UNIVERSITY OF DUBLIN
TRINITY COLLEGE
COMPUTER LABORATORY

ANNUAL REPORT 1979/80

CONTENTS

SECTION 1   INTRODUCTION

In the Computer Laboratory, 1979/80 was primarily a year of
consolidation during which plans, initiated in early 1979,
were implemented. These included the installation in October,
of the DECsystem-2020 for library and administrative work
and of a Digital VAX 11/780 in the Department of Computer
Science, and the withdrawal of the IBM System/360 at the
beginning of December. While these changes did much to
rationalise the central computing environment and provide
a base for development over the next few years, they did
not ease the heavy overload that existed, particularly in
the academic area, and the year continued to be an extremely
frustrating one for all users, notwithstanding the consider-
able amount of computing time obtained outside College. A
major upgrade to the DECsystem-2040 was, however, ordered
in July and will make a significant improvement when
installed, in 1981.

The installation of new data transmission lines by the Post
Office continued to cause difficulty throughout the year
although the position improved somewhat over the previous
year.

The Computer Users' Committee continued to be very active
in 1979/80 and made valuable contributions to the Management
Committee in a number of areas. It's representation on the
latter Committee was also increased from one to three
representatives.

SECTION 2   MACHINE UTILISATION

2.1   Computer Activity

As usual, this section of the Report consists mainly
of tables which describe those College computing activ-
ities, funded through the Computer Laboratory, in terms
of actual cost. The format of some tables has been
changed this year to reflect the increased number of
machines involved and the level of detail available
from the usage recording programs.

Computer time obtained outside College has been included
in terms of its actual cost to College. This means that
the main tables do include computer time purchased
commercially but do not reflect computer time obtained
free of charge from UCD although some indication of
this is provided in Table 13.

With the installation of the VAX 11/780, those aspects
of the research and teaching computers in the Department
of Computer Science, which are funded through the
Laboratory, have increased considerably and are now
shown separately and not included as an overhead, as
in the past.

2.2   Ancillary Operations

Data recording, which was a major part of the Laboratory's
activity in the past, has now ceased since users perform
their own data entry via terminals. Accordingly, from
this year onward, "Data Preparation Service" no longer
appears as an entry in this Report and the Laboratory
staff who performed this work have been retrained as
programmers.

Analysis of Computer Use
Cost of Monthly Use per User Category

£

Month	User Category					Total (Note 3)
	Library	Academic	Admin (Note 2)	Outside	Systems Support	
10/79	3109	10428	6313	1758	3396	25004
11/79	4009	15422	4796	2306	2186	28719
12/79	1079	11650	2075	137	1209	16150
1/80	2417	16128	2602	342	1877	23366
2/80	4369	21488	4138	197	1750	31942
3/80	3814	25540	2639	249	2952	35194
4/80	2685	32824	6696	153	2043	44401
5/80	3424	19255	7990	243	2790	33702
6/80	2445	9785	7883	322	2612	23047
7/80	2483	13185	4152	430	3052	23302
8/80	3798	9055	5325	388	3179	21745
9/80	2572	12292	7469	439	1982	24754
Computer Science Machines (Note 1)	-	19140	-	-	-	19140
Overall	36204	216192	62078	6964	29028	350466

Note 1: The operational cost to the Computer Laboratory of the VAX 11/78 and B1700 research and teaching systems are only available on a full-year basis.

Note 2: The administrative figures include computer time purchased outside at a total cost of £14182, during the period immediately following the withdrawal of the IBM System/360.

Note 3: In addition to this usage, Academic and Library processing was performed at UCD, at no cost to TCD. This usage, however, amounted to £22176 when priced at UCD's charging rates.

Table 1

Analysis of Computer Use

Percent of Total Monthly Use per User Category

Month	User Category				
	Library	Academic	Admin	Outside	Systems Support
	%	%	%	%	%
10/79	12.4	41.8	25.2	7.0	13.6
11/79	14.0	53.7	16.7	8.0	7.6
12/79	6.7	72.2	12.8	0.8	7.5
1/80	10.3	69.0	11.1	1.5	8.1
2/80	13.7	67.2	13.0	0.6	5.5
3/80	10.8	72.5	7.7	0.7	8.3
4/80	6.0	73.9	15.1	0.3	4.7
5/80	10.2	57.1	23.7	0.7	8.3
6/80	10.6	42.5	34.2	1.4	11.3
7/80	10.7	56.6	17.8	1.8	13.1
8/80	17.5	41.6	24.5	1.8	14.6
9/80	10.4	49.7	30.2	1.8	7.9
Computer Science Machines (Note 1)	-	100.0	-	-	-
Overall	10.3	61.7	17.7	2.0	8.3

Note 1: The operational cost to the Computer Laboratory of the VAX 11/78 and B1700 research and teaching systems are only available on a full-year basis.

