COMPUTER LABORATORY

SUMMARY ANNUAL REPORT
1984/85

In the interests of economy, this abridged version of the Laboratory's annual report is being circulated in place of the full document. The latter is, however, available on request from the Secretary's office.

Summary

1984/85 was a difficult year for the Computer Laboratory because of the size and complexity of the ICL installation project which highlighted the understaffing situation and was further compounded by delivery delays. However, the situation was under control by the end of the year and Board authorisation for additional appointments offered the prospect of some relief in the coming year. The existing systems performed well.

Usage Statistics

Percent of Use per System per User Category:

Machine	User Category					
	Library	Academic	Admin	Outside	Support	TOTAL
DEC2020	8.76	.01	11.75	.28	.85	21.64
DEC2060	.01	51.63	.87	.37	4.87	57.75
VAX11/780	.00	16.43	.00	.00	.00	16.43
PDP11/34	4.17	.00	.00	.00	.00	4.17
TOTAL	12.94	68.07	12.61	.65	5.72	100.00

Analysis of Academic Computer Use:

Faculty	Percent of Total Computer Use			
	DEC2020	DEC2060	VAX	TOTAL
Eng. & System Sci.	.01	22.68	16.43	39.12
Science	.00	24.75	.00	24.75
Econ. & Social Std.	.00	2.45	.00	2.45
Med. & Dent. Sci.	.00	1.21	.00	1.21
Arts(Humanities)	.00	0.33	.00	0.33
Arts(Letters)	.00	0.21	.00	0.21
TOTAL	.01	51.63	16.43	68.07

Machine Performance

DECsystem-2060 availability: 8603.67 hours (98.22%)
DECsystem-2020 availability: 8706.63 hours (99.39%)

Cost Summary

Expenditure:		Actual £	Budget £
	Pay Cost	390,804	392,000
	Non-Pay Cost	436,452	448,137
	Total	837,256	840,137
Income:	Income from Sales:	10,831	12,000
Net Annual Cost:		826,425	828,137

Analysis of Service Costs:

User Category	Computer Service (Note 1)	Application Development (Note 2)	Total
Academic	500668	0	500668
Library	95197	51677	146874
Administrative	92760	81313	174073
Outside	4808	0	4808
Total	693434	132990	826424

Note 1: "Systems Support" use is included as a overhead in these costs.

Note 2: This breakdown is approximate and based on the total development cost distributed in proportion to the number of development staff assigned.

UNIVERSITY OF DUBLIN

TRINITY COLLEGE

COMPUTER LABORATORY

ANNUAL REPORT 1984/85

CONTENTS

SECTION 1 INTRODUCTION

The year was one of considerable activity in the Laboratory, due mainly to the transition from an all DEC computing environment to a mixed ICL and DEC one. This imposed very considerable pressures on all concerned and gave rise to many problems. However, most of these were surmounted and by the end of September the fundamental requirements for the new academic year's service were in place and a satisfactory working relationship had developed with the new supplier.

The difficulties commenced with the delayed delivery and installation of the interim ICL machine originally expected in October 1984 but which went into operation in early 1985. This, together with the unexpected complexity of the VME operating system and the significant differences in technical structure, initially gave rise to some lack of confidence in the feasibility of implementing a suitable service on schedule but this was overcome by internal re-grouping to meet the challenge, by further training, and by improved ICL support.

A further problem arose in April when the delivery of the main machine was deferred from July to October. However, the company responded appropriately to this by installing a much more powerful interim machine in June to ensure that the delay would not jeopardise service during the coming academic year and satisfactorily met all major delivery and installation commitments relating to this system.

The demands of this development on top of the ongoing work of running the existing service highlighted the serious understaffing situation that developed in the Laboratory in recent years. Several other important developments, including the implementation of the pilot X-25 local area network, fell seriously behind schedule and the level of assistance to users also suffered.

On the other hand, the Board approved the appointment, by 1st July, of two additional specialist staff to ease this situation. Unfortunately, recruitment difficulties made it impossible to make the appointments by that date but the staff concerned will make a significant impact in the coming academic year.

