COMPUTER LABORATORY

SUMMARY ANNUAL REPORT
1985/86

In the interests of economy, this abridged version of the Laboratory's annual report is being circulated in place of the full document. Following suggestions last year, it is somewhat larger than the summary document circulated on previous occasions. As before, the full report is available on request from the Secretary's office.

Summary

1985/86 was another very difficult year for the computing service. The demand from users continued to grow, in line with experience internationally. The Laboratory's resources, however, remained virtually unchanged resulting in an even greater overload with an inevitable reduction in the quality of service and increasing backlogs.

The main ICL system, which went into service at the beginning of January, offers impressive computing power but is extremely complex. Users need and reasonably expect access to this power but implementation of all the software and other facilities desired exceeds the capacity of our systems programming staff and the complexity of the system makes very heavy demands on user support personnel. A substantial backlog of work remains to be done with little prospect of catching up in the near future.

The ageing DECsystem-20 machines continue to be heavily used both because of the capacity which they offer and their relative ease of use. Serious consideration must now be given to their replacement as it is unlikely to prove economic to move them to the new Advanced Technology Building.

Support for microcomputer users in College is another area of spectacular growth which impacts all areas of the Laboratory. The microcomputer support programmer, appointed last year, has been of great help here but the volume of work is still greater than can be handled by one person. Users need advice on the selection of software and equipment, the changing products of many suppliers must be kept under regular review, and discount agreements negotiated. The latter contracts usually require a single contact point in College and the Laboratory therefore acts as a central purchasing agent on behalf of users. This entails a very considerable administrative workload. Some 60 systems together with their various software and ancillary devices and supplies were purchased last year and over £68,000 worth of these transactions were on behalf of other departments, individual staff members, or students.

While the small staff establishment has already been referred to as a problem, it must also be said that efforts to recruit experienced personnel to fill vacancies which arose during the year and the additional positions authorised last year have not been as successful as hoped for. Excellent internal appointments were made, but these were at a more junior level than planned and the injection of outside experience which had been hoped for proved impossible.

On a brighter note, a number of interesting developments took place during the year. One of these was the assembly of a workstation for blind users. This unit, consisting of a microcomputer with a braille printer, a voice output unit, and special software, went into service at the end of the year and received financial support from a number of bodies. Another development was the opening, thanks to the co-operation of the Faculty of Science, of a microcomputer laboratory in refurbished space under the "Arches" in the Parade Ground. While not fully equipped by the year end, it was nevertheless ready for limited operation at the beginning of term.

Usage Statistics

Percent of Use per System per User Category:

Machine	User Category					
	Library	Academic	Admin	Outside	Support	TOTAL
DEC2020	3.41	.02	4.90	.08	.23	8.64
DEC2060	.36	21.57	.23	.14	2.56	24.86
VAX11/780	.00	7.25	.00	.00	.00	7.25
PDP11/34	1.44	.00	.00	.00	.00	1.44
ICL	.00	32.37	.00	5.78	19.65	57.81
TOTAL	5.20	61.21	5.14	6.00	22.45	100.00

Analysis of Academic Computer Use:

	Percent of Total Computer Use				
Faculty	DEC2020	DEC2060	VAX	ICL	TOTAL
Eng. & System Science	.00	8.82	7.25	.00	16.08
Science	.02	10.45	.00	.00	10.47
Econ. & Social Studies	.00	1.64	.00	.00	1.64
Health Sciences	.00	.39	.00	.00	.39
Arts (Humanities)	.00	.18	.00	.00	.18
Arts(Letters)	.00	.08	.00	.00	.08
General (Note 1)	.00	.00	.00	32.37	32.37
Total	.02	21.57	7.25	32.37	61.21

Note 1: This refers to use of the ICL system for which a detailed usage analysis is not available.

Machine Performance

DECsystem-2060 availability: 8364.65 hours (95.48%)
DECsystem-2020 availability: 8624.97 hours (98.45%)

Cost Summary

Expenditure:		Actual £	Budget £
	Pay Cost	429,467	440,800
	Non-Pay Cost	485,569	458,277
	Total	915,036	899,077
Income:	Income from Sales:	23,951	12,000
Net Annual Cost:		891,085	887,077

Analysis of Total Service Costs:

User Category	Total
Academic	585587
Library	107749
Administrative	140341
Outside	57408
Total	891085

Note: These are approximate figures based on the analysis of computer usage together with an estimated allocation of other costs to the four user categories.