The percentages in this table are based on the costs in Table 1.

Table   2

Total Annual Cost per System per User Category

£

| System | User Category | | | | | Total |
	Library	Academic	Admin.	Outside	Systems Support	
System/360	3814	4307	4120	3254	1905	17400
DEC-2020	31930	80	42631	75	631	75347
DEC-2040	460	192665	1145	3635	26492	224397
External (Note 1)	-	-	14182	-	-	14182
VAX 11/780	-	12424	-	-	-	12424
B1700	-	6716	-	-	-	6716
Total	36204	216192	62078	6964	29028	350466

Note 1: This is the cost of computer time purchased externally. It does not include time obtained free of charge in UCD.

Table   3

Percent of Total Annual Cost per System per User Category

System	User Category					Total
	Library	Academic	Admin.	Outside	Systems Support	
System/360	1.1	1.2	1.2	1.0	0.5	5.0
DEC-2020	9.1	0	12.2	0	0.2	21.5
DEC-2040	0.1	55.1	0.3	1.0	7.6	64.1
External (Note 1)	-	-	4.0	-	-	4.0
VAX 11/780	-	3.5	-	-	-	3.5
B1700	-	1.9	-	-	-	1.9
Total	10.3	61.7	17.7	2.0	8.3	100.0

Note 1: This is the cost of computer time purchased
externally. It does not include time obtained
free of charge in UCD.

Table 4

Department	Cost of Computer Usage					
	DEC-2040	DEC-2020	System/360	VAX 11/780	B1700	Total
Computer Science	62059	80	1185	12424	6716	82464
Engineering	34356	–	608	–	–	34964
Chemistry	25758	–	–	–	–	25758
Statistics	18064	–	168	–	–	18232
Pure Mathematics	11356	–	4	–	–	11360
Community Health	6652	–	–	–	–	6652
Applied Mathematics	6109	–	80	–	–	6189
Physics	5623	–	8	–	–	5631
Genetics	2520	–	2163	–	–	4683
Zoology	4496	–	–	–	–	4496
Education	2626	–	5	–	–	2631
Psychology	2486	–	–	–	–	2486
Geography	2430	–	–	–	–	2430
Political Science	1887	–	71	–	–	1958
Business Studies	1432	–	–	–	–	1432
Economics	1328	–	13	–	–	1341
Pharmacy	764	–	–	–	–	764
Sociology	601	–	–	–	–	601
Botany	460	–	2	–	–	462
Microbiology	372	–	–	–	–	372
Physiology	351	–	–	–	–	351
Pathology	321	–	–	–	–	321
Biochemistry	269	–	–	–	–	269
Surgery	164	–	–	–	–	164
Others (4)	181	–	–	–	–	181
	192665	80	4307	12424	6716	216192

Table 5

Analysis of Academic Computer Cost
by Machine by Department - Percent

Department	Percent of Total Computer Cost					
	DEC-2040	DEC-2020	System/360	VAX 11/780	B1700	Total
Computer Science	17.7	0	0.3	3.5	1.9	23.4
Engineering	9.8	0	0.2	-	-	10.0
Chemistry	7.4	0	0	-	-	7.4
Statistics	5.2	0	0.1	-	-	5.3
Pure Mathematics	3.3	0	0	-	-	3.3
Community Health	2.0	0	0	-	-	2.0
Applied Mathematics	1.7	0	0	-	-	1.7
Physics	1.6	0	0	-	-	1.6
Genetics	0.7	0	0.6	-	-	1.3
Zoology	1.3	0	0	-	-	1.3
Education	0.7	0	0	-	-	0.7
Psychology	0.7	0	0	-	-	0.7
Geography	0.7	0	0	-	-	0.7
Political Science	0.5	0	0	-	-	0.5
Business Studies	0.4	0	0	-	-	0.4
Economics	0.4	0	0	-	-	0.4
Pharmacy	0.2	0	0	-	-	0.2
Sociology	0.2	0	0	-	-	0.2
Botany	0.1	0	0	-	-	0.1
Microbiology	0.1	0	0	-	-	0.1
Physiology	0.1	0	0	-	-	0.1
Pathology	0.1	0	0	-	-	0.1
Biochemistry	0.1	0	0	-	-	0.1
Others (5)	0.1	0	0	-	-	0.1
	55.1	0	1.2	3.5	1.9	61.7

