# **COMPUTER LABORATORY**

# **ANNUAL REPORT**

# 1990/91

# CONTENTS

Section 1.		Introduction
Section 2.		Services
	2.1 2.2 2.3	Mainframe services Microcomputer service and support Communications
Section 3.		Other Activities
	3.1 3.2	Sale of Equipment and Supplies Sale of Services
Section 4.		Future developments
Appendix A		Equipment
Appendix B		Staff
Appendix C		Costs

### Section 1 Introduction.

1990/91 was another year of change in the College computing service with significant new developments in a number of areas.

In the teaching sector, perhaps the most notable was the commissioning of the Beckett Microcomputer Laboratory which was completed in time for the beginning of the academic year and has been very heavily used by all faculties. A major review of documentation produced for the general academic user was also undertaken and resulted in the publication of several new booklets which were very well received by the user community.

The VAX8350 Library machine was replaced by a new DECsystem-5000 system during the Summer. The new unit will continue to run the Dynix software but will permit wider on-line access to the Library catalogue and offer a faster response to readers.

In the communications area, the main Ethernet was extended to a number of locations not previously connected and externally, faster links were commissioned to HEANET and directly to UCD while a direct line was installed to the international Internet network. The number of "dial-in" connections to the College computing service was increased from six to ten to facilitate the growing number of users wishing to use the facility outside normal hours.

In the administrative area, a four year plan to modernise College's administrative computing systems was accepted. This development, which will build on the experience gain with the new Student Administration System, is currently proceeding on schedule and includes the extension of the fibre-optic network to the main administrative offices.

The year was not without problems. The continually changing technology and rapid growth made severe demands, at all levels, on the limited number of staff. The dispersion of staff between the O'Reilly Institute and Pearse Street sites continued to present operational and coordination difficulties. However, the additional appointments authorised during the year helped considerably.

#### Section 2 Use of Services

As before, the principal services offered by the Laboratory are considered under the following categories:

Mainframe related services

Microcomputer related services.

Communications

The net running cost of the Laboratory has been apportioned to each of these and to the main categories of user of each. The basis of the costing is described in more detail in Appendix C.

It must again be emphasised that much of this information 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 by individuals of the Local area Network.

The information is presented in the same format as in previous years. All tables, with the exception of Table 2, are expressed in £s.

# **TABLE 1 - OVERALL COST OF SERVICES**

User	Mainframe	Micro.	Comms.	Total
Academic	372212	131067	161555	664833
Academic Svcs.	147658	53567	64049	265274
Admin.	167147	102625	54207	323980
Total	687017	287260	279811	1254087

# TABLE 2 - PERCENT OF TOTAL USE

User	Mainframe	Micro.	Comms.	Total
Academic Academic Svcs. Admin.	29.68% 11.77% 13.33%	10.45% 4.27% 8.18%	12.88% 5.11% 4.32%	53.01% 21.15% 25.83%
Total	54.78%	22.91%	22.31%	100.00%

## **TABLE 3 - OVERALL COST OF SERVICES**

User	Pay	Non-pay	Total
Academic	316311	348522	664833
Academic Svcs.	141817	123457	265274
Admin.	199736	124243	323980
Total	657864	596223	1254087

# 2.1 Mainframe 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 4 - COST OF MAINFRAME ACTIVITIES**

User	Pay	Non-pay	Total
Academic Academic Svcs. Admin.	150970 58643 76869	221242 88974 90278	372212 147658 167147
Total	286524	400493	687017

#### TABLE 5 - USE OF CENTRAL SYSTEMS BY USER CATEGORY

System	User Category			
	Academic	Academic	Admin.	Total
		Services		
VAX1	263777	239	359	264375
LBVAX1/LIB1	0	147419	0	147419
ADVAX1-4	0	0	166787	166787
UNIX1	54218	0	0	54218
UNIX2	54218	0	0	54218
Total	372212	147658	167147	687017

# TABLE 6 - ACADEMIC USE BY FACULTY

Faculty	VAX1	UNIX1	UNIX2	Total
Arts (Humanities)	4490	0	0	4490
Arts (Letters)	1241	0	0	1241
B.E. & S.S.	7563	0	0	7563
Engineering	117390	4183	1139	122713
Health Sciences	2690	0	0	2690
Science	130402	50034	53078	233515
Total	263777	54218	54218	372212

The VAX 6230 (VAX1) continued to be the mainstay of the academic service and came under increasing strain with a consequent deterioration in response time to users, a situation which is not visible from the cost-based usage statistics. The two ICL DRS-500 machines (UNIX1 and UNIX2) continued to operate very satisfactorily serving a more specialised user community within the Science and Engineering faculties.

The new library DECsystem-5000 went into service in August. This more powerful machine has provided a much improved service to users. It has also made the library application more secure in the longer term by removing the dependence on a highly specialised third party co-processor board and enabling the Dynix software to operate on standard hardware running the UNIX operating system.