UNIVERSITY OF DUBLIN

TRINITY COLLEGE

COMPUTER LABORATORY

ANNUAL REPORT 1985/86

CONTENTS

SECTION 1 INTRODUCTION

This year was another particularly difficult one for the Computer Laboratory as user demands and the complexity of the systems continued to grow at an increasing rate.

Perhaps the biggest single focus of activity was the central ICL machine which was delivered at the beginning of the year and went into service at the beginning of January. This powerful but complex system made enormous demands on systems programming, operations, and user services staff and while its computing power is impressive, it not as easy to use as the other machines in the Laboratory and has not achieved the same popularity among users as the other systems.

The ageing DECsystem-20 machines continue to be heavily used both because of the capacity which they offer and their relative ease of use. Serious consideration must now be given to their replacement as it is unlikely to prove economic to move them to the new Advanced Technology Building.

The other area of major activity was the microcomputer field. The demand for advice and assistance in the acquisition of machines and participation in the various educational or volume based discount arrangements grew enormously during the year and by the end of September some 60 systems had been purchased. As part of this activity, the College accepted an invitation to become the first Irish member of the Apple University Consortium, an international group of universities which share experience and software for the company's machines.

While staff numbers have already been referred to as a problem, it must be said that efforts to recruit experienced personnel to fill vacancies which arose during the year and the additional positions authorised last year have not been as successful as hoped for. Excellent internal appointments were made, but these were at a more junior level than planned and the injection of outside experience which had been hoped for proved impossible.

On a brighter note, a number of interesting developments took place during the year. One of these was the assembly of a workstation for blind users. This unit, consisting of a microcomputer with a braille printer, a voice output unit, and special software, went into service at the end of the year and received financial support from a number of bodies. Another development was the opening, thanks to the co-operation of the Faculty of Science, of a microcomputer laboratory in refurbished space under the "Arches" in the Parade Ground. While not fully equipped by the year end, it was nevertheless ready for limited operation at the beginning of term.

In summary, the scope of the service which the user community expects from the Laboratory is growing in line with such developments internationally. Staffing levels are, however, virtually static and the level of service, instead of keeping pace, has deteriorated seriously as staff effectiveness is eroded by endeavouring to cope with an ever increasing overload.

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 the figures 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.

Detailed analyses of activity on the ICL system are not included as manpower to develop the necessary programs to produce them was not available.

As in previous years, Trinity made some use of the UCD DECsystem-2060 during the year. While it is known that heavy use was also made of UCD's Amdahl 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.

There was a significant increase in use of the Laboratory's Optical Mark Reader for the marking of multiple-choice examinations and a number of departments have become dependent on the machine. It has not proved reliable and caused serious inconvenience to users during the year when it was necessary to send it abroad for repair.

Analysis of Computer Use

Cost of Monthly Use per User Category (IR£)

Month	User Category					TOTAL
	Library	Academic (Note 2)	Admin	Outside	Support	
10/85	2684	9963	4012	128	1809	18596
11/85	3487	13326	5292	115	2082	24302
12/85	1854	11515	2423	69	1371	17232
1/86	2239	17650	2773	61	1897	24620
2/86	2431	13594	2868	95	1442	20430
3/86	1706	15807	2634	121	1278	21545
4/86	2612	20171	2961	198	1382	27325
5/86	2393	14877	2847	262	1471	21849
6/86	1944	12486	2360	124	1357	18271
7/86	2261	13825	2829	65	2061	21040
8/86	1996	9591	3401	218	2375	17581
9/86	2331	7386	3708	178	2186	15789
VAX/PDP11	10676	53788	0	0	0	64464
ICL	0	240170	0	42888	145817	428875
TOTAL	38611	454148	38108	44523	166528	741918

Note 1: The operational cost to the Computer Laboratory of the ICL system, the VAX11/780 located in the Computer Science Department and of the PDP 11/34 Library circulation control machine are only available on a full-year basis. Furthermore, the breakdown of ICL usage between categories is estimated.