Table 6

Analysis of Library Use

Cost - £

Application	Development and Maintenance	Production	Total
Accessions System	-	5260	5260
Cataloguing System	9399	21214	30613
SDI Service	8	323	331
Total	9407	26797	36204

Table 7

Analysis of Library Use

Percent

Application	Development and Maintenance	Production	Total
Accessions System	-	1.5	1.5
Cataloguing System	2.7	6.0	8.7
SDI Service	0	0.1	0.1
Total	2.7	7.6	10.3

Table 8

Application	Development and Maintenance	Production	Total
Accommodation Booking	206	734	940
Admissions	-	599	599
Student and Graduate Records	6484	12295	18779
Examination Processing	-	73	73
Staff Statistics	-	429	429
Salaries and Wages	11048	16174	27222
Debtors Ledgers including fees and Incidentals	363	8252	8615
Creditors Ledger	143	1551	1694
Nominal Ledger	578	2448	3026
Buildings Office	20	681	701
Total	18842	43236	62078

Table 9

Analysis of Administrative Use

Percent

Application	Development and Maintenance	Production	Total
Accommodation Booking	0.1	0.2	0.3
Admissions	-	0.2	0.2
Student and Graduate Records	2.0	3.4	5.4
Examination Processing	-	0	0
Staff Statistics	-	0.1	0.1
Salaries and Wages	3.2	4.5	7.7
Debtors Ledgers including fees and Incidentals	0.1	2.4	2.5
Creditors Ledger	0	0.4	0.4
Nominal Ledger	0.2	0.7	0.9
Buildings Office	0	0.2	0.2
Total	5.6	12.1	17.7

Table 10

DECsystem-2020 Availability

Month	System Down-time - Hours		Environment Causes	Software	Total	Availability	
	Engineering					Hours	%
	Scheduled	Unscheduled					
10/79	27.32*	5.60	3.40	0	36.32	707.68	95.12
11/79	0	0.42	0	0.30	0.72	719.28	99.90
12/80	1.00	26.32	44.47	0.98	72.77	671.23	90.22
1/80	2.00	2.60	0	0	4.60	739.40	99.38
2/80	2.22	0.40	0.43	0	3.05	692.95	99.56
3/80	3.00	0.03	0	0	3.03	740.97	99.59
4/80	7.88	2.52	0.55	1.43	12.38	707.62	98.28
5/80	4.93	0.03	0	0.32	5.28	738.72	99.29
6/80	3.63	0	0.90	0.22	4.75	715.25	99.34
7/80	2.07	0	2.68	0	4.75	739.25	99.36
8/80	3.83	0.47	94.00	0	98.30	645.70	86.79
9/80	2.97	0	0.23	0.93	4.13	715.87	99.43
Overall	60.85	38.39	146.66	4.18	250.08	8533.92	97.15

*   Includes installation

Table 11

Month	System Down-time - Hours					Availability	
	Engineering		Environment Causes	Software	Total	Hours	%
	Scheduled	Unscheduled					
10/79	0	62.28	3.65	1.55	67.48	676.52	90.93
11/79	0	2.15	9.29	0.65	12.09	707.91	98.32
12/79	2.33	0.35	20.67	0.02	23.37	720.63	96.86
1/80	3.57	0	0.03	0.13	3.53	740.47	99.52
2/80	0	0.13	0.37	0.13	0.63	695.37	99.91
3/80	2.08	16.93	58.32	0.28	77.61	666.39	89.57
4/80	0	0.07	31.07	0.32	31.46	688.54	95.63
5/80	0	19.08	0.28	0	19.36	724.64	97.40
6/80	0	101.68	37.92	0.45	140.05	579.95	80.55
7/80	2.33	6.08	10.67	0	19.08	724.92	97.44
8/80	2.75	46.95	110.15	1.87	161.72	582.28	78.26
9/80	0	6.48	22.83	7.12	36.43	683.57	94.94
Overall	12.86	262.18	305.25	12.52	592.81	8191.19	93.25