SECTION 2 MACHINE UTILISATION AND PERFORMANCE

The use of the central equipment by various College departments is described in the following tables in both percentage and cost terms. The basis of this costing is set out in Appendix C and it must be emphasised that they reflect only the equipment funded by the Computer Laboratory and are not a measure of the total computing activity in College since many users have access to other equipment ranging from substantial mini-computers to small personal machines located in many departments. While an ICL 2955 was operation from February to mid-June and an ICL 2966 from mid-June onwards, software to record and analyse usage was not yet ready so activity on these machines is not shown in detail. It consisted almost entirely of "Systems Support" work by Laboratory staff with only a small amount of activity by users. The costs involved are included in the overhead element of the costing rates for the existing systems.

Trinity again made extensive use of the UCD DECsystem-2060 during the year. While it is believed that heavy use was also made of UCD's IBM machine, no figures for this activity were received from the UCD Computer Centre.

The reliability of the central equipment was again very satisfactory during the year as can be seen from Tables 11 and 12 and no abnormal breakdowns were experienced.

Analysis of Computer Use

Cost of Monthly Use per User Category (IR£)

Month	User Category					TOTAL
	Library	Academic (Note 2)	Admin	Outside	Support	
10/84	5113	21587	9856	330	3714	40601
11/84	6138	34768	14364	310	3269	58849
12/84	2772	21096	5398	327	2652	32244
1/85	4383	33917	5778	342	3254	47674
2/85	4664	32535	5133	379	3540	46251
3/85	4830	41562	5501	396	3628	55917
4/85	5680	38313	5451	484	4866	54794
5/85	5064	35116	6985	316	3625	51105
6/85	5747	28258	5956	578	2705	43243
7/85	4833	18591	6691	227	2916	33257
8/85	6155	28395	7906	436	2879	45771
9/85	5434	23966	8439	408	2602	40849
VAX/PDP11 (Note 1)	28943	113937	0	0	0	142880
TOTAL	89754	472041	87456	4533	39650	693434

Table 1

Note 1: The operational cost to the Computer Laboratory of the VAX 11/780 located in the Computer Science Department and of the PDP 11/34 Library circulation control machine are only available on a full-year basis.

Note 2: In addition to this usage, processing was performed at UCD, at no cost to TCD.

Analysis of Computer Use

Percent of Total Monthly Use per User Category

Month	User Category					TOTAL
	Library	Academic (Note 2)	Admin	Outside	Support	
10/84	12.59	53.17	24.28	.81	9.15	100.00
11/84	10.43	59.08	24.41	.53	5.56	100.00
12/84	8.60	65.43	16.74	1.02	8.22	100.00
1/85	9.19	71.15	12.12	.72	6.82	100.00
2/85	10.08	70.34	11.10	.82	7.65	100.00
3/85	8.64	74.33	9.84	.71	6.49	100.00
4/85	10.37	69.92	9.95	.88	8.88	100.00
5/85	9.91	68.71	13.67	.62	7.09	100.00
6/85	13.29	65.35	13.77	1.34	6.26	100.00
7/85	14.53	55.90	20.12	.68	8.77	100.00
8/85	13.45	62.04	17.27	.95	6.29	100.00
9/85	13.30	58.67	20.66	1.00	6.37	100.00
VAX/PDP11 (Note 1)	20.26	79.74	.00	.00	.00	100.00
TOTAL	12.94	68.07	12.61	.65	5.72	100.00

Table 2

Note 1: The operational cost to the Computer Laboratory of the VAX 11/780 located in the Computer Science Department and of the PDP 11/34 Library circulation control machine are only available on a full-year basis.

Note 2: In addition to this usage, processing was performed at UCD, at no cost to TCD.