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

Note 3: Due to the rapidly changing structure of the computing service and facilities, the accounting mechanisms on which these figures are based no longer accurately reflect the present allocation of resources. In particular, the microcomputer activity is not identifiable and the high capital value of the ICL system has excessively reduced the overhead element attributable to the other systems. The procedures are now under review.

Analysis of Computer Use

Percent of Total Monthly Use per User Category

Month	User Category					TOTAL
	Library	Academic (Note 2)	Admin	Outside	Support	
10/85	14.43	53.57	21.58	.69	9.73	100.00
11/85	14.35	54.84	21.78	.47	8.57	100.00
12/85	10.76	66.82	14.06	.40	7.96	100.00
1/86	9.09	71.69	11.26	.25	7.71	100.00
2/86	11.90	66.54	14.04	.47	7.06	100.00
3/86	7.92	73.37	12.22	.56	5.93	100.00
4/86	9.56	73.82	10.84	.73	5.06	100.00
5/86	10.95	68.09	13.03	1.20	6.73	100.00
6/86	10.64	68.34	12.92	.68	7.43	100.00
7/86	10.74	65.71	13.45	.31	9.79	100.00
8/86	11.35	54.55	19.34	1.24	13.51	100.00
9/86	14.76	46.78	23.48	1.13	13.85	100.00
VAX/PDP11	16.56	83.44	.00	.00	.00	100.00
ICL	.00	56.00	.00	10.00	34.00	100.00
TOTAL	5.20	61.21	5.14	6.00	22.45	100.00

Table 2

Note 1: The operational cost to the Computer Laboratory of the ICL system, 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. Furthermore, the breakdown of ICL usage between categories is estimated.

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

Note 3: Due to the rapidly changing structure of the computing service and facilities, the accounting mechanisms on which these figures are based no longer accurately reflect the present allocation of resources. In particular, the microcomputer activity is not identifiable and the high capital value of the ICL system has excessively reduced the overhead element attributable to the other systems. The procedures are now under review.

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

Machine	User Category					
	Library	Academic	Admin	Outside	Support	TOTAL
DEC2020	25268	173	36386	563	1733	64123
DEC2060	2667	160017	1722	1072	18978	184456
VAX11/780	0	53788	0	0	0	53788
PDP11/34	10676	0	0	0	0	10676
ICL	0	240170	0	42888	145817	428875
TOTAL	38611	454148	38108	44523	166528	741918

Percent of Total Annual Cost per System per User Category

Machine	User Category					
	Library	Academic	Admin	Outside	Support	TOTAL
DEC2020	3.41	.02	4.90	.08	.23	8.64
DEC2060	.36	21.57	.23	.14	2.56	24.86
VAX11/780	.00	7.25	.00	.00	.00	7.25
PDP11/34	1.44	.00	.00	.00	.00	1.44
ICL	.00	32.37	.00	5.78	19.65	57.81
TOTAL	5.20	61.21	5.14	6.00	22.45	100.00

Table 4

Analysis of Academic Computer Use

by Machine by Department - Cost IR£

	Cost of Computer Use				
Department	DEC2020	DEC2060	VAX	ICL	TOTAL
Computer Science	21	41374	53788	X	95183
Chemistry	138	35965	0	X	36103
Applied Maths	0	12915	0	0	12915
Statistics	0	11590	0	0	11590
Pure Maths	0	10467	0	0	10467
Business Studies	0	8721	0	0	8721
Microelectronics	0	4877	0	0	4877
Zoology	0	4001	0	0	4001
Mechanical Eng.	0	3833	0	0	3833
Civil Eng.	0	3745	0	0	3745
Physics	0	2889	0	X	2889
Psychology	0	2838	0	0	2838
Genetics	0	2592	0	0	2592
Geology	0	2417	0	0	2417
Economics	0	2007	0	0	2007
Community Health	0	1983	0	0	1983
Biochemistry	0	838	0	0	838
Botany	14	750	0	0	764
Sociology	0	711	0	0	711
Education	0	592	0	0	592
Pharmacology	0	527	0	0	527
Political Sci.	0	488	0	0	488
Physiology	0	469	0	0	469
Environmental Science	0	413	0	0	413
Clinical Med.	0	412	0	0	412
Others	0	2603	0	0	2603
General	0	0	0	240170	240170
TOTAL	173	160017	53788	240170	454148