Table 12

Month	Cost of Use at UCD Rates - £ (Note 1)		
	IBM Machines	DECsystem-2060 (Note 2)	Total
10/79	4.49	80.58	85.07
11/79	126.43	75.58	202.01
12/79	64.89	63.03	127.92
1/80	890.20	56.16	946.36
2/80	2111.98	289.45	2401.43
3/80	2741.78	124.29	2866.07
4/80	2773.76	1009.01	3782.77
5/80	2791.96	2094.80	4886.76
6/80	898.32	1432.12	2330.44
7/80	574.94	1159.29	1734.23
8/80	102.54	1032.85	1135.39
9/80	176.55	1501.11	1677.66
Total	13257.84	8918.27	22176.11

Note 1: This usage has been priced at UCD's billing rate to outside users and does not represent actual cost.

Note 2: Access to the UCD DEC machine was for plotting purposes only.

Table 13

SECTION 3   APPLICATION DEVELOPMENT

3.1 Academic

The demand for academic computing continued unabated
and despite the rationing system, introduced last year,
the congestion on the DECsystem-2040 was extremely
severe, especially since most academic applications
were transferred to it as a result of the withdrawal
of the IBM machine. Those academic users for whom
transfer to the DEC was not feasible due to existing
commitments to IBM programs made use of the IBM machine
in UCD by means of the data transmission link which was
heavily used from January onwards. This work consisted
mainly of research computing requiring programs only
available on IBM equipment and undergraduate use by
classes which could not change in mid-course. The
latter is of a temporary nature but the former will
continue and is being supplemented by a growing amount
of work requiring access to plotting facilities which
cannot yet be provided here.

3.2 Library

The development of the DEC version of the library system
continued to be the main activity in this area. The
first component of this, the accessions subsystem,
which went into operation last year performed well
and the new version of the catalogue supplement sub-
system went into routine use in August, on schedule,
having run on UCDs IBM system during the transition
period. This was later followed by the DEC version of
the SDI programs. Much work still remains to be done
before a complete edition of the catalogue is produced
but it is planned to do this on the DEC in the first
half of 1981.

3.3 Administration

The transfer of existing applications to the DECsystem-
2020 was the major activity in the administrative data
processing area. By far the biggest task was the con-
version of the payroll application which was completed
by the end of the year having run on a commercial
service bureau during the transition period. In its
new form, not only entry of data but also the printing
of output, including salary cheques, is done using
printing terminals in the Finance Office so that the
user has a high degree of control over the complete
process. By the end of the year, all administrative
applications had been converted including staff
statistics and the remaining ledger applications.
Other administrative computing projects included the
automation of much of the work involved in the imple-
mentation of the Devlin and National Understanding
pay rounds and the further development of a ready
reckoner for use in this area which is produced by
the Laboratory and used extensively by all the other
university and related institutions. The student
record system operated satisfactorily but its extension
to permit direct access by terminals in the faculty
offices had not gone into operation by the end of the
year due to delays in obtaining data transmission lines.

4.1 Hardware

As already mentioned, the main equipment changes were
the installation of the DECsystem-2020 and the VAX 11/780
together with the withdrawal of the IBM machine and
while these resulted in redistribution of the workload
and made it possible to cope with the initial impact
of the Manpower Programme, they did not result in
increased computing power to relieve the serious over-
load situation or to cater for growth in other areas.
However, once the financial commitments associated
with the IBM 360 were finally discharged, it was possible
to order the equipment necessary to upgrade the DECsystem-
2040 to a DECsystem-2060, a significantly faster pro-
cessor, and to increase its memory size by 256K words
of storage which will further accelerate its performance.
In addition, a third disc storage unit was ordered for
attachment to the DECsystem-2020 where shortage of
space for some of the large data files involved was
causing considerable difficulty. These additions are
scheduled for installation during 1980/81.

During the year, the Gandalf PACX line switching unit
was expanded to meet the growing number of user terminals
and a new terminal room, initially equipped with a small
number of machines, was opened in the Arts Building to
facilitate users from that area. The User Preparation
Room in the Laboratory itself was also expanded con-
siderably to cater for increasing numbers.

