13/5/92

Departmental response to Faculty request for input to the University Planning Statement.

Attached is a copy of a letter from Bruce Nelson at the Faculty Office asking for input from departments so that the Faculty can provide input to the revised University Planning statement for the UFC. *The deadline for this is very tight — we received the letter on 12th May and we must repond by Friday 15th May.* We have a problem in responing at all in the time but I believe we should try to produce a well-balanced response from the department. To achieve this I am circulating this to some members of the department whom I hope can respond quickly (i.e. on thursday) — I will then try to unify the responses to form a coherent whole.

In the course of beginning to formulate a response I wondered what a planning statement looked like — the outcome of Dean's consultations over the summer of 1991 generated the Faculty Planning Statement (which contributes to the university statement). This document did not get wide distribution within the department so I have copied it and attached it to this note — I think it makes interesting reading.

I find it difficult to assess the importance of such planning statements but our response does give us a mechanism to point out our plans and problems directly to the Dean and I guess that silence from us is an indication that we are happy with the current situation.

Below is my first draft of a list of points under each of the headings provided by UFC. Faculty wants our response in the form of itemised points for each heading. I have filled in a few points briefly — I will expand these in the final document (I'd appreciate anything you can say in amplification of these points).

The nature of the University and its principal aims:

- I'd like a statement of our aims here and how we think they fit into what we believe the University's aims to be.
- As a department I believe we might say something like this:
  - In research we aim to maintain and expand our capabilities to carry out basic research which supports applied research and technology transfer activities within the advanced IT industries.
  - In teaching we aim to recruit able students and provide an education oriented to supplying the next generation of academic and industrial researchers and provide highly skilled graduates to advanced IT suppliers.

  What we say about the University aims should be consistent with this.

Academic developments in the planning period:

- CS1/2 reorganisation.
- IEE accreditation — if we get this the new funding council may well fund our undergraduates at engineering rates — consequences (should be be losing staff at current rates)?
- Creation of European Institute of Theoretical Computer Science: 4 year graduate course, more visitors, themes etc.

- What developments in EPCC over the period?

Staffing Policies:

- Unfilled chair.
- Lack of promoted staff — problems with organisation and running of the department.
- Losses of support staff — consequences.
- Losses of teaching staff — consequences, potential negative effect of teaching quality, research ratings.

Physical Resources:

- Accommodation: EPCC requrements, LFCS requirements, MSc increases, what are the limits to years 3 and 4 of the undergraduate course? Consequence of European Institute for TCS — expansion in PhD numbers, new staff.
- Equipment — likely needs to support research and teaching over the planning period.
- Research Infrastructure — how do we fund under the new arrangements — will this be adequate.

Financial Requirements:

- Building costs — what would we need to spend to find new accomodation to support expanded numbers.
- Funding for trading units(LFCS, EPCC)— freezing of assets, treatment of surplus at end of year.
- Funding of departments — treatment of surpluses.

Quality Issues:

- The likely admin costs of full-blown quality assessments. This is an order of magnitude greater than that for the academic audit — how do we do it with fixed resources.
- The current method of achieving staff savings targets takes no account of the quality of the result — shouldn't faculty think about it?

Stuart Anderson
May 13, 1992

University of Edinburgh

Department of Computer Science

Departmental Meeting

3.30 pm Friday 29th May 1992 in 2510

AGENDA

1. Minutes of the last meeting
2. Matters arising
3. Convenor's Business:
   - Staff News
   - Convenors of Committees
   - Faculty Centenary
4. Secretarial Duties

   We shall be short of secretarial effort following Dorothy's retirement. EAK will report on the plans for providing secretarial support until such time as we can appoint a replacement.
5. Election of Representative on School of E & IT Committee

   Currently our representatives are RNI (ex officio as HoD) and MikeF; Mike has served his three year term.
6. Planning Units

   Within the next few months the Faculty will be divided up into Planning and Budgeting Units (PBUs). The School of E & IT could become a PBU, or Cost Centre 18 (AI, CogSci, CS) could become a PBU. We need to form an opinion on this issue.
7. Reports from Subcommittees
   - Syllabus
   - Teaching
8. AOCB

Our Reference
Your Reference

Date 19th August 1992

CPCS Directory Representative

Mike – you asked to see a copy of
the latest entry. Le voici !

L

Department
of
Computer Science

Dear Representative,

Re: CPCS Directory

Despite our best efforts, there have been teething troubles converting the Directory to an SGML format. For this reason, we have corrected those errors pointed out to us and others that we have noticed.

Please check the revised entry enclosed and let us know of any further amendments by 14th September 1992. If we have heard nothing from you by this time we will assume that your entry is correct.

Many thanks for your help.

Yours faithfully,

Lois Catchpole

Lois Catchpole
Departmental Secretary

University Park
Nottingham
NG7 2RD

Telephone
(0602) 484848
Extension 2862

Telex
37346
(Uninot G)

Facsimile
(0602) 783450

E mail
lois@
cs.nott.ac.uk

Sent oft 1/9

CPCS Directory - Version II

UNIVERSITY OF EDINBURGH

Department of Computer Science

Department of Computer Science
James Clerk Maxwell Building
The Kings Buildings
Mayfield Road
Edinburgh EH9 3JZ

Telephone: (031) 667 1081 fax. 031 667 7209
fax no. please

Head of Department: **Professor R N Ibbett**
Alternative Academic Contact: Prof R Burstall (director LFCS)

Space occupied: 2719m² (1988)

Electronic mail: {mname}@uk.ac.ed.dcs
hod @uk.ac.ed.dcs

Contact for CPCS Computer Science Directory: Ms L M Paterson lmp @ uk.ac.ed.dcs

DEPARTMENTAL STAFF

Professor and Head of Department

Ibbett R N MSc PhD FBCS rni e uk.ac.ed.dcs
Burstall R M BA MSc PhD FBCS rb e . . . .
Fourman M P BSc BSc MSc DPhil mikef e . . .
Milner A J R G BA FRS rm e . . . .
Plotkin G D BSc PhD FRS gdp e . . . .