In the administrative area, a significant start was made in implementing the plan to rationalise the present incompatible applications by standardising on MicroVAX equipment using ORACLE database software, where possible. New machines were installed to serve part of the Finance Office (ADVAX3) and the Building and Accommodation areas (ADVAX4). These provide compatibility with the existing Student Administration machine (ADVAX1) and with an external machine (ADVAX2) to which the Buildings area has partial access. The Laboratory's Information Systems Group also played a significant role in coping with the demands made on College by the HEA's new unit-cost system.

4

#### TABLE 7 - COST OF MICRO RELATED ACTIVITY

User	Pay	Non-pay	Total
Academic	90830	40237	131067
Academic Svcs.	41433	12134	53567
Admin.	90491	12134	102625
Total	222755	64505	287260

The newly installed BECKETT Microcomputer Laboratory dominated the microcomputer scene during the year. While it operated well and partially filled a major deficiency in the available facilities, it used equipment and network software which was very new and made considerable demands on the Laboratory's technical staff to cope with the many small but complex teething problems which arose from the integration of the different products involved. It proved feasible within existing finances to upgrade the IBM compatible machines in the Arches area to the same technical level as those in the BECKETT and to link them to the same server machine so that the facilities in the two locations are now compatible.

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

#### 2.3 Communications

#### TABLE 8 - COST OF COMMUNICATIONS ACTIVITIES

User	Pay	Non-pay	Total
Academic	74511	87044	161555
Academic Svcs.	41699	22350	64049
Admin.	32376	21832	54207
Total	148586	131225	279811

#### 2.3.1 Internal Communications

The main internal Ethernet Local Area Network again performed satisfactorily during the year and was extended to a number of additional locations. These included the BECKETT Microcomputer Laboratory, administrative offices in the Catering Building and West Chapel, and the new premises for Mathematics in Westland Row. Further extensions to the Chemistry and Physics buildings were in the course of installation at the end of the year. A major internal network wiring project was completed in the area of the Arts Building housing the BE&SS faculty and the Centre for Language and Communications Studies was also connected.

Several incompatible communication protocols co-exist on the Ethernet. The principal ones are that used by the VAX systems (LAT) and the protocol used by the UNIX machines and many PCs (TCP/IP). During the year, a protocol converter was installed to enable these two "cultures" communicate with each other and remove the restriction which limited specific terminals to particular types of computer.

#### 2.3.2 External Networking

The external connection via HEANET to the other Irish colleges and to international networks including EUNET was again heavily used, largely for electronic mail purposes. The HEANET connection from College to Telecom Eireann's EIRPAC service was upgraded from a speed of 4.8 kb/s to 64 kb/s in June as part of a general enhancement of the HEANET system. A private 64 kb/s line from TCD to UCD, provided free of charge for three years by Telecom Eireann as a Quatercentenary donation, was also commissioned.

Access was also provided to the international Internet system during the year via a private line to the Internet node in the UK at the University of Kent.

Discussions were initiated between HEANET, the RTCs, Dublin Institute of Technology, and EOLAS with a view to the establishment of a national research network. Progress has been slow due, in part, to the different levels of development prevailing in the organisations involved of which the HEA sector and DIT are the only areas with extensive networking facilities in place. However, such a development offers the prospect of a scale of operation which would permit the establishment of a professional network management unit to take over the functions currently performed on a voluntary basis by individuals in the university computing services and which are making major demands on scarce staff resources.

Coincidentally with the phased transfer of part of the communications equipment from Pearse Street to the O'Reilly Institute, the number of direct Telecom Eireann telephone lines connected to the central systems was increased from six to ten to cater for the growing number of users who wish to use the facilities from home outside normal hours. The speed of these dial-in connections was also enhanced and all lines can now cope with the normal standard speeds of up to 2400 bps, adapting automatically to the speed of the caller's equipment.

Section 3. Other Activities

#### 3.1 Sale of Equipment and Supplies

The Computer Laboratory shop had another successful year and sales increased from £587,700 to £722,020. The shop, which aims to operate on a self-funding basis, acts as a central purchasing unit to channel the benefits of academic discounts and bulk purchasing to members of College. In addition to microcomputers and related accessories and supplies, it also administers most of the Laboratory's services for which a cash charge is made. The Shop is regarded as one of the Laboratory's more useful services by many members of College and it is anticipated that it will continue to grow as the falling cost of microcomputers brings them within reach of more and more individuals. In particular, it can be expected that a growing number of students will be able to acquire their own machines in future and the manufacturers are now beginning to seriously address this potential market.

#### 3.2 Sale of Services

The sale of mainframe computer time increased slightly due to the activities of one user. This is not indicitave of a trend and sale of machine time is no longer a significant part of the Laboratory's income. Some income also arose from participation by Laboratory staff in an EC funded project undertaken by the Library. Much of the income recorded under this heading comes from those internal services for which the Laboratory makes a charge, such as the issuing of "Entacards" and laser printing tokens.