Total Annual Cost per System per User Category (IR£)

Machine	User Category					
	Library	Academic	Admin	Outside	Support	TOTAL
DEC2020	60731	56	81445	1971	5871	150074
DEC2060	80	358048	6011	2563	33778	400480
VAX11/780	0	113937	0	0	0	113937
PDP11/34	28943	0	0	0	0	28943
TOTAL	89754	472041	87456	4533	39650	693434

Table 3

Percent of Total Annual Cost per System per User Category

Machine	User Category					
	Library	Academic	Admin	Outside	Support	TOTAL
DEC2020	8.76	.01	11.75	.28	.85	21.64
DEC2060	.01	51.63	.87	.37	4.87	57.75
VAX11/780	.00	16.43	.00	.00	.00	16.43
PDP11/34	4.17	.00	.00	.00	.00	4.17
TOTAL	12.94	68.07	12.61	.65	5.72	100.00

Table 4

Analysis of Academic Computer Use

by Machine by Department - Cost IR£

Department	Cost of Computer Use			
	DEC2020	DEC2060	VAX	TOTAL
Computer Science	56	105766	113937	219759
Chemistry	0	94152	0	94152
Statistics	0	27128	0	27128
Pure Maths	0	19749	0	19749
Physics	0	15280	0	15280
Applied Maths	0	9376	0	9376
Genetics	0	8532	0	8532
Microelectronics	0	8251	0	8251
Civil Eng.	0	8242	0	8242
Mechanical Eng.	0	7871	0	7871
Business Studies	0	7758	0	7758
Zoology	0	6716	0	6716
Community Health	0	4990	0	4990
Economics	0	4457	0	4457
Psychology	0	4314	0	4314
Sociology	0	4278	0	4278
Botany	0	4117	0	4117
Geology	0	2946	0	2946
Geography	0	2206	0	2206
Physiology	0	1695	0	1695
Education	0	1506	0	1506
Environmental Scienc	0	1358	0	1358
Spanish	0	1300	0	1300
Biochemistry	0	1238	0	1238
Pharmacy	0	1082	0	1082
Others	0	3740	0	3740
TOTAL	56	358049	113937	472041

Table 5

Analysis of Academic Computer Use

by Machine by Department - percent

Department	Percent of Total Computer Use			
	DEC2020	DEC2060	VAX	TOTAL
Computer Science	.01	15.25	16.43	31.69
Chemistry	.00	13.58	.00	13.58
Statistics	.00	3.91	.00	3.91
Pure Maths	.00	2.85	.00	2.85
Physics	.00	2.20	.00	2.20
Applied Maths	.00	1.35	.00	1.35
Genetics	.00	1.23	.00	1.23
Microelectronics	.00	1.19	.00	1.19
Civil Eng.	.00	1.19	.00	1.19
Mechanical Eng.	.00	1.14	.00	1.14
Business Studies	.00	1.12	.00	1.12
Zoology	.00	.97	.00	.97
Community Health	.00	.72	.00	.72
Economics	.00	.64	.00	.64
Psychology	.00	.62	.00	.62
Sociology	.00	.62	.00	.62
Botany	.00	.59	.00	.59
Geology	.00	.42	.00	.42
Geography	.00	.32	.00	.32
Physiology	.00	.24	.00	.24
Education	.00	.22	.00	.22
Environmental Scienc	.00	.20	.00	.20
Spanish	.00	.19	.00	.19
Biochemistry	.00	.18	.00	.18
Pharmacy	.00	.16	.00	.16
Others	.00	.54	.00	.54
TOTAL	.01	51.63	16.43	68.07

Table 6

Analysis of Library Use

Cost - IR£

Application	Cost
Cataloguing	30932
Accessions	25588
Circulation Control (Note 1)	28943
Reader Services	3970
SDI	34
Miscellaneous	287
Total	89754

Table 7

Note 1: Maintenance cost of the PDP 11/34 are paid by the Library.