Readers

Sannella D T BSc MSc PhD dts e . . .
* **Stirling C P** MA DPhil cps e . . .

Senior Lecturers

Rees D J BSc ARCS PhD djr e . . .
** **Anderson S O** BSc soa e . . .

Honorary Fellow

Schofield P D A BSc ARCS MBCS pds e . . .

Lecturers

~~** **Anderson S O** BSc~~
Arvind D K BSc dka e . . .
Brebner G J BSc PhD gjrdon e . . .
Candlin Mrs E R S MA PhD rc e . . .
Gilmore S T BSc PhD stg e mail addresses please.
Hopkins T M BSc tmh e . . .
Jerrum M R MA PhD mrj e . . .
Kalorkoti K A BSc MSc PhD kk e . .
McKenzie R A MSc CEng MIERE ram e . . .
Mitchell K N BSc PhD Kevin e . . .
~~**Moggi E** MSc PhD~~
Pooley R J BSc MSc rjp e . . .
Procter R N BSc PhD rnp e . . .
Sinclair A J MA PhD ajs e . . .
Smaill A D BSc MSc DPhil (Joint AI/CS) Smaill e uk.ac.ed.dcs / . . .ed.ai.sb
Stacey F BSc fs e . . .
~~* **Stirling C P** MA DPhil~~ pt e
Thanisch P BSc npt e
Topham N P BSc PhD asw e
Wight A S MA PhD

Full Time Equivalent (FTE) Staff

	Profs	*Readers*	*Sen. Lects.*	*Lects.*	*Acad. Reltd.*	*Technical*	*Secretarial*	*Other*
Male	5	2	2	19	14	7	6	3
Female	0	0	0	0	0	0	0	0

← ??

Note

No male or female breakdown given

STUDENT DETAILS

	Full Time Equivalent Students									
	Departmental				Service and Subsidiary				Total	
	Home + EC		Overseas		Home + EC		Overseas		Home + EC	Overseas
	M	F	M	F	M	F	M	F	M+F	M+F
Postgraduate (research)	29	0	20	0	0	0	0	0	29	20
Postgraduate (taught)	16	0	1	0	0	0	0	0	16	1
Undergraduate	185	0	2	0	51	0	0	0	236	0
							TOTAL		281	21

Note

~~These figures have not been updated for this edition~~

DEGREE COURSES AVAILABLE

Course	UG or PG	Full Time Equivalent Students							
		Home + EC				Overseas			
		On Course		Graduated 1991		On Course		Graduated 1991	
		M	F	M	F	M	F	M	F
MSc Computer Science	PG	14	0	14	0	0	0	0	0
Computer Science (Hons)	UG	107	0	32.5	0	0	0	0	0
CS & Artificial Intelligence	UG	22	0	6	0	0	0	0	0
CS & Electrical Engineering	UG	4	0	0	0	0	0	0	0
CS & Mathematics	UG	4	0	0	0	0	0	0	0
CS & Statistics	UG	1	0	0	0	0	0	0	0
CS & Physics	UG	3	0	0	0	0	0	0	0
CS & Management Science	UG	9	0	2	0	0	0	0	0

Note

* No male or female breakdown given.
* No overseas breakdown

RESEARCH ACTIVITIES

	Home + EC		Overseas	
	M	F	M	F
Research students (full time)	45(45)	0	0	0
Research students (part time)	20(3)	0	0	0
Research assistants	20	0	0	0

MAIN RESEARCH ACTIVITIES

Title	Holder	Funding Body
Types, Proofs and Programs	Burstall, Plotkin	CEC, BRA
Concurrency and Functions: Evaluations and Reductions	Milner	CEC BRA
Calculi and algebras of Concurrency: Extensions, tools and Applications	Stirling, Milner	CEC BRA
Brit-German Collaboration Project	Fourman	Brit. Council
SERC Advanced Fellowship: Formal devment of modular progs from alg specs	Sannellla	SERC
SERC Senior Fellowship: An integrated theory of the sems. and logic of prog. langs	Plotkin	SERC
Algebraic and logical foundations of formal SW devment	Sannella	SERC
Fellowship:Formal devment of mod. progs. from alg. specs.	Sannella	SERC
A compreh. Alg. Approach to System Spec and Devment	Sannella, Burstall	CEC ESPRIT
Randomized Algorithms	Jerrum	CEC ESPRIT
Teaching Company Scheme with Adelard	Cleland, Anderson	SERC,
Programming Language semantics and program logics	Plotkin,	SERC CEC Science
CAFR: Formal Devpt of Programs from Specifications	Sannella	SERC
Typed Lambda Calculus	Plotkin	CEC Sci. Stimulation
Logical Framework - Design Implementation, Expt.	Harper, Plotkin, Milner	ESPRIT BRA
Theories of Concurrency:Unification and Extension	Walker,Milner	ESPRIT BRA
Algebraic Approach to System Specification	Sannella, Burstall	ESPRIT BRA
Mathematically Proven Safety Software	Cleland,Walker,Anderson	IED/SERC
Modal and Temporal Mu-Calculi	Stirling	SERC
Formal System Design	Fourman	IED/SERC
Formally Based Systems Design Tools	Fourman	SERC
Declaritive Languages and Applied Semantics	Milner, Fourman, Mitchell	SERC
Logical and Semanical Frameworks	Plotkin,Moggi	SERC Rolling
Logical Systems and Logical Frameworks	Plotkin	SERC VF
Denotational semantics and concurrency	Stirling	SERC VF
Constructive Logic as a Basis for program Development	Burstall	SERC Rolling
Verification of Infinite State Systems	Stirling	SERC
Quantitive analysis of stochastic systems	Sinclair	SERC
Brit-Spanish Collaboration Project	Sannella	Brit. Council
Awareness Club in Formal Reason	Cleland	DTI
Computer Architecture Studies w/ ARCI, Lyon	Topham	CEC ESPRIT II
Parallel Processing w/Intelligent Knowledge bases	Thanisch	IED/SERC