#### Section 4 Future Developments

The Computer Management Committee initiated a major review of the future information technology needs of College and circulated a discussion document to all departments at the end of Trinity term. This document envisaged the extension of an enhanced data network to every individual staff and student workplace in College providing access to a comprehensive range of facilities including electronic mail, library services, publication facilities, computer assisted teaching, general information services, and specialised computing resources. While the outcome of this planning operation will not be known before sometime in 1992, some aspects of the computing service's more immediate needs can be mentioned now.

Access by students to terminals and microcomputers continues to be a problem and the ratio of users to machines is bad in Trinity compared to most other HEA funded institutions and extremely poor by the standards which prevail in the RTCs. While there is an urgent need to improve this situation and the low unit cost of the equipment suggests that small incremental improvements should be possible from time to time, no space is available to accommodate more machines. The provision of more accommodation, suitably located for convenient user access, must be an urgent priority. This will become even more urgent when it becomes necessary to demolish the present Pearse Street building which houses the Laboratory's main user areas and over half its staff.

The extension of the Ethernet to main College buildings not yet connected and the extension of the local distribution wiring within buildings is another important objective. Several major areas such as the Museum building, the Parsons building, the Moyne Institute and several houses in the Front Square area are still unconnected and many of those which the fibre optic backbone does reach have minimal internal wiring facilities. A systematic start can be made on this from 1991/92 onwards when £20000 p.a. of recurrent funding, heretofore committed to paying for the original backbone installation, becomes available.

Users of the academic VAX 6230 will be aware of the fact that this machine is now heavily loaded during term. While it has not yet reached crisis level, the question of replacing or supplementing it should be addressed during the current year.

Developments such as the BECKETT facility have served to underline the fact that decentralised unattended equipment with a high level of utilisation using complex technology make very considerable demands on staff time. While the Laboratory has been permitted to increase its staffing level in recent years, it is still considerably understaffed for its present level of activity and improving this situation must remain a priority.

# APPENDIX A

#### EQUIPMENT

The specifications of the equipment in service on September 30th, 1991, are as follows:

#### Digital DECsystem-5000:

LIB1

1 x DECsystem-5000 Model 200 with 96 Mb of memory, 9 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 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 3500:

1 x MicroVAX 3500 with 16 Mbyte of memory, an Ethernet port, and 280 Mbytes of disc storage

Digital MicroVAX 3100

#### ADVAX3

ADVAX4

ADVAX1

1 x MicroVAX 3100 with 16 Mbyte of memory, Ethernet port, and 1.1 Gbyte of disc storage

Digital MicroVAX 3100

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 over 300 terminals or microcomputers, most of which belong to user departments, have access to the equipment from within College. Many of these compete for the limited number of entry ports on the appropriate computer via a Gandalf PACX IV switching unit or the Ericsson MD110 exchange. Others, 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 a Xyplex protocol converter. 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 direct 9.6 kb/s line to the international Internet are also operated. Other direct lines link the Laboratory with off-site College locations including Pharmacy in Shrewsbury Road and the Library in Santry.

#### **Microcomputers**

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

1 x Apple Macintoshes 1 x Amstrad PCW8256 1 x Apple Laserwriter 1 x ICL 55SX PC

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

A microcomputer laboratory, located under the railway arches near the parade ground has the following equipment:

13 x 386-33 based PCs 16 x Apple Macintoshes 1 x Apple Laserwriter 1 x QMS Laser Printer

A microcomputer facility is located in Beckett Room 1 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

The PCs in the Arches and Beckett laboratories are networked to an 80486 based fileserver using 3COM + network software running on the main Ethernet cabling.



# COMPUTER LABORATORY Central Equipment

Figure A.1

#### APPENDIX B

#### STAFF

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

30-9-1991

#### APPENDIX C

#### COSTS

The services provided by the Laboratory may be divided into those related to the central mainframe 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 Mainframe Machine Service, the expenditure was further apportioned between the five 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 mainframe activity and on estimates in the case of microcomputers and communications.

#### **ACCOUNTS for Year Ended 30th September, 1991**

Ŧ		Actual	Budget
Income:	Sale of Services	15998	5504
	Net Sale of Goods	23313	10454
	Undersponding B/Forward	152	/309
	Underspending b/ Forward		
	Total Income	47055	23500
Expenditure:	Salaries	643505	654600
	Wages	14359	13850
	Total Pay Cost	657864	668450
	Rentals of Equipment	75843	84500
	Equipment Purchase	361558	303129
	Maintenance	136486	154412
	Consumable Supplies	28883	25000
	Cost of External Services	21786	25000
	Insurance Charges	3060	10000
	Telephone Charges	4768	3000
	Miscellaneous Expenses	10894	11000
	Total Non-Pay Cost	643278	616041
	Total expenditure:	1301142	1284491
	Net annual cost:	1254087	1260991
	Underspending C/F	6904	0
Total Annual Cost		1260991	1260991