Analysis of Library Use

Percent of Total Use

Application	Percent
Cataloguing	4.46
Accessions	3.69
Circulation Control (Note 1)	4.17
Reader Services	.57
SDI	.00
Miscellaneous	.04
Total	12.94

Table 8

Note 1: Maintenance cost of the PDP 11/34 are paid by the Library

Analysis of Administrative Use

Cost - IR£

User		Cost
Finance Office:		33037
Academic Administration:		
- Student and Graduate Records	30789	
- Admissions	12823	
- Faculty Offices:	3008	
- Miscellaneous	1348	
		47967
Accommodation Office		5619
Buildings Office		10
Staff Office		336
Information Office		137
General Services Office		7
Other		343
Total		87456

Table 9

Analysis of Administrative Use

percent

User		Percent of Total Use
Finance Office:		4.76
Academic Administration:		
- Student and Graduate Records	4.44	
- Admissions	1.85	
- Faculty Offices:	.43	
- Miscellaneous	.19	
		6.92
Accommodation Office		.81
Buildings Office		.00
Staff Office		.05
Information Office		.02
General Services Office		.00
Other		.05
Total		12.61

Table 10

SECTION 3 APPLICATIONS

3.1 Academic

No major changes were observed in the pattern of academic usage. A number of existing trends continued; use of the plotter, for example, continued to grow and the demand for word processing facilities by academic users, which was further stimulated by the availability of a Toshiba high quality printer, again far exceeded the capacity of the limited resources available.

3.2 The Library

Considerable effort was again spent on evaluating means of converting the existing card catalogue entries to machine readable form to permit their integration with the main computer catalogue. A microcomputer based approach aimed at minimising the amount of editing required by automatically processing as much material as possible during the data entry process appeared likely to prove feasible but no definite conclusion had been reached by the year end. The book ordering system went into full operation during the year and among the other developments undertaken were a revision of the data file security arrangements, the extension of word processing facilities, and the selection of microcomputer equipment to improve the on-line database search facilities.

3.3 Administration

No major new applications were implemented in the administrative area and most of the available effort was spent on supporting the existing systems and the growing number of microcomputers installed in administrative offices. Discussions between major administrative users, the library, and the Computer Laboratory began in December with a view to developing a new strategy for the development of information systems in College. Unfortunately, these were delayed by internal re-organisation undertaken to cope with the ICL installation and again by the resignation of the Manager of the Information Systems Group and will not resume until the coming academic year.

DECsystem-2060 Availability

Month	System Down-time - Hours					Availability	
	Engineering		Environ-mental causes	Soft-ware	Total	Hours	%
	Scheduled	Unscheduled					
10/84	3.28	0.08	0.18	0.12	3.67	740.34	99.51
11/84	3.33	0.97	0.08	0.10	4.48	715.52	99.38
12/84	4.77	2.40	0	0	7.17	736.83	99.04
1/85	3.12	3.47	0	0	6.58	737.42	99.12
2/85	3.93	0.17	5.45	0.05	9.60	662.40	98.57
3/85	3.00	0.45	0	0.12	3.57	740.43	99.52
4/85	3.00	0.57	0	0.18	3.75	716.25	99.48
5/85	4.35	1.42	0.12	0.23	6.12	737.89	99.18
6/85	2.97	0	19.30	0.22	22.48	697.52	96.88
7/85	5.63	0.28	17.73	9.95	33.60	710.40	95.48
8/95	3.00	0.33	10.12	0.07	13.52	730.49	98.18
9/85	11.53	30.22	0.07	0	41.82	678.19	94.19
Overall	51.91	40.35	53.05	11.03	156.34	8603.67	98.22

Table 11

DECsystem-2020 Availability

Month	System Down-time - Hours					Availability	
	Engineering		Environ-mental causes	Soft-ware	Total	Hours	%
	Scheduled	Unscheduled					
10/84	2.12	0	0.02	0	2.13	741.87	99.71
11/84	3.00	0.25	0.10	0.63	3.98	716.02	99.45
12/84	1.97	0	0	0	1.97	742.03	99.74
1/85	2.12	0	0	0	2.12	741.88	99.72
2/85	2.37	0	10.25	0	12.62	659.38	98.12
3/85	2.22	0.03	0	0.02	2.27	741.74	99.70
4/85	2.35	0	0	0.02	2.37	717.63	99.67
5/85	2.25	0	0	0.08	2.33	741.67	99.69
6/85	2.25	0	0.70	0.13	3.08	716.92	99.57
7/85	2.25	0.08	12.32	0	14.65	729.35	98.03
8/85	2.90	0	0	0.12	3.02	740.98	99.59
9/85	2.58	0.08	0.05	0.13	2.85	717.15	99.60
Overall	28.36	0.45	23.43	1.13	53.37	8706.63	99.39