Table 5

Analysis of Academic Computer Use

by Machine by Department - percent

Department	Percent of Total Computer Use				
	DEC2020	DEC2060	VAX	ICL	TOTAL
Computer Science	.00	5.58	7.25	.00	12.83
Chemistry	.02	4.85	.00	.00	4.87
Statistics	.00	1.74	.00	.00	1.74
Pure Maths	.00	1.56	.00	.00	1.56
Physics	.00	1.41	.00	.00	1.41
Applied Maths	.00	1.18	.00	.00	1.18
Genetics	.00	.66	.00	.00	.66
Microelectronics	.00	.54	.00	.00	.54
Civil Eng.	.00	.52	.00	.00	.52
Mechanical Eng.	.00	.50	.00	.00	.50
Business Studies	.00	.39	.00	.00	.39
Zoology	.00	.38	.00	.00	.38
Community Health	.00	.35	.00	.00	.35
Economics	.00	.33	.00	.00	.33
Psychology	.00	.27	.00	.00	.27
Sociology	.00	.27	.00	.00	.27
Botany	.00	.11	.00	.00	.11
Geology	.00	.10	.00	.00	.10
Geography	.00	.10	.00	.00	.10
Physiology	.00	.08	.00	.00	.08
Education	.00	.07	.00	.00	.07
Environmental Science	.00	.07	.00	.00	.07
Spanish	.00	.06	.00	.00	.06
Biochemistry	.00	.06	.00	.00	.06
Pharmacy	.00	.06	.00	.00	.06
Others	.00	.35	.00	.00	.35
General	.00	.00	.00	32.37	32.37
TOTAL	.02	21.57	7.25	32.37	61.21

Table 6

Analysis of Library Use

Cost - IR£

Application	Cost
Cataloguing	15697
Accessions	9682
Circulation Control (Note 1)	10676
Reader Services	2002
SDI	16
Miscellaneous	539
Total	38611

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	2.12
Accessions	1.30
Circulation Control (Note 1)	1.44
Reader Services	.27
SDI	.00
Miscellaneous	.07
Total	5.20

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:		14230
Academic Administration:		
- Student and Graduate Records	12847	
- Admissions	6694	
- Faculty Offices:	831	
- Miscellaneous	349	
		20720
Accommodation Office		2549
Buildings Office		39
Staff Office		389
Information Office		52
General Services Office		3
Other		127
Total		38108

Table 9

Analysis of Administrative Use

percent

User		Percent of Total Use
Finance Office:		1.92
Academic Administration:		
- Student and Graduate Records	1.73	
- Admissions	.90	
- Faculty Offices:	.11	
- Miscellaneous	.05	
		2.79
Accommodation Office		.34
Buildings Office		.01
Staff Office		.05
Information Office		.01
General Services Office		.00
Other		.02
Total		5.14

Table 10

DECsystem-2060 Availability

Month	System Down-time - Hours					Availability	
	Engineering		Environ-mental	Soft-			
	Scheduled	Unscheduled	causes	ware	Total	Hours	%
10/85	4.92	8.72	4.10	0.15	17.89	726.11	97.59
11/85	2.49	0.73	0	0.06	3.28	716.72	99.54
12/85	2.58	0.60	0	0.22	3.40	740.60	99.54
1/86	5.28	20.75	12.33	0.95	39.31	704.69	94.71
2/86	4.08	20.58	0	0.13	24.79	647.21	96.31
3/86	3.01	33.13	0	0.31	36.45	707.55	95.10
4/86	2.50	0.08	0	0.20	2.78	717.22	99.61
5/86	10.21	66.31	0.07	12.25	88.84	655.16	88.05
6/86	3.00	9.33	47.43	0.28	60.04	659.96	91.66
7/86	3.31	0.08	1.46	0.13	4.98	739.02	99.33
8/86	2.93	66.35	0	0.07	69.35	674.65	90.67
9/86	3.43	12.62	0.82	27.37	44.24	675.76	93.85
Overall	47.74	239.28	66.21	42.12	395.35	8364.65	95.48