A Digital PDP 11/34 system, funded by the Library, was
also installed in the Laboratory. This machine will be
used exclusively for a library circulation control
system which is under development.

4.2 Software

During the year a number of new application program packages were implemented on the DECsystem-2040. Among these were HARVEY, a least squares maximum likelihood program, MULTAN, an extension to an existing chemistry program called SHELX, and HANSCH, a compound analysis package funded by the School of Pharmacy. A number of updated versions of existing packages were also implemented during the year including the implementation of Release 7.2 of SPSS, a major statistical package funded by the Department of Statistics. A new version of the main DEC-20 operation system, TOPS-20 Version 4 was implemented on the DECsystem-2040 in September and while all its features cannot be made available until the equipment has been upgraded, it will provide several additional facilities for users.

SECTION 5   OTHER ACTIVITIES

5.1   Teaching and Publications

The Academic User Services Group ran 16 short courses
for users including short introductory courses, pro-
gramming courses in FORTRAN and PASCAL, advanced
user courses, and instruction in the use of program
packages. A new edition of the Laboratory Catalogue
of Programs was produced in September and new editions
of a number of pamphlets were also produced. At the
end of the year a new edition of the Laboratory Users'
Guide was in course of preparation as was the TCD
Hardware Catalogue. The latter is an attempt to pro-
vide a central catalogue, based on information supplied
by departments, of the growing amount of computing
equipment which now exists in College.

5.2   Sale of Services

As predicated in last year's Report, the revenue from
the sale of computer services dropped sharply from
£19,518 last year to £10,115 in 1979/80. Some users
found it more convenient to move their work to other
IBM installations rather than undertake extensive
program conversion. Because of the seriously over-
loaded condition of the College equipment and the
resulting poor service to users, outside use is
unlikely to grow in the near future although it is
hoped that once a better level of service is re-
established, revenue may again increase.

5.3   External Contacts

The Laboratory continued to be active in the DECUS
organisation, the DEC user group, and was represented
at all of its meetings in this country. The Assistant
Director again served as chairman of the Irish branch
and as a council member of the U.K. section. Three
Laboratory representatives attended the DECUS U.K.
regional conference in Edinburgh but no representative
was sent to the organisation's European annual meeting
this year. The Library Systems Analyst attended the
U.K. MARC Users' Group Conference in September. As
usual, ongoing informal contact was maintained with
the NUI college's computer centres and with a number
of local installations with common interests, particularly
the Meteorological Services DECsystem-2050 Centre. The
Laboratory also organised a small exhibition of word
processing equipment as part of the 1980 Irish Uni-
versity Administrators' Conference which was held in
Trinity at Easter.

In the short term, installation of the additional equipment
now on order will greatly improve the service to users by
reducing the response time of the main DEC system to a
satisfactory level. Once this happens, a new bottleneck
will emerge as the growing number of terminal owners
increasingly find all 32 entry ports to the system engaged
when they attempt a connection and as their growing demands
for file storage exceed the capacity of the systems' disc
space. In general, however, these features of the system
can be expanded in relatively small steps.

In the longer term, it can be expected that the number of
computers acquired by individual academic departments will
increase considerably as the size and cost of such equipment
continues to fall. The role of the Computer Laboratory
and the nature of its equipment must be carefully considered
to ensure the most effective overall use of computing re-
sources within College and to prevent unnecessary duplication
of effort or equipment.

In non-academic areas, also, the extent to which future comput-
ing power is provided by upgrading the central facilities or
by providing small dedicated machines in individual offices
must be carefully evaluated.

APPENDIX A

EQUIPMENT

1. The specifications of the equipment installed on September 30th, 1980 are as follows:

Digital DECsystem-2040:

        1 x 2040 CPU with 256K words of memory and
            32 asynchronous communications ports
        3 x RP06 200 Mbyte disc drives
        2 x TU45 120Kb, 9-track, 800/1600 b.p.i.
            tape drives
        1 x CD20-A 300 card/Minute Card Reader
        1 x LP20-AB 300 line/minute 64 Character printer
        1 x DN20 synchronous communications port
        1 x LA36 Console

    On order:
        - CPU upgrade to model 2060
        - additional 256K words of memory

Digital DECsystem-2020

        1 x 2020 CPU with 256K words of memory,
            32 asychronous communications ports and
            1 synchronous communication port
        2 x RP06 200 Mbyte disc drive
        2 x TU45 120 Kb 9-track 800/1600 b.p.i.
            magnetic tape drives
        1 x LA36 Console