Communication Protocols – Brebner

Computational Complexity: Jerrum; Kalyhoti; Sinclair

Computer Algebra: Kalyhoti

Computer Architecture: Hopkins; Ibbett; Topham

Concurrency: Anderson; Milner; Stirling; Gilmore

Databases: Thanisch

Formal System Design: Anderson; Fourman; Gilmore, Sannella

Graphics: Mckenzie

Human-Computer Interaction: Procter

Language Design and Semantics: Milner; Mitchell; Plotkin; Sannella

Logic and Formal Reasoning: Milner; Plotkin; Sannella

Parallel and Distributed Systems: Arvind; Candlin; Cole; Heywood; Ibbett; Stacey; Thanisch

Performance Modelling: Candlin; Pooley; Wight

VLSI: Rees

UNIVERSITY OF EDINBURGH
DEPARTMENT OF COMPUTER SCIENCE
DEPARTMENTAL COMMITTEES 1992/93

Policy Committee

This committee will formulate policies on strategic issues and make recommendations to the Departmental Meeting for approval and where appropriate will act as an advisory body to the Head of Department on sensitive issues.

Membership

The Head of Department (Convenor)	RNI
The Professors	RB, MIKEF, RM, GDP
Convenor of the Teaching Committee	SOA
Convenor of the Computing Staff Subcommittee	DJR
Convenor of the Technical Staff Subcommittee	RAM
The Principal Computing Officer	JHB
The Assistant Director of the LFCS	GLC

Remit

1. To formulate the Department's Academic Plan
2. To advise the Departmental Meeting and the Head of Department on staffing and resource requirements
3. To advise the Departmental Meeting and the Head of Department on staffing and resource allocations
4. To formulate policy on external relations

Academic Staff Subcommittee

Membership

The Head of Department (Convenor)	RNI
The Professors	RB, MIKEF, RM, GDP
Convenor of the Teaching Committee	SOA
2 elected representatives of the teaching staff	MRJ, TMH

Remit

1. To advise the Policy Committee on academic staff requirements in terms of the teaching and research profile of the Department
2. To set up appointment and interview committees
3. To advise the Head of Department, in appropriate cases, on matters relating to teaching and research staff development, appraisals and promotions

Computing Staff Subcommittee

Membership

A Convenor appointed by the Head of Department	DJR
The Senior Computing Officer	JHB
Representatives of the Teaching Staff	RC

Remit

1. To advise the Policy Committee on CO staffing requirements

2. To provide authority to the Senior Computing Officer for disposition of computing staff effort
3. To organise a forum in which computing staff can discuss matters relating to computing support within the Department
4. To advise the Head of Department, in appropriate cases, on matters relating to computing staff development, appraisal and promotions
5. To meet at least once per year with the Technical Staff Subcommittee to discuss the allocation of duties between COs and technicians

Technical Staff Subcommittee

Membership

A Convenor appointed by the Head of Department	RAM
The Laboratory Superintendent	JCD
Representatives of the technical staff	JJ, DCH
Representatives of the teaching staff	TMH

Remit

1. To advise the Policy Committee on technical staffing requirements
2. To provide authority to the Laboratory Superintendent for disposition of technical staff effort
3. To organise a forum in which technical staff can discuss matters relating to technical support within the Department
4. To advise the Head of Department, in appropriate cases, on matters relating to technical staff development, appraisals and promotions
5. To meet at least once per year with the Computing Staff Subcommittee to discuss the allocation of duties between COs and technicians
6. To advise the Head of Department on matters relating to Departmental safety

Administrative Staff Subcommittee

Membership

The Head of Department (Convenor)	
The Senior Secretary	EAK
Appointee of HoD	GLC
Representative of the Admin Staff	LMP
Representatives of the Secretaries	

Remit

1. To advise the Policy Committee on Administrative staffing requirements
2. To provide authority to the Senior Secretary for disposition of secretarial staff effort
3. To organise a forum in which administrative staff can discuss matters relating to administrative support within the Department
4. To advise the Head of Department, in appropriate cases, on matters relating to administrative staff development, appraisal and promotions

Systems Requirements Subcommittee

Membership

Convenor appointed by HOD	Mikef
The Senior Computing Officer	JHB
2 Representatives of the Computing Staff	GDMR, DWB
A Representative of the Teaching Committee	
A Representative of the Syllabus Committee	JCB, RJP
A Representative of the Administrative Staff	LMP
2 Research Representatives appointed by the professors	T. Harris, ray, glc
Co-opted members as required	

Remit

1. To consider systems requirements for teaching, research, and administration.
2. To inform the Department of options for future developments.
3. To hold an open discussion meeting once a term.
4. To advise the Policy Committee and Departmental Meeting on computing strategy, and resource requirements.

Computing Resource Allocation Subcommittee

Membership JHB, MikeF, RNI

Remit

1. To advise the Policy Committee on the allocation of computing resources

Teaching Committee

Membership

A Convenor appointed by the Head of Department	SOA
Course organisers	STG, NPT, TMH
	MIC, ASW, DKA
The Admin Assistant	LMP
Computing Officers Representative	JTB (Secretary)
Technical Staff Representative	JCD
Student Representatives (CS1, CS2, CS3, CS4 & M.Sc.)	
Co-opted members as appropriate	

Remit

1. To coordinate the work of course organisers for MSc and undergraduate classes.
2. To review and coordinate the teaching and assessment procedures
3. To advise the Policy Committee and its Subcommittees on staffing requirements for teaching
4. To advise the Policy Committee of computing and software needs for teaching
5. To receive reports from staff-student liaison committees.
6. To coordinate the arrangements for degree examinations, invigilation and examiners meetings; to liaise with External Examiners and Convenors of Boards of Examiners
7. To specify requirements for the student record system and to collect statistics on student numbers

Syllabus Committee

Membership

Convenor	Mikef
All members of the teaching staff	
The Admin Assistant	LMP
Student Representatives (CS3, CS4 & M.Sc.)	