Table 12

SECTION 4 COMPUTING SERVICE DEVELOPMENT

4.1 Equipment

All development resources in the equipment area were concentrated on the installation of the ICL system ordered in 1983/84. Initially, this entailed the installation of an interim ICL2955 machine and an ICL OSLAN Local Area Network within the Laboratory which was used exclusively for software development and for training purposes. The 2955 was subsequently replaced in June by the bigger 2966 and the first regular users of the ICL service began work. The ICL system was linked to the Gandalf PACX to permit access by the existing terminal network and in addition, twenty four additional terminals were installed via the OSLAN.
Work commenced on the installation of a pilot Local Area Network using X-25 equipment to initially link a group of users in the Science Faculty and in the Faculty of Engineering with the Laboratory. This had fallen well behind schedule by the end of the year due to the demands of the ICL implementation effort and is unlikely to be in operation before the end of the calendar year, 1985.

4.2 Software

No new software was implemented on the DECsystem-20 machines other than SPSS-X, a major new version of the statistical program SPSS. All systems programming staff worked on the installation and tailoring of the ICL VME operating system and of the necessary editor and programming language compilers. User services and systems programmers jointly developed the necessary simplified System Control Language procedures to facilitate use of the very complex system by users migrating from the DEC machines.

SECTION 5 OTHER ACTIVITIES

5.1 Teaching and Publications

The Academic User Services Group ran its usual range of courses and, in addition, ran a pilot course on the ICL system for Laboratory and Computer Science staff. The Newsletter was published as usual during the year and in addition to new versions of some of the existing pamphlets, a new introductory document for users of the ICL service was produced.

5.2 Sale of Services

Income at £10,831, showed a slight increase over last year. However, it was still below the arbitrary target of £12,000 and this is unlikely to change in the immediate future. This year's increase was attributable to one abnormal transaction of a non-recurrent nature.

SECTION 6 FUTURE DEVELOPMENTS

At the time of writing, the main ICL machine, the Series 39 Level 80 (formerly "Estriel") which was scheduled for delivery in October 1985 has been installed. It is planned to transfer users from the 2966 to this on a phased basis as soon as the operating system and other software have been satisfactorily installed - probably during Hilary term. The transfer of users from the DECsystem-2060 to the ICL machine will depend largely on the rate at which programs can be converted and on the rate at which suitable ICL-based replacements for existing program packages can be located and installed. While no date has been fixed for the withdrawal of the DEC, it is likely that increasing running costs in terms of maintenance charges, energy consumption, space occupancy, and system administration will make it economically attractive to replace it within the next two years. However, every effort will be made to ensure that users have ample notice of this so that work can be transferred to the new system.

It is hoped that sufficient experience will be gained with the pilot LAN during the coming year to enable its enhancement, by either the same or an alternative technology, during the summer of 1986. It is also planned that HEANET, which is now in operation linking VAX machines in all participating colleges, will be accessible from the ICL system and can therefore be made available to users of the Laboratory.

Microcomputer equipment currently located in the Laboratory will be accessible to users by arrangement. At present, this includes an ICL multi-user microcomputer running the CP/M operating system and basic wordprocessing, spreadsheet, and database application software and an Apple Mackintosh and it is hoped that this range can be extended if other equipment becomes available.