    On order:
        - 1 x RP06 200 Mbyte disc drive

Digital PDP 11/34:

For real-time Library Circulation Control system:

- CPU with 128K memory
- 8 asynchronous lines
- 3 x RL01 Disc drives
- 1 x LA 36 Console

Digital VAX 11/780:

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

- Central Processor with 1 Mbyte of memory
- 24 asynchronous lines
- 1 x LA120 Console
- 3 x RK07 Disc drives

Burroughs B1700:

1 x B1700 System in the Department of Computer
Science comprising:

- B1714 CPU and SPO including 64K memory
- A9480-12 Dual Disc unit
- A9115 Card Reader
- A9359.2 Line Printer

Communications

Approximately 80 terminals, most of which belong to
user departments, have access to the equipment. These
compete for the limited number of entry ports on the
appropriate computer via a Gandalf PACX III switching
unit. 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-2040
with the IBM 4331 machine in UCD.
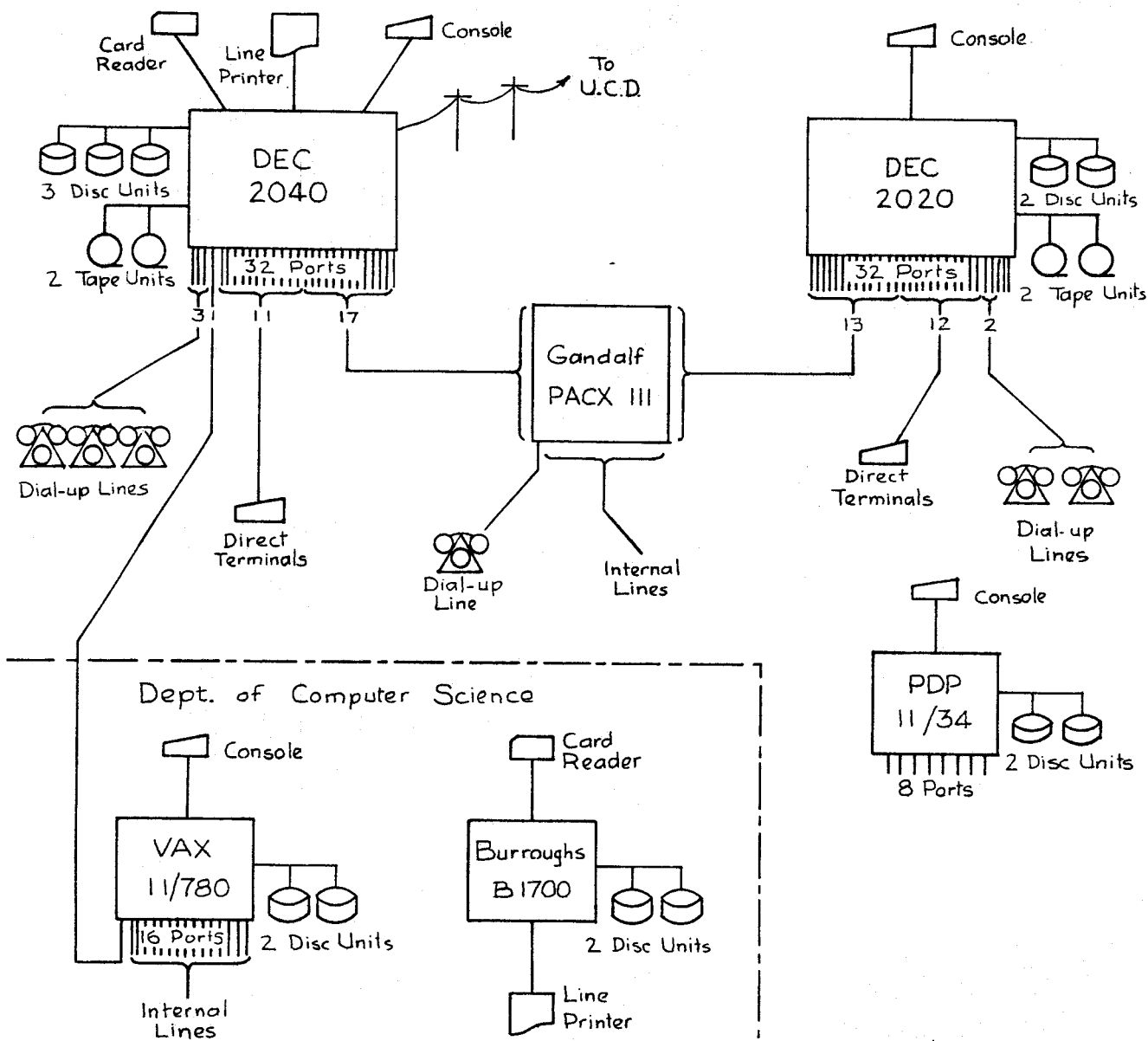
INSTALLED EQUIPMENT CONFIGURATION - 30.9.80