Remit

1. To be responsible for the syllabuses of all Departmental courses in the University Calendar.
2. To prepare proposals for Boards of Studies.

Library Committee

Membership

A Convenor appointed by the Head of Department	PT
Representatives of the teaching staff	FS
A representative of the research staff	DPYM
A representative of the research students	AB

Remit

1. To formulate departmental policy and to advise the Policy Committee on library matters
2. To consider the allocation of library funds for books, journals and conference proceedings.

Postgraduate Committee

Membership

Membership is open, but includes at least the following:

A Convenor appointed by the Head of Department	CPS
PG course organiser	SOA
PG Mentors	RB, MikeF, RC
Postgraduate Representatives	MJM

Remit

1. To advise on PG admissions
2. To advise on PG courses
3. To consider PG issues (e.g Codes of Practice for supervision)

Publicity Committee

Membership

A Convenor appointed by the Head of Department	LMP
Schools Liasion	Gordon
1^{st} year course organiser	MIC
M.Sc. course organiser	DKA
PG Admissions	CPS
Open Day Organiser	MikeF
LFCS representative	MKL

Remit

1. To advise on all aspects of departmental publicity

Computing Officer Duties 1992/3

Mr P. Anderson (paul): LFCS Systems Development Manager.

Mr D.W.T. Baines (dwb): CS2/3/4/MSc systems support; CS2 teaching support; news; mail; communications support; Gandalf.

Ms J.T. Blishen (jtb): Unix system management; sources server; information distribution; CS1 teaching environment.

Mr J.H. Butler (jhb): Service Manager; EPCC liason; PC-NFS; Maple.

Dr G.L. Cleland (glc): Assistant Director of LFCS.

Mr C. Cooke (cc): Staff systems support; GNU emacs.

Ms C. Dow (carol): Part-time Computing Support Officer
Faults; documentation; advisory; accreditation.

Mr A.J.C. Duggan (ajcd): p/t Computing Officer; p/t PG
TeX; graphics packages and course support; printers, plotters and spooling; DTP.

Ms M. Findlay (morna): LFCS System Manager; mail.

Mr A. Howitt (arch): Hardware laboratory support; CS3/4 projects; P-CAD; IBM PC clones.

Mr D.J. Rogers (ddr): VLSI support; SOLO; Cadence; ELLA; Faculty representative for ECAD, Eurochip and EASE.

Dr G.D.M. Ross (gdmr): CS1 teaching cluster; Sun; X11; networking; mail; X toolkits.

Mr A.J. Scobie (ajs): MaPS Project (Faculty); APM replacement; annexes; Unix device drivers; technical support to Service Manager, EUCS liaison.

Ms J.J. Smith (jenny): Computing Support Officer
faults; support; accreditation; backups.

Ms R. Soutar (rs): p/t Computing Officer
administrative databases; HP support.

Mr R.W. Thonnes (rwt): C compiler; hardware/software systems development; Sparse vector machine.

Mr J.S. Turnbull (jst): IS1 co-organiser (with AS Wight); Mac; Apple fileservers and gateways; animator generator; c-prolog; ML teaching support.

University of Edinburgh
Informatics Planning Unit
1992-3 Draft Planning Statement

1 Strategic Position

The Informatics Planning Unit (IPU) is made up of

- The Department of Artificial Intelligence (AI)
- The Centre for Cognitive Science (CCS)
- The Department of Computer Science (CS)
- The Human Communications Research Centre (HCRC)

i. *Main strengths of the Planning Unit*

The IPU has major strengths in both teaching and research. The single honours degree in Computer Science and the joint honours degrees in Artificial Intelligence & CS and CS & Electronics are fully accredited by the British Computer Society and are among the first group of BCS accredited degrees to have been recognised by the Engineering Council. We believe that these degrees provide the best education in these areas in the country. The AI & CS degree is unique in providing a strong grounding in both subjects while containing more AI than is common in single honours degrees with that title elsewhere. The particular strengths of these degrees are the breadth and depth of coverage and the linkage of theory and practice. Our students are in high demand both in industry and as postgraduate students. In addition to these degrees, a rich variety of other joint degrees is offered by AI and CS.

At postgraduate level AI, CCS and CS all have thriving and internationally renowed M.Sc. and Ph.D. programmes.

In research the HCRC adds a further strength to the outstanding international reputation which all three departments enjoy. In the recent UFC research assessment exercise, computer science at Edinburgh was rated 5A, placing us in the top four universities in the UK.

ii. *Main Weaknesses of the Planning Unit*

The most significant weakness of the IPU is a shortage of resource. The 1980s saw a major expansion of student numbers in Informatics at Edinburgh, largely funded at engineering rates under the ETP. With the introduction of "Guide Prices" by the UFC, the income per FTE student in Cost Centre 18 dropped dramatically. This, coupled with the severe local financial difficulties in this University, and factors in the University's financial model which are not helpful to this Planning Unit, have lead to severe reductions in staffing levels in the three academic departments in the IPU. Although the bulk of cuts has been achieved, it has been through random natural wastage, giving little opportunity for planning, so that the staffing profiles are no longer close to the ideal, not only as between different categories of staff, but also in terms of the research profiles of teaching staff.

A second weakness, which affects AI in particular, is accommodation, not only in terms shortage of appropriate accommodation in a number of instances, but also its location. AI is split across two sites, neither of which is close to KB. This adds substantially to running costs through *eg* duplication of facilities between sites and to loss of staff time through commuting between the two AI sites. Joint honours AI and CS students are affected both by the need to commute and by the lack of a common identity between the two departments. Cognitive Science and HCRC are at yet another site, reducing the effectiveness of the essential collaboration with, in particular,

staff in AI. The geographic dispersion also reduces the potential for future "economies of scale" at Planning Unit level.