Table 11

DECsystem-2020 Availability

Month	System Down-time - Hours					Availability	
	Engineering		Environ-mental	Soft-			
	Scheduled	Unscheduled	causes	ware	Total	Hours	%
10/85	2.90	26.08	3.95	0.03	32.96	711.04	95.57
11/85	2.53	0.18	0	0.54	3.25	716.75	99.54
12/85	1.63	9.16	0	0.15	10.94	733.06	98.52
1/86	2.00	0	12.80	0.50	15.30	728.70	97.94
2/86	2.67	0	0	0.47	3.14	668.86	99.53
3/86	2.43	0	0	0.31	2.74	741.26	99.63
4/86	1.08	0	0	0.10	1.18	718.82	99.83
5/86	9.55	0	0.05	0.04	9.64	734.36	98.70
6/86	3.00	0.28	41.35	0	44.63	675.37	93.80
7/86	4.30	0.93	1.21	0	6.44	737.56	99.13
8/86	2.43	0.15	0	0	2.58	741.42	99.65
9/86	2.18	0.05	0	0	2.23	717.77	99.69
Overall	36.70	36.83	59.36	2.14	135.03	8624.97	98.45

Table 12

SECTION 3 APPLICATIONS

3.1 Academic

Academic use of the mainframe machines followed the usual general pattern. No major new application packages went into operation and most effort was concentrated on getting basic applications transferred from the DEC to the ICL systems.

In terms of overall academic computing activity, the most visible change from the Laboratory's standpoint was the continued growth in the use of microcomputers. Word-processing for academic document production ranging from research publications and theses to undergraduate project reports continued to grow and introduced computing to a number of new areas, particularly in the arts faculties, for the first time. Over sixty microsystems together with their printers and other accessories were ordered through the Laboratory under the various bulk purchase discount arrangements during the year.

3.2 The Library

Because of limited staff resources, most of the work during the year was concentrated on maintaining the existing systems in operation with little scope for new projects. However, some development did take place and perhaps the most important activity in this area was the undertaking of a preliminary study of Library's requirements when existing computer systems are replaced over the next few years. This resulted in a broad statement of functional requirements which will form the basis of more detailed proposals and cost estimates during the coming year. The project to convert the card catalogue to machine readable form, which had been under examination for a number of years, resulted in the development of a viable technique for implementing the conversion, using microcomputers, and work will start early in the coming academic year.

3.3 Administration

The decentralisation of administrative applications to microcomputers located in the user areas continued with the Laboratory providing co-ordination and support. The use of Computer Aided Drafting continued in the Buildings Office and the latter area also installed the first personal computer network in College, outside the Laboratory - a development that gave rise to considerable teething problems which required much effort on the part of the users, the Laboratory, and the supplier to overcome. The staff office personnel system also went into operation during the year. One of the biggest projects was the selection and implementation of a new payroll system to run on IBM Personal Computers in the Finance Office. College is one of the first organisations of its size to run a complex payroll on microcomputers and while a proprietary software package was selected, it required extensive tailoring by the supplier to meet the requirements. It is expected to go into full operation by the New Year.

SECTION 4 COMPUTING SERVICE DEVELOPMENT

4.1 Equipment

The main equipment development was the installation of the ICL Series 39 Level 80 mainframe in October and its introduction into service in early January. The machine was further enhanced in June by the installation of a Scientific Unit which significantly increased its computational performance.

To improve accessibility, twenty four additional terminals were also installed in the Laboratory and linked to the ICL machine via an OSLAN local area network - the ICL implementation of Ethernet.

The Colleges X-25 internal network was further extended by the installation of a CAMTEC PAD in the Parsons Building. The planned installation of another in the Arts Building together with the provision of additional terminal wiring in both the East End and in the Arts Building were delayed by the diversion of manpower to repair the extensive damage to lines and equipment which was sustained during the severe electrical storm at the end of June. However, these will be provided early in 1986/87.

The microcomputer facilities for users in 200/201 Pearse Street were further enhanced by the addition of another Apple Macintosh with Laserwriter, an Apple IIC, a Commodore Amiga, a BBC micro, a DEC Rainbow, an Amstrad PCW8256, and an IBM Personal computer in addition to the existing ICL multi-user machines and the older Apple II. In co-operation with the Science Faculty, work began on the equipping a new microcomputer laboratory under the railway arches in the Parade Ground and this was close to completion by the end of the year.