FIGURE A.1

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, and
janitors who are responsible for security.

INFORMATION SYSTEMS GROUP

This Group is responsible for the regular operation of exist-
ing administrative and Library computer applications and for
the development of new ones.

Development of new projects is performed by Systems Analysts
who design the applications and Programmers who write and
test the computer programs needed for their implementation.
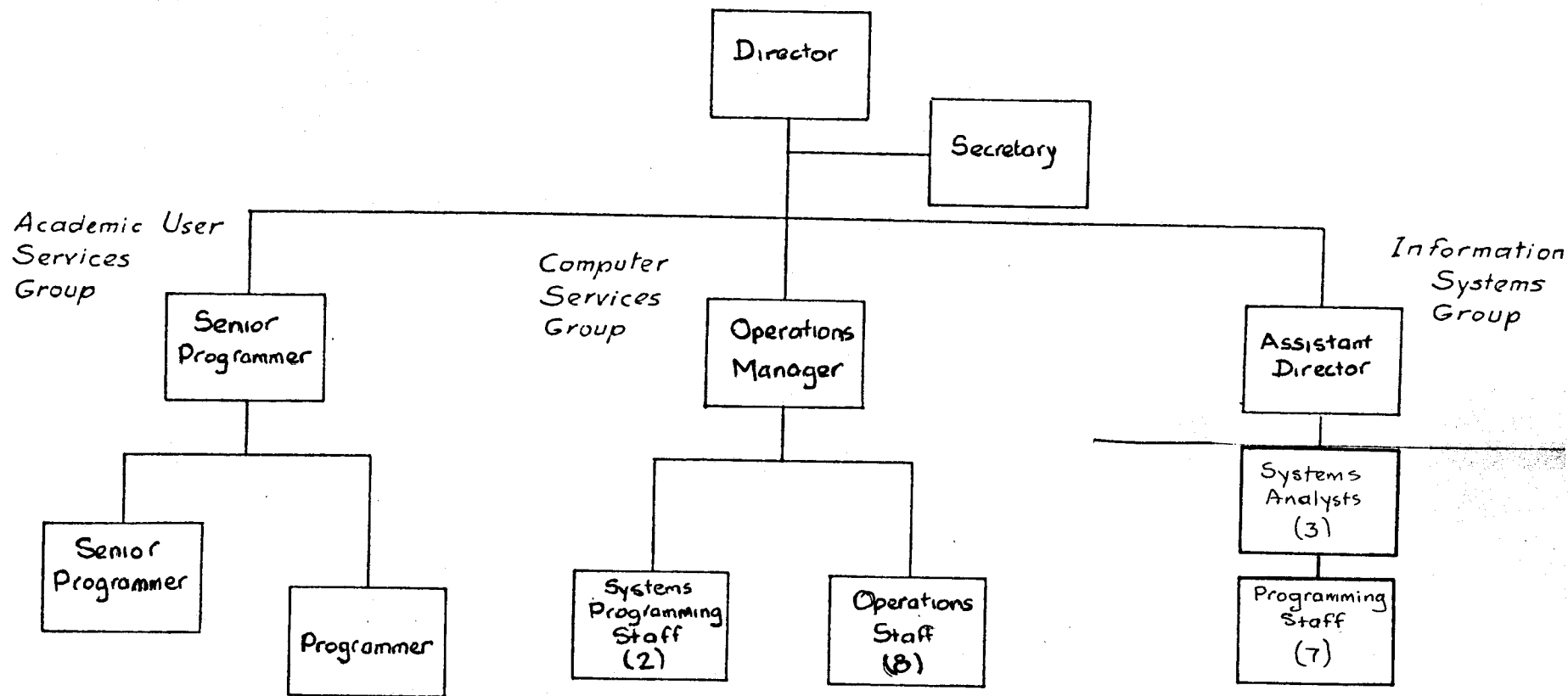
COMPUTER LABORATORY

ORGANISATION

Figure B.1

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

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

2. <u>Application Development Service</u>

    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 dis-
tributed 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 IBM System/360, the DECsystem-2040,
the DECsystem-2020 and the two machines operated by the Computer
Science Department. In the case of the three central machines
the records of time used were then costed for use in this report.