There is potential for teaching undergraduate courses in Cognitive Science but this cannot be exploited at current resource levels.

iii. *(a) Core Areas of teaching*

At undergraduate level the core areas of teaching are the Single Honours degree in CS and the Joint Honours degrees in AI & CS and CS & Electronics, all of which are fully accredited by the BCS. Closely allied to these are the other joint honours degrees offered by AI (Linguistics & AI, AI & Mathematics and (proposed from 1994) AI & Psychology) and by CS (CS & Management Science, CS & Mathematics, CS & Physics and CS & Statistics). All these degrees attract high calibre students, and the CS joint degrees in this group all have partial BCS accreditation.

At postgraduate level, all three academic departments offer MSc courses, each of which attracts significant numbers of students. In CS the theory PhD programme is unique in the UK in providing a thorough preparation for research in theoretical computer science.

(b) Core Areas of research

Research in AI can be classified under four general headings, automated reasoning, intelligent robotics, knowledge based systems and natural language processing. Each of these headings covers sub-areas: for example, intelligent robotics includes machine vision, autonomous vehicles and automated assembly.

In CCS the principal areas of research are Natural Language, Information & Cognition and Parallel & Distributed Processing. Both AI and CCS have close links with HCRC.

In CS research is focussed in two main areas, theoretical computer science, through the work of the LFCS, and computer systems, particularly the software, architecture and performance modelling and evaluation of parallel systems, where the links with EPCC are important.

(c) Infrastructure support

In each of the departments we have large and active groups of researchers who require a modern computing environment in order to work effectively. To support teaching we use large distributed systems of high performance workstations on which we need to run subject specific languages (*e.g.* ML and Prolog) and applications. Since these facilities cannot be provide by the Computing Service, we employ our own highly skilled Computing Officers who do substantial innovative development work. Without such support for our computing infrastructure it would be impossible to maintain our research standing and excellence in teaching.

iv. *Peripheral activities*

In teaching the Information Systems 1 service course is peripheral, but we believe it provides very high quality provision for students in the Arts/Social Science faculties. If we were to abandon this course then some other provision would be necessary and we believe any replacement would be poorer than the current course.

The CS joint honours degrees with Management Science, Mathematics, Physics and Statistics, and the AI degree with Linguistics all have low numbers, but negligible resource requirement. They could be regarded as peripheral but this would have an adverse affect on recruitment.

Computing officers in CS serve the University in a number of ways. These activities are relatively unimportant to the running of the departments, but the rôle of CS as a "lead site" in the University has substantial "trickle-down" benefits for all University users.

v. *Major external developments impacting on Informatics*

UK economic decline The decline in the UK economy, especially its manufacturing base and the concentration on short-term solutions, has adversely affected industrial participation in research and development programmes, and job opportunities for our graduates.

UG funding The uncertainty over the level of SHEFC funding for CS undergraduates is a major concern. At the current guide price we *cannot* maintain the resources necessary to continue to teach the present style of course. This is a matter of concern *w.r.t.* to accreditation.

Degree courses in other institutions A number of institutions are starting to offer undergraduate AI degree programmes. CCS is also facing increased competition from other institutions in the UK, in the USA and in Europe.

MSc funding The changing priority within SERC away from conversion courses to specialist MSc courses, which has implications for AI.

Increased take-up of AI technology The increased take-up of AI technology in a variety of applications, particularly in the US and Japan, is increasing the worldwide demand for people knowledgeable about such technology. Expansion of the EC will increase pressure on the multi-language problem, with increased scope for machine translation systems and other intelligent language handling systems.

Research funding An increasing number of alpha-rated projects go unfunded due to limited resources within SERC. This situation is not only extremely demoralising for the researchers involved, but also limits our research activity.

2 Academic aims for the 1993-96 planning period

vi. *Teaching Priorities*

(a) *High priority*

Our highest priorities are to maintain the quality and quantity in the core areas of both undergraduate and postgraduate teaching, and to expand numbers overall such that teaching staff levels can be restored to around 20 in AI, 5 in CCS and 30 in CS. We believe these numbers are optimal with respect to coverage of the disciplines in terms of both research and teaching (especially with a view to C.Eng accreditation).

In order to be able to attract additional undergraduate students we have reorganised the first and years in CS to allow direct entry to second year, and are currently planning a similar reorganisation in AI. More importantly, we have established a working group which is examining the range of possibilities and opportunities for single and joint degree provision across the whole of the Planning Unit. We therefore anticipate that within the planning period we will be seeking to introduce a number of new degrees, and that CCS will become involved in undergraduate teaching, *e.g.* by offering one or two honours modules in Cognitive Science and/or Cognitive modelling which would be appropriate to students taking most of the AI joint degrees.

The new degree AI & Mathematics has just started and the proposed new degree AI & Psychology is due to take in students in 1994. These collaborations will be good for the health of the discipline in the longer term, and will also receive high priority.

At postgraduate level we need to complement the "conversion" style courses with "specialist" courses in AI and CCS (the CS MSc has always been classified as specialist, but we still need to secure additional studentships for this course). Overseas applicants for the existing AI MSc course are bouyant, so this will continue, but in order to maintain the allocation of SERC Advanced Course Studentships for UK students, a high priority is to investigate the possibility of starting up a new, specialist MSc course in 1994/95. The possibility of mounting a specialist MSc course in Applied Natural Language Processing, involving both AI and CCS, will also be investigated.

(b) *Low priority*

The joint degrees in Linguistics & AI, CS & Management Science, CS & Mathematics, CS & Physics and CS & Statistics all have low take ups, averaging in each case no more than about 5 students per year. Since they consume very little additional resource, however,

termination would not achieve more than a very marginal saving. Furthermore, plans are in hand for revamping the CS & Management Science, CS & Mathematics and the CS & Physics degrees and numbers are expected to rise as a consequence.