Another interesting project was the development of a workstation for blind computer users. This unit, based on an Ergo IBM compatible personal computer with a braille printer, a voice output unit, and specially adapted software, was made available to users at the end of the year.

4.2 Software

In the systems software area, most effort was concentrated on the implementation and tailoring of the ICL VME system to the individual requirements of College. A pre-release version of a UNIX operating system, running under VME on the ICL machine, was also implemented as part of a field-trial project in conjunction with the company.

On the DECsystem-2060, the main development was the implementation of the network software to permit the connection of this machine to HEANET. The HEA launched HEANET officially in February and chose College as the venue for the event.

In the applications software area, effort was again concentrated the implementation of some of the main packages on the ICL system and by the end of the year, several had been installed including SPSSX, BMDP, MINITAB, and the NAG software library. Several others remain to be installed including the GINO graphics software and OCP, the Oxford Concordance Program, of interest to users in the Arts (Literature).

SECTION 5 OTHER ACTIVITIES

5.1 Teaching and Publications

The main thrust of the Laboratory's courses was directed towards the growing number of users on the ICL system and towards the demand from the microcomputer area. The course programme, and the publication of the Newsletter which appeared once per term, were cut back somewhat to enable User Services staff cope with the enormous workload arising from the conversion of applications to the ICL machine and with the preparation of documentation.

5.2 Sale of Services

The income from the sale of services, amounting to £23,951, saw a sharp rise during the year and exceeded target substantially for the first time in several years. This arose mainly from one exceptional non-recurrent software project and from some intensive but temporary use of the ICL system by a commercial organisation. It is unlikely that the performance will be repeated regularly.

SECTION 6 FUTURE DEVELOPMENTS

The immediate future development will the increased integration of the ICL system into the daily operation of the service, particularly in the area of computational applications. On the other end of the scale, the microcomputer support activities of the Laboratory will continue to play an increasingly important role. Already, they account for, perhaps, twenty percent of the staff activity and have caused a major increase in the volume of transactions processed through the department's accounts.

The replacement of the DECsystem-20 machines will require urgent consideration during the coming year. They carry a major part of the workload and complement the type of service provided on the ICL machine. However, the DECsystem-2060 has now been in operation nearly ten years and is approaching the end of its economic life. It is no longer in production and can be expected to give rise to operational problems similar to those experienced with our IBM System/360 at a similar age. It would appear unwise to plan on its availability beyond the end of 1987/88. Similar considerations apply in the case of the DECsystem-2020.

Another major development is the planned move of part of the Laboratory to new accommodation in the new Advanced Technology Building. While this will cause some disruption of service and create operational problems by fragmenting the Laboratory staff and distancing the core unit of the service from users for some years, it is nevertheless a very welcome development and will forestall a major crisis which would otherwise arise from the rapidly deteriorating condition of the existing central computer room.

APPENDIX A

EQUIPMENT

The specifications of the equipment installed on September 30th, 1986 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 Series 39 Level 80

1 x Series 39 Level 80 Node with 32Mb of memory and a Scientific unit and three Macrolan switches.
1 x FDS2500 2.5 Gb Disc Storage Unit.
1 x FDS640 640 Mb Disc Storage Unit
1 x GCS 6250 bpi Magnetic Tape Unit
1 x ICL 1440 Line Printer
1 x DRS20 Operator Console