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

COMPUTER LABORATORY

ACCOUNTS

Year Ended 30 September 1980

Expenditure:

	Actual	Budget
Cost of Staff:		
- Salaries	200,903	208,800
- Wages	12,031	12,000
Rentals of Equipment	5,381	5,400
Purchases of Ancillary Equipment	143,797	124,900
Maintenance	66,061	83,600
Consumable Supplies	17,846	19,200
Cost of External Services	14,182	8,900
Insurance Charges	1,691	2,000
Miscellaneous Expenses	2,863	3,400
Recurrent Cost for Year	464,755	468,200

Income:

Income from Sale of Computer Services - £10,115

This includes income amounting to £4620.08 from computer use by externally funded research and consulting activities undertaken by the following departments:

Applied Research and Consultancy	£3,110.60
Statistics	1,466.70
Community Health	42.78
	£4,620.08

Table C.1

User Category	Computer Service (Note 1)	Application Development Service (Note 2)	Total
Academic	235114	0	235114
Library	39680	39052	78732
Administrarive	68039	75237	143276
Outside	7633	0	7633
Total	350466	114289	464755

Note 1: "Systems Support" use is included as
an 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.

Table C.2

GLOSSARY

CPU   : Central Processing Unit, the major
                          component of a computer system.
                          Six College CPUs are referred to
                          in this report, IBM 2044, DEC-2020,
                          DEC-2040, VAX 11/780, Burroughs B1714
                          and a PDP 11/34.

DECUS   : A Digital Equipment Corporation
                          computer users' group.

Development Use   : Use of the system by systems analysis
                          and programming staff for the develop-
                          ment of new applications or of major
                          enhancements to existing ones includ-
                          ing the productive running of new
                          programs prior to their transfer to
                          the data processing or administrative
                          staff for routine use.

Maintenance Use   : Use of the machine by systems analysis
                          and programming staff for the main-
                          tenance and updating of existing
                          programs.

MARC   : MAchine Readable Cataloguing. An
                          internationally used format for the
                          recording of bibliographic data.

Memory   : Storage within a CPU used to store
                          programs and data currently in use.
                          In general, the speed of a computer

system increases as the memory in its CPU is expanded. Memory is "working" storage unlike magnetic discs or tapes which are used for the longer term storage of data files.

Modem   : Modulator-demodulator unit, one of which is normally required for signal conversion purposes at each end of a data transmission line.

P.A.C.X.   : Private automatic computer exchange. A device, similar to an automatic telephone exchange, which enables many terminals to compete for access to a limited number of entry ports on one or more computers.

Plotting   : The production of computer output on paper in the form of graphs, drawings or maps, etc. The Laboratory has no plotting equipment at present and uses facilities in UCD.

Port   : An entry channel through which one terminal at a time can communicate with the computer. Ports may be "synchronous" or "asynchronous", depending on the communications technique used. The former are normally used for high speed communication only.

Production Use   : Use of the computer by data processing or administrative staff for routine productive work.

SDI Service   :   The current awareness service based
                           on individual interest profiles
                           operated by the Library.

System   :   This word is used in two ways,
                           according to context:

                           1.   An application system is a set
                                of computer programs and their
                                associated manual procedures
                                to perform a specific task, e.g.,
                                the Payroll System or the Library
                                Catalogue Production System.

                           2.   A computer system is a complete
                                computer consisting of the CPU
                                and the peripheral machines
                                connected to it for input, output,
                                and data file storage purposes.
                                This report refers to six TCD
                                computer systems, the IBM System/360,
                                DECsystem-2020, DECsystem-2040,
                                VAX 11/780, Burroughs B1700 and
                                the PDP 11/34.

TOPS-20   :   The main control program on the
                           DECsystem-20.