We are exploring with colleagues in France and Germany the possibility of offering a five-year European Diploma in Informatics.

vii. *Research Priorities*

(a) *High priority*

In AI each of the major research areas is significant in its own right. Research work in Automated Reasoning commands international respect and is underpinned by a SERC Rolling Grant. Research work in Intelligent Robotics is very important to the department for both academic and resource reasons. Much of this activity is of a laboratory kind, justifying the need for first class mechanical and electronic engineering support which benefits all research groups.

Research work in Natural Language Processing is closely related to the computational work being undertaken in Cognitive Science and in HCRC. With the setting up of a Language Technology Group in HCRC, we anticipate increased collaboration between AI and HCRC.

Finally, research in KBS is important because of its relationship to teaching. Here there are strong links with AIAI, and a significant imbalance in the strength of the two organizations in favour of AIAI has recently been addressed by the appointment of a second temporary lecturer in AI.

In CCS it is envisaged that research will continue in all the principal areas. There will be more emphasis placed on applications oriented NLP, as a consequence of the current project portfolio in CCS and HCRC. Joint work between CCS and researchers in speech pathology at Queen Margaret's College, Edinburgh, is underway in the area of developing diagnostic tests for communication skills in dysphasic patients, an area which also has immediate training potential.

In CS our priorities are to at least maintain and preferably strengthen the work of the LFCS and Computer Systems Group. We need additional posts in both these areas (including the filling of Prof Michaelson's chair), and more PhD students. To this end we have applied for a larger number of funded PhD places, and are exploring new sources of funded PhD students outside the UK.

We are in the process of developing further industrial links involving Teaching Company Schemes with a variety of firms.

We will further develop our connections with Europe. In addition to existing collaborative projects under the ESPRIT programme, we will use the Human Capital and Mobility programme to bring in European researchers.

(b) *Low priority*

We have commitments to TEMPUS and expect to continue to devote some effort to fostering further links with Eastern Europe through the planning period.

3 Plans for 1993/4

viii. *Activities and Programmes at the planning margins*[1]

	Budget Scenario		
Issue	Minimum (-2.5%)	Central (0%)	Maximum (+2.5%)
Student Nos.	We will seek to expand numbers of highly qualified direct entrants into second year of the undergraduate degrees. We intend to secure the number of MSc students at around 100 and the number of PhD students at 120. These numbers include a high proportion of overseas students.		
Staffing	It may be necessary to look at some form of redeployment; most of those likely to leave have already done so. Savings in technical and computing staff could be sustained in CS, though the loss of such staff could seriously impair support for teaching and research infrastructure.	We believe that we would be able to achieve our savings targets without recourse to redeployment etc. But this leaves the academic research base impaired.	We could begin to repair the damage caused by uncontrolled loss of staff in the moratorium on appointments, and consolidate the position of several staff on temporary appointments. We could begin to strengthen established research groups.
Courses	We will continue to develop new undergraduate and postgraduate courses and revise existing courses, particularly joint honours.		Student admissions to AI & Psychology for 1994/5 could begin. UG modules in CCS could be started.
Research	Loss of support for research will seriously impair our ability to operate as Grade 5 departments.	Despite increased teaching and administrative loads during the moratorium, we have increased research income. Level funding will not alleviate the current level of pressure on research time; this will inevitably lead to a decline in activity.	Appointments of research active teaching staff on temporary contracts should be consolidated; gaps in research capability amongst academic staff could still not be repaired.
Income	Most of the trading activities related to the IPU take place in other, associated units (AIAI and EPCC). In CS We are exploring the possibility of expanding our course programme but the recession means attendances tend to be low. We are involved in Teaching Company and other collaborative industrial schemes and will explore further schemes. AI will investigate an MSc via distance learning.		
Other areas	The main implication for others is in the area of accommodation. To accommodate increased numbers of UG and PG students and research staff (for whom expansion in numbers is largely independent of University funding) we will require significant extra space and restructuring of existing accommodation.		

[1] *No activities are to be ceased*

Aganist this is the problem of the increasing amount of time and energy which have to be devoted to administration. This necessarily encroaches primarily on research time, and is becoming a matter of increasing concern. In practice administration is now taking some 30% of most people's time.

xii. *Relevance of* Scottishness

The academic areas of interest in the Informatics Planning Unit are international. They are nevertheless important to Scotland in the context of providing both educated manpower and intellectual input to relevant local industry, both indigenous and inwardly investing.

xiii. *Planning issues relevant to other Faculty Groups*

AI and CCS have close ties with Linguistics and Psychology and some of the planned new activities involve these departments.

AI and CS have links with the Department of Business Studies through joint degrees which will be further developed or could be introduced.

xiv. *Support from Support Groups*

We have always employed our own computing support staff within IPU departments since we have always had, necessarily, more advanced computing facilities than those provided by the Computing Service. If we are to remain at the forefront of teaching and research this situation will necessarily have to continue into the forseeable future. Our concern, therefore, is not that we should receive more support from the Computing Service, but that we should not be taxed (through the University's financial model) to pay for the service which it provides for others.

The issue of income/expenditure flow is clearly a matter of importance for all departments, and we need clear financial information at both planning unit and departmental level.

xv. *Strategic questions*

- Determining whether academic activities should be pursued on academic merits or purely in terms of their assocaiated cash flows.
- How to maintain research time and opportunities for staff in the face of increasing SSRs and externally imposed administrative burdens.
- Whether the University should attempt to orient towards more "vocational" education.

Technical Staff Subcommittee

Meeting: 15th March 1993

TSS met in response to a request from HOD to consider the implications of the proposals arising out of a meeting held 9th March, by an invited group, to discuss the use of CS lab space in the face of increasing student numbers. TSS met as a matter of urgency since it was reported that implementation of the proposals were proceeding apace, although this may have related to costing and feasibility studies only at present.

TSS wish to express, in strongest terms, the incredulity that the CS space meeting should take place without invitations to the Laboratory Superintendant (and, perhaps, in his rôle as Safety Officer), the convener of TSS and the senior member of technical staff in charge of the labs. It was reported that the computing officer associated with the labs was also omitted but on finding out in time, he invited himself. Whilst it is appreciated that numbers would have been large, that merely reflects the scale of the proposals and of the number of staff directly involved. TSS believes that the teaching requirements should have been discussed first and requirements passed to another meeting to generate proposals to meet those needs.

