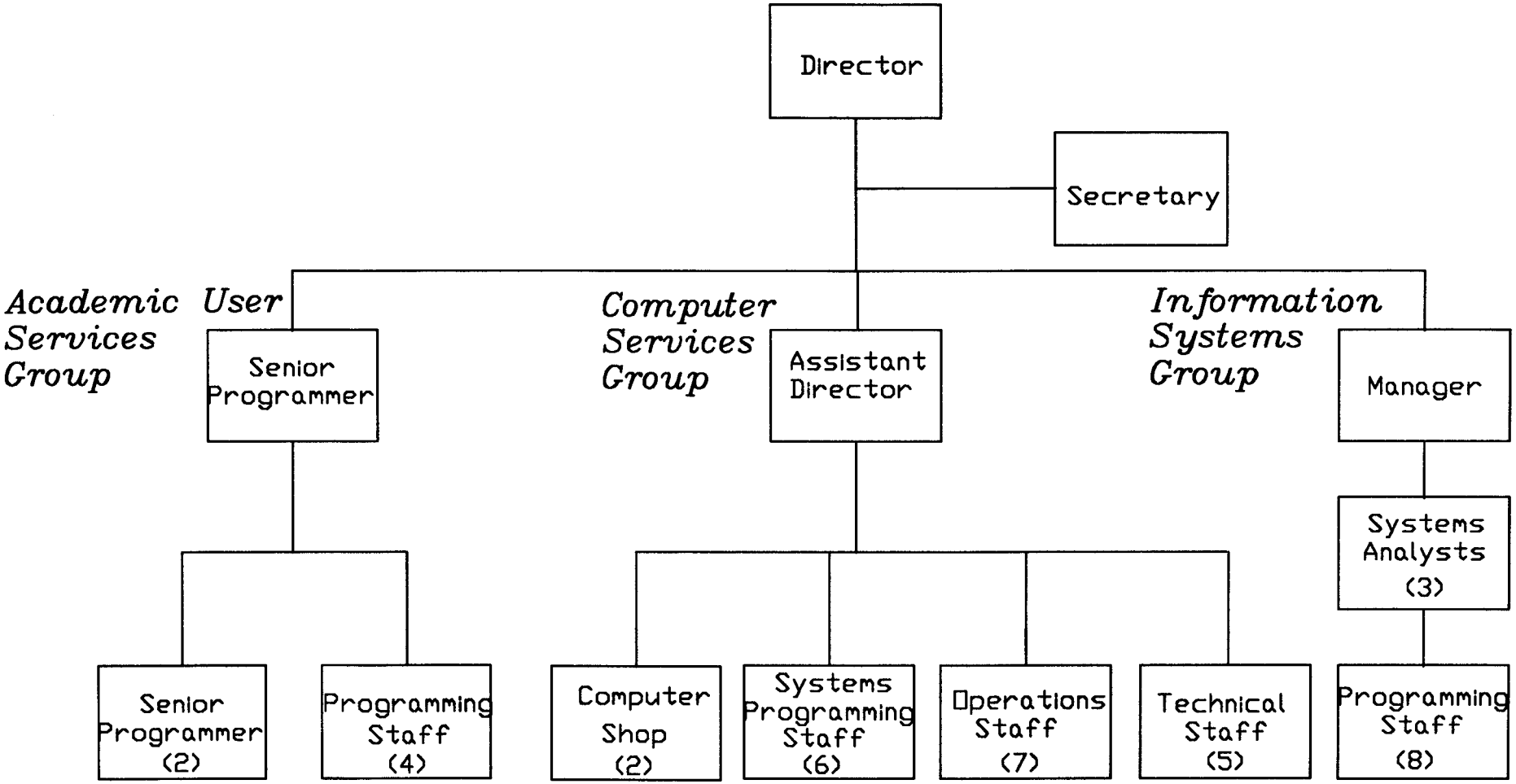
This Group is responsible for the running of the central computer equipment. It is staffed by operations personnel who look after the running of the machines and perform the associated ancillary functions, systems programmers who generate and maintain the central systems and network software, technicians, and janitors who are responsible for security.
This Group is also responsible for the provision of specialised technical advice and support on both mainframe, microcomputer, and communications matters to the other two user oriented Groups in the Laboratory.

The Computer Shop which retails microcomputer equipment and supplies within College is also part of this Group.

INFORMATION SYSTEMS GROUP

This Group is responsible for the regular operation of existing administrative and Library mainframe computer applications and for the development of new ones.

Development of new projects is performed by Systems Analysts and Programmers who design the applications and perform an ongoing supervisory role in the running of the more complex systems.



COMPUTER LABORATORY ORGANISATION

(Including temporary appointments)

Figure B.1

30-9-1993

APPENDIX C

COSTS

The services provided by the Laboratory may be divided into those related to the central computer systems, microcomputers, and communications. The total cost of running the Laboratory is shown below under the main expenditure headings used in the College accounts. The cost of providing each of the three categories of service mentioned above was estimated by analysing all the categories of expenditure shown in Table C.1 to estimate the fraction of each used to provide each service. For example, in the case of salaries, an estimate of the time spent by each individual member of the Laboratory's staff on each of the three activities was made and the individual's salary costs allocated accordingly. In the case of Central Machine Service, the expenditure was further apportioned between the seven machines currently operated by the Laboratory. Allocation of the costs among the different categories of user is based on measured usage in the case of central machine activity and on estimates in the case of microcomputers and communications.

ACCOUNTS for Year Ended 30th September, 1993

		Actual	Budget
Income:	Sale of Services	16112	12285
	Net Sale of Goods	13450	12313
	Miscellaneous Income	0	0
	Underspending B/Forward	(9598)	(9598)
	Total Income	19964	15000
Expenditure:	Salaries	857008	853000
	Wages	13370	15000
	Total Pay Cost	870378	868000
	Rentals of Equipment	67704	70000
	Equipment Purchase	368471	342869
	Maintenance	183377	203000
	Consumable Supplies	29753	25000
	Cost of External Services	34220	34000
	Insurance Charges	4779	4500
	Telephone Charges	7316	8800
	Miscellaneous Expenses	19211	20000
	Total Non-Pay Cost	714831	708169
	Total expenditure:	1585209	1576169
	Net annual cost:	1565245	1561169
	Overspending C/F	(4076)	0
Total Annual Cost:		1561169	1561169