APPENDIX A

EQUIPMENT

The specifications of the equipment installed on September 30th, 1985 are as follows:

Digital DECsystem-2060:

1 x 2060 CPU with 1024K words of memory and 80 asynchronous communications ports
4 x RP06 200 Mbyte disc drives
2 x TU45 120Kb, 9-track, 800/1600 b.p.i. tape drives
1 x DN20 synchronous communications port
1 x LA36 Console
1 x Calcomp Model 81 Plotter
1 x Kaiser Optical Mark Reader

Digital DECsystem-2020:

1 x 2020 CPU with 512K words of memory, 32 asynchronous communications ports and 1 synchronous communication port
3 x RP06 200 Mbyte disc drives
2 x TU45 120 KB 9-track, 800/1600 b.p.i. magnetic tape drives
1 x LA36 Console

ICL 2966 System:

- 1 x ICL 2966 OCP, SCU, & 16 Mb STO
- 2 x EDS80/160 Disc Units each with 80 Mb removable and 160 Mb fixed storage
- 1 x FDS160/160 Disc unit with 320Mb of fixed storage.
- 1 x FDS640 Disc unit with 640 Mb of fixed storage.
- 1 x MT Magnetic tape drive 800/1600 b.p.i.
- 24 x asynchronous terminal ports accessed via an OSNET LAN.

Digital PDP 11/34:

For real-time Library Circulation Control System:

- CPU with 256K memory
- 8 asynchronous lines
- 2 x RL01 Disc drives
- 1 x RL02 Disc drive
- 1 x LA36 Console

Digital VAX 11/780:

1 x VAX 11/780 system in the Department of Computer Science comprising the following:

- Central Processor with 1.75 Mbyte of memory
- 32 asynchronous lines
- 1 x LA120 Console
- 3 x RK06 Disc drives
- 1 x TS11 Magnetic tape drive

Communications

Approximately 200 terminals or microcomputers, most of which belong to user departments, have access to the equipment. Most of these compete for the limited number of entry ports on the appropriate computer via a Gandalf PACX IV switching unit. Many of the public terminals which may be booked in advance and located in the Terminal Room of the Laboratory have dedicated ports, however, to guarantee access. A high-speed data-line connects the DECsystem-2060 with the Amdahl 470 machine in UCD. The DECsystem-2060 is also connected to the experimental Irish Universities Network currently linking TCD, UCD and UCG, and the VAX 11/780 is connected to EIRPAC, Telecom Eireann's public X-25 service as part of the HEANET development.