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

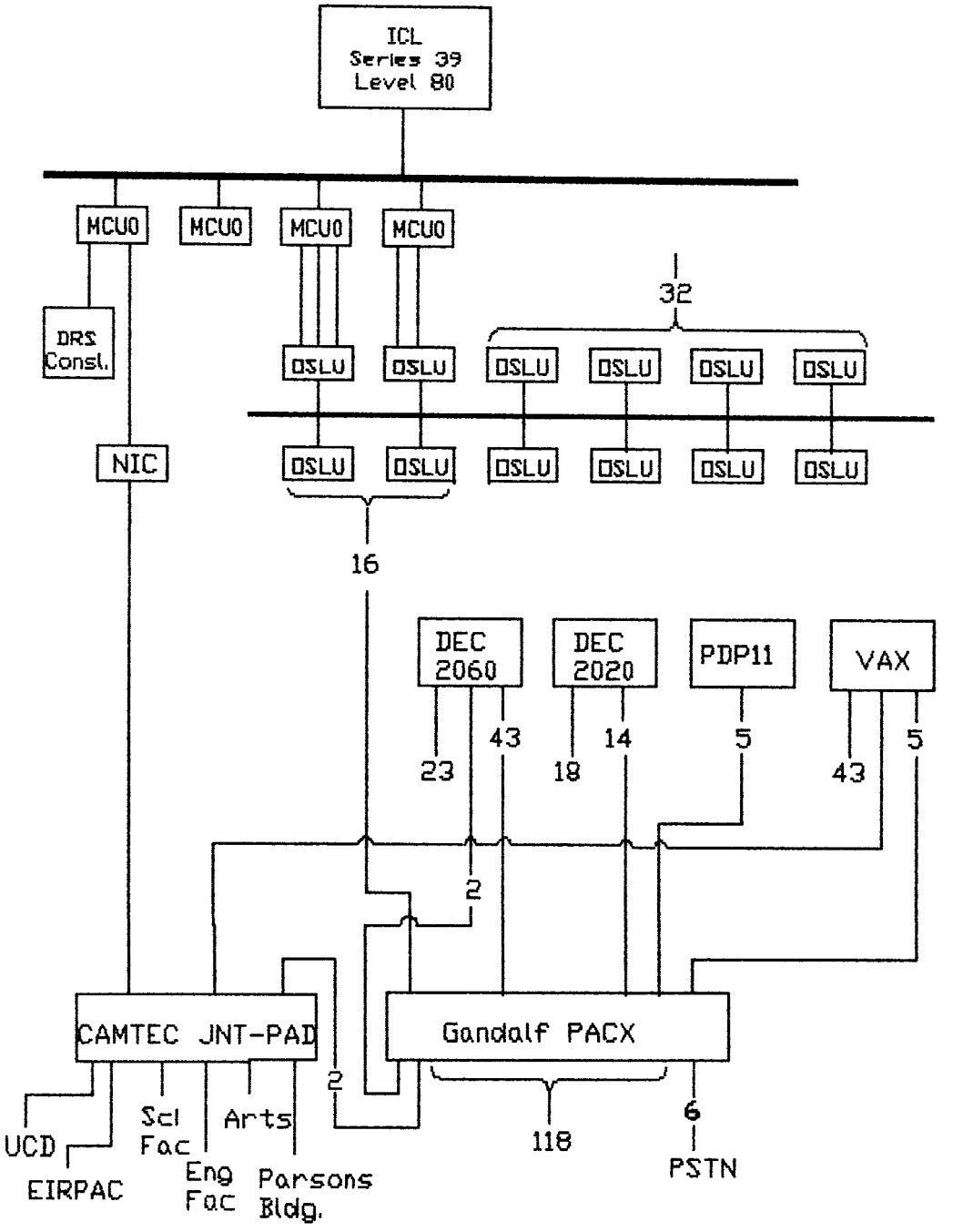
Communications

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.

Microcomputers

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

1 x BBC Microcomputer
2 x Apple Macintoshes
1 x Apple II
1 x Apple IIC
1 x IBM PC
1 x Commodore Amiga
1 x Amstrad PCW8256
1 x DEC Rainbow
2 x ICL multi-user PCs



COMPUTER LABORATORY

Central Equipment

Figure A.1

30-9-1986

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.