TSS examined the proposals carefully and concluded that, in general, they represented a well-constructed plan to meet the requirements of expanding numbers. TSS offer a number of positive proposals which are recorded as they were discussed, as an itemised list, in order of perceived significance. Since a number of the implications require discussions between technical staff and Works, TSS suggest that a member of technical staff be present at any meeting with Works. JCD will represent TSS and should be kept informed of meetings. He is unable to attend the first meeting .

1. **PC maintenance: TSS propose that a group of those concerned with PC lab space, software and hardware should gather to discuss maintenance.** It does seem to be a problem on other sites. A policy on first-line hardware maintenance, in particular, needs to be addressed.

2. **North Hall:** Construction is flagged as a real problem. TSS is particularly concerned about flying metal clippings (unsleeved) in the System Design practical with keyboards and cases with perforated tops as especially vulnerable. **TSS proposes that the Department replace all wire-cutters with the type which contains clippings.** This would minimise, if not eliminate the problem.

   As we met, TMH had not measured the area planned for the Computer Design practical. TSS feels that the area will not cope with 20 students both in area and power resourcing. **TSS therefore propose that the wall to the dark room be removed to enlarge the area and allow better**

access to the PDU in the dark room. The Bepi room could remain as a storage room or the switch room could be used for that purpose. **TSS propose that the wall between the dark room and the Bepi room be removed and the wall to the switch room moved out towards the dark room to enlarge the switch room for storage.** The technical staff lab in the North Hall would remain. The metal cupboards would be placed against the lab and the lab used to store the expensive components.

Tom Wigham moves to the lab in the North Hall.

JJ will still be in charge of the labs in their new home in the North Hall.

The use of ELCBs will be investigated by DCH. There has been a problem with earth leakage in the halls in the past and the current situation will be assessed. **TSS proposes that PC equipment be wired direct to the PDU but that student-added constructed equipment be powered through ELCBs.**

3. **South Hall:** TSS feels that the proposals here should be changed. The partitioned rooms at the west end are underused and the issue of expansion of the server room at some time has not been fully addressed. Therefore it would appear to make more sense to remove the partitioned areas and expand CS3/4/MSc workstations to the west keeping the machines in one block. The server room would be free to expand, if necessary, into the Posie area. This would keep the south end as a secure, partitioned block from servers through to technical staff lab. Some of the Posie area could be used as a machine hall data library and/or for the printer if the server room did not need to expand to all of that area. It was also felt that the South Hall would look much more presentable with that arrangement. **TSS proposes that the workstation expansion be to the west, that the partitions be removed, the south would be used for server expansion or for library/printer.**

4. **1501/1507:** TSS felt that the dividing wall should remain and sees no good reason for its removal. The benches are not compatible with the chairs in 3208. However those chairs will have to be removed sometime for HSE reasons. DCH is investigating deploying the benches to 3208 as the preferred solution to house workstations. In anticipation, **TSS proposes that the benches be redeployed to 3208 and the Department obtains new chairs to comply with bench height and new HSE regulations.**

5. **1513:** It was felt that after Tom moves out this room should remain. It will be required at times for noisy equipment, soldering and such specialised needs by project students.

6. **Other rooms:** Proposals for 1512, 2501, 3208, 3312, 3311, 3310 and 3309 required no comment other than to suggest that the wall between 3310 and 3311 should indeed come down.

7. **Technical Staff:** Effort required by the technical staff should be carefully planned. It is presumed that work will be scheduled over the summer vacation and staff holiday leave will have to be taken into account. DCH needs to involved from the start of planning how to serve rooms with the required cables.

Faculty Officer
D B NELSON BSc MBA PhD MIMgt

19 MAR 1993
HOD

Our ref:
Your ref:

FACULTY of SCIENCE and ENGINEERING
The University of Edinburgh
King's Buildings
West Mains Road

Tel: 031-650 5757
Fax: 031-650 5738
Email: d.b.nelson@ed

18 March 1993

Heads of Planning Unit

Dear Colleague

Computer Board Equipment Pool

I enclose a copy of correspondence received by the Provost inviting Faculty Group bids for advances of money from the Computer Board Equipment Pool. If you wish to bid could you please let the Dean have a statement of our case by Friday 23 April 1993.

Please note that:

1. Bids should be discussed in the first instance with the Manager of the Faculty User Support Team.

2. Any cash allocated to PUs will be deducted in two equal portions from Planning Unit Equipment Allocations for 1994/95 and 1995/96.

Yours sincerely

Dr D B Nelson
Assistant Secretary

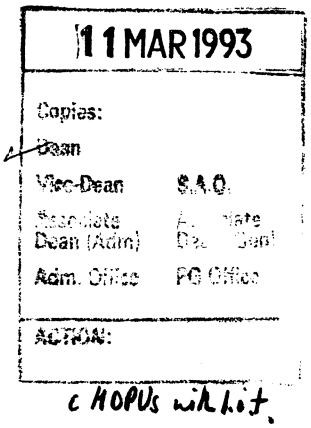
Enc.

11 March 1993

Ref: 2N 03 AF

To: All Provosts

From: Vice-Principal Professor M Anderson
Department of Economic & Social History
William Robertson Building



c HOPUs with list.

Dear Provost

Computer Board Equipment Pool

I am writing to invite bids from your Faculty Group for loans to help purchase equipment in advance of normal timescales through use of a budget earmarked from the 1990 Computer Board Grant (the Computer Board Equipment Pool). Ten departments from five faculties benefited from the first round of loans from the special budget; eight departments, again from five faculties, benefited from the 1991 allocation, and four departments from three faculties benefited from the 1992 allocation. Most of the available money was allocated to the immediate funding of viable groups of microcomputers on a 0% APR deferred payment basis, with departments and faculties paying back the advance to the Pool in either one year or two.