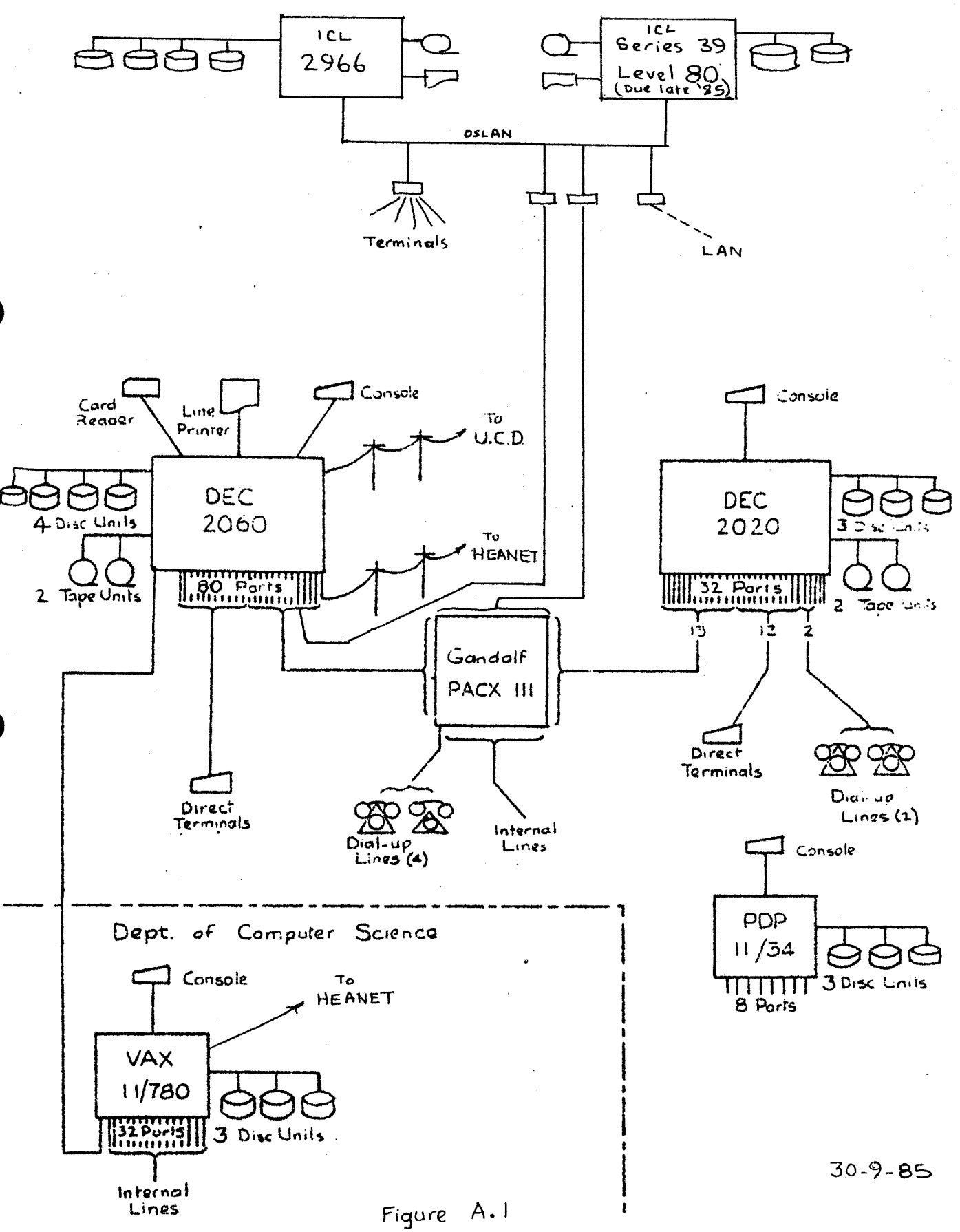

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Figure A.1

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.