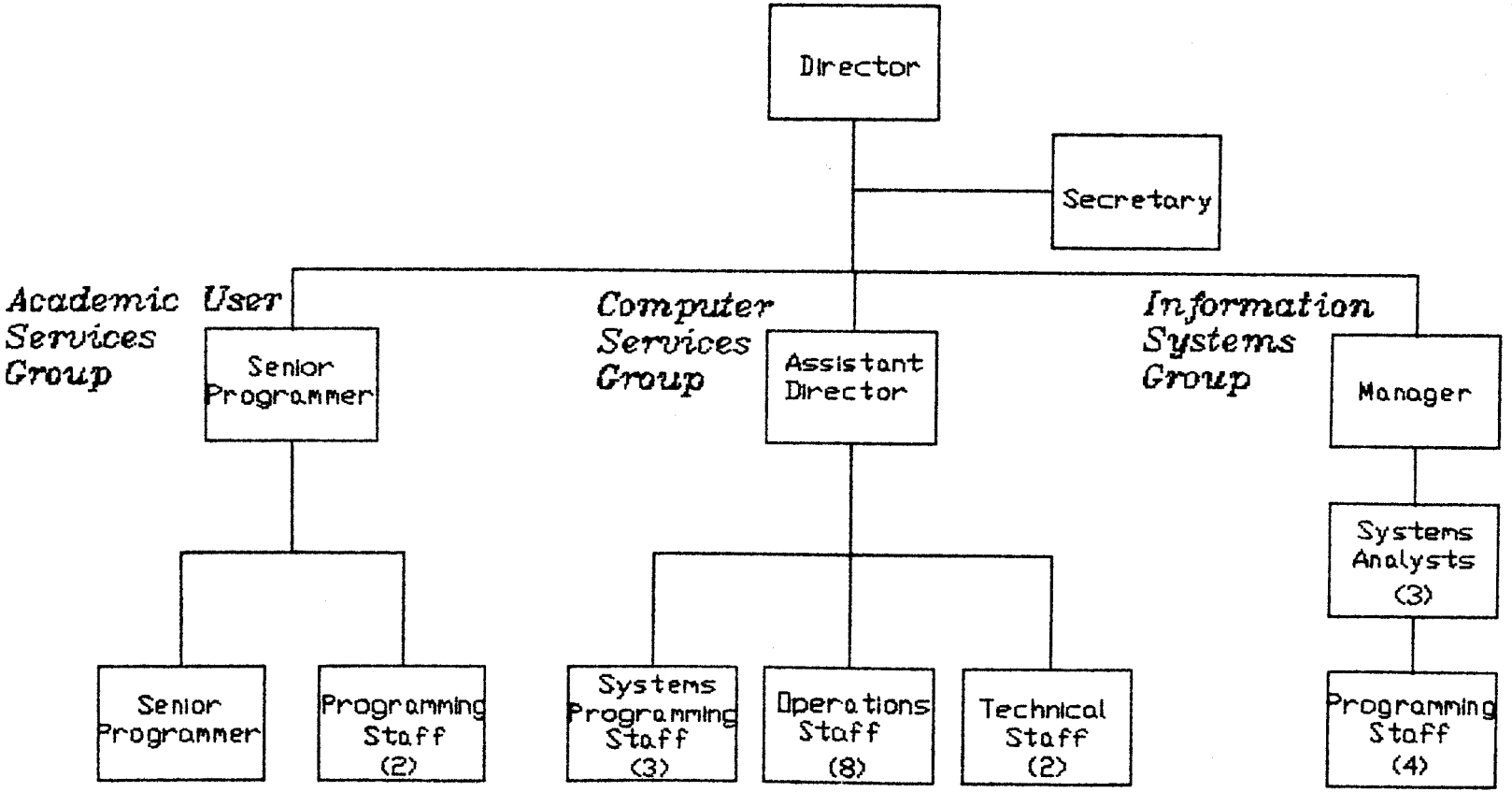
COMPUTER SERVICES GROUP

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.

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

30-9-86

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 ICL system, 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 1986

	Actual	Budget
	£	£
Income:		
Income from Sale of Computer Services:	23,951	12,000
Expenditure:		
Cost of Staff:		
- Salaries	408,487	418,800
- Wages	20,981	22,000
Total Pay Cost	429,467	440,800
Rentals of Equipment	47,096	60,274
Purchase of Ancillary Equipment	208,573	176,303
Maintenance	177,197	161,000
Consumable Supplies	35,553	39,500
Cost of External Services	71	3,500
Insurance Charges	3,684	3,700
Miscellaneous Expenses	13,395	14,000
Total Non-Pay Cost	485,569	458,277
Total expenditure:	915,036	899,077
Net annual cost:	891,085	887,077

Table C.1

Analysis of Service Costs

User Category	Total
Academic	585587
Library	107749
Administrative	140341
Outside	57408
Total	891085

Note: These are approximate figures based on the computer usage data from Table 1 and an estimated allocation of other costs to the four user categories.

Table C.2