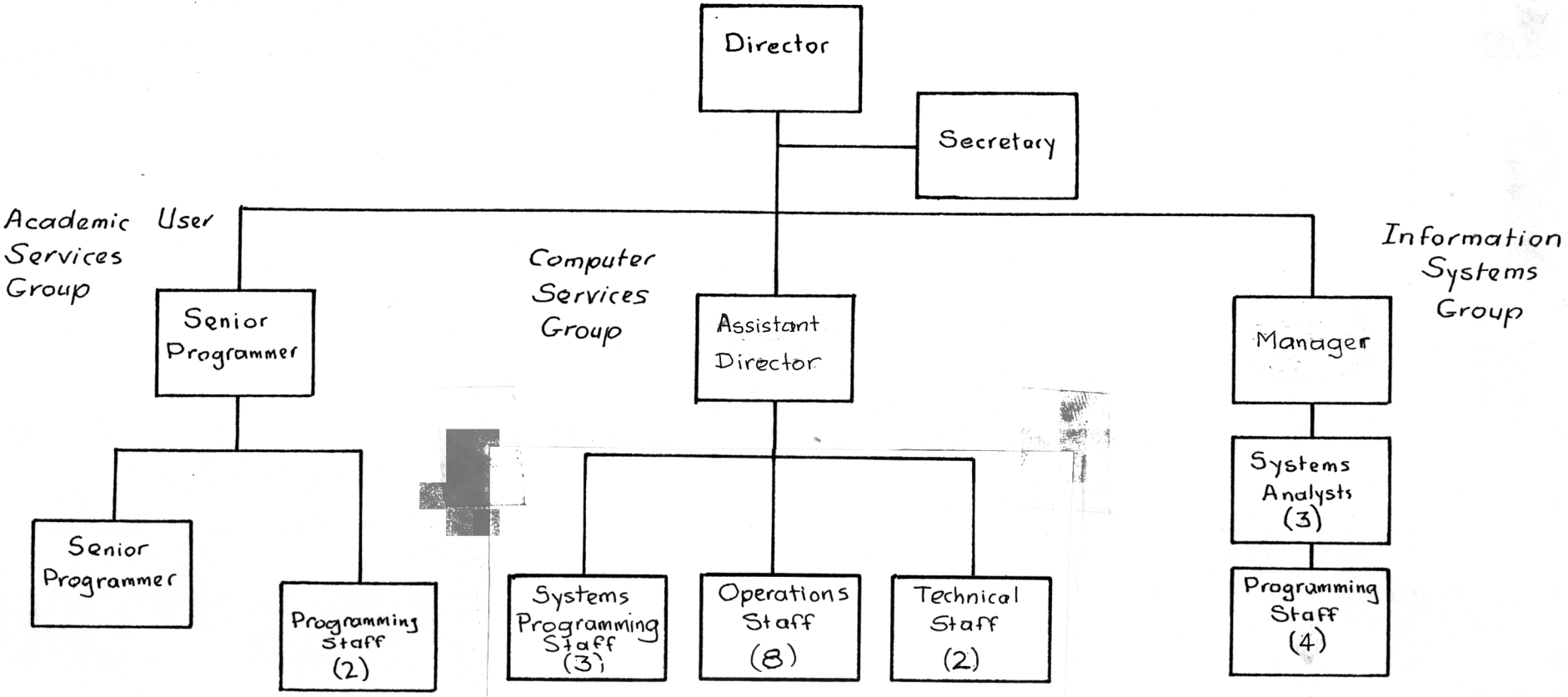
COMPUTER SERVICES GROUP

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 software, technicians, and janitors who are responsible for security.

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
Figure B.1

APPENDIX C

COSTS

The services provided by the Laboratory may be divided into two groups:

1. Computer Service consisting of computer time together with the appropriate materials and support facilities. This is available to all college departments and to outside users.

2. Application Development Service This is a full systems analysis and programming service provided for library and administrative applications design. The Laboratory staff who perform this work normally use the "Computing Service" for test purposes on behalf of the user departments.

The total cost of running the Laboratory is shown in Table C.1 under the main expenditure headings used in the College accounts. The cost of providing each of the two services was determined 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 the cost of Systems Analysts is charged to Application Development, Operators to Computer Service, while the cost of others such as the Director is distributed over both in proportion to the estimated effort spent on each by the individuals concerned.

In the case of Computer Service, the expenditure was further apportioned between the DECsystem-2020, the DECsystem-2060, the PDP 11/34 and the machine operated by the Computer Science Department. In the case of the two DECsystem-20 machines the records of time used were then costed for use in this report. Income from sale of computer time has been credited to the machine when allocating the costs.

Table C.2 shows use of the two services by user category.

COMPUTER LABORATORY

ACCOUNTS

Year Ended 30 September 1985

	Actual	Budget
	£	£
Income:		
Income from Sale of Computer Services:	10,831	12,000
Expenditure:		
Cost of Staff:		
- Salaries	369,741	371,000
- Wages	21,063	21,000
Total Pay Cost	390,804	392,000
Rentals of Equipment	36,052	53,000
Purchase of Ancillary Equipment	259,734	219,937
Maintenance	109,141	135,000
Consumable Supplies	31,429	26,500
Cost of External Services	633	2,200
Insurance Charges	3,374	3,500
Miscellaneous Expenses	6,090	8,000
Total Non-Pay Cost	436,452	448,137
Total expenditure:	837,256	840,137
Net annual cost:	826,425	828,137

Table C.1

Analysis of Service Costs

User Category	Computer Service (Note 1)	Application Development Service (Note 2)	Total
Academic	500668	0	500668
Library	95197	51677	146874
Administrative	92760	81313	174073
Outside	4808	0	4808
Total	693434	132990	826424

Note 1: "Systems Support" use is included

Note 2: This breakdown is approximate and based on the total development cost distributed in proportion to the number of development staff assigned.

Table C.2