The total sum of money available is expected to be similar to previous years, i.e. around £60,000. The aim, as in the previous rounds, is to enable less well-off departments to make a reasonable start at achieving computer power distributed on end users' desks, and in particular to allow them to achieve viable initial configurations which they might otherwise find it difficult to fund from their normal faculty allocations in any one year. Although all bids will be considered, relatively small bids of between £5,000 and £10,000 will be given preference. Even if this budget is significantly over-subscribed, the information presented through the bids helps in the more general planning of an adequate provision of computing facilities within the University. You should also be aware that this budget may again be used to help departments fund Ethernet cards to allow existing personal computers in the University to be connected to the new network EdLAN as soon as feasible, but of course depending on the rate of progress of the various building wiring programmes.

Therefore, I am writing to you now to invite you to consider how the Equipment Pool could benefit departments in your Faculty Planning Units in the fourth round of funding which will be available from August 1993. I hope that by contacting you at this stage you will have time to consider how this deferred payment budget could be utilised in conjunction with the 1993 UFC Equipment Grant. Formal requests for advances of money from the Pool should be lodged with Dr Andrew McKendrick in the Computing Service by Friday 14 May, to enable allocations to be decided early in June.

This is a working document. Not for circulation or distribution outside the Department. Comments welcome. Michael P. Fourman

This document consists of four parts:

Introduction: a summary of the Department's rôle within the University, its particular strengths, and its connections with Industry;

Structure: a brief guide to the organisational structures supporting the Department's teaching functions;

Assessment: an assessment of each quality aspect, following the SHEFC framework:

Contents

Documentation: a collection of supporting documentation.

Introduction

The University of Edinburgh is internationally recognised as a leading research university. Its Corporate Plan states that "the University is building its future on strength in research and on the promotion of education and training whose qualities depend on a challenging environment of research and professional practice, resulting in a distinctive type of teaching". A full statement of the University's aims, as defined in its Planning Statement, is reproduced in [?]. The University is divided into eight *faculties* for academic purposes; the faculties are organised into four *faculty groups* for planning and financial management. The Department of Computer Science is within the Faculty of Science and Engineering: the largest faculty, and a faculty group in its own right. The Faculty's aims are described in [?], together with an amplification of what it sees as the features of teaching in a research environment.

The individual academic *department* has traditionally been the fundamental operating unit at Edinburgh, with the *Head of Department* responsible for academic planning and management within the department. In 1991, the University commissioned a major independent review (by management consultants Coopers & Lybrand Deloitte) of its management and financial practices. The outcomes of this review included the introduction of the faculty groups, mentioned above, and a parallel reorganisation of departments into *planning units* within the faculty groups. There are nine planning units in the Faculty of Science and Engineering. The Department of Computer Science is part of the Informatics Planning Unit, together with the Department of Artificial Intelligence, the Centre for Cognitive Science and the Human Communication Research Centre. The eventual purpose of the reorganisation is to devolve more financial control to the *Head of Planning Unit*, consistently with the traditional departmental academic responsibility.

While the above hierarchical structure is appropriate for purposes of planning and financial control, it is complemented by horizontal linkages that reflect the more organic and diverse relationships between academic disciplines across the whole University. The Department of Computer Science has strongest links with those departments sharing Joint Honours degree programmes; in addition, there are research connections with many other departments: for example, Chemical Engineering, Sociology, the Research Centre for Social Sciences and the Human Communication Research Centre.

The Department offers degrees in Computer Science at three levels: B.Sc. Ordinary, B.Sc. Honours and M.Sc., as well as the following Joint Honours degrees:

- B.Sc. (Hons) Artificial Intelligence and Computer Science;
- B.Eng. (Hons) Computer Science and Electronics;
- B.Sc. (Hons) Computer Science and Management Science;
- B.Sc. (Hons) Computer Science and Mathematics;
- B.Sc. (Hons) Computer Science and Physics; and
- B.Sc. (Hons) Computer Science and Statistics

The Department is a leading research centre, and had a 5A rating in the 1992 Research Selectivity exercise. Almost all teaching staff are active in research, and their specialist knowledge informs all aspects of curriculum design and delivery. A Research Officer provides advice and assistance in preparing applications and managing grants. Most research in the department takes place within one of two major research groupings: the Laboratory for Foundations of Computer Science (LFCS), a research federation for theoretical work within the Department; or the Computer Systems Group, which has links with the Edinburgh Parallel Computing Centre (EPCC), an inter-departmental unit active in research into applications of parallel computing both in university departments (Physics in particular) and in industry. The LFCS and the EPCC are both internationally renowned as leaders in their fields.

The Department also enjoys a close and productive relationship with industry. Some members of staff have consultancy arrangements with companies and/or are involved in giving training courses to industrial engineers. Research and consultancy work carried out in the department has led to the formation of a number of spin-off companies during the last decade, including: Clan Systems, Lattice Logic, 3L and Algotronix.

RJP to expand this.

Industry contributes to the Department's teaching in several ways. First, the *Information Technology Education Advisory Board* provides a formal structure for including comment from industry in the process of curriculum review. It also provides a forum for the discussion of strategic issues, such as the effects of Government funding policies. Second, where appropriate, the Department also seeks (and receives) help from industry in delivering or assessing particular aspects of the curriculum. The most notable examples are: Professional Issues lectures; the System Design group practical project; and joint academic/industrial supervision of M.Sc. project students. Several companies have shown their high regard for the Department through substantial donations (or loans) of equipment.

Ask GLC and JHB for details.

A number of companies also sponsor prizes to be awarded to students for their performance on general or specific aspects of the course. These include: Prentice-Hall (first year), Procter and Gamble (second year), FI Group (third year), Sun Microsystems (fourth year), Hewlett-Packard (joint Electronics degree) and Anderson Consulting (System Design project).

Members of staff hold positions on many professional and government bodies which have a significant role in shaping the development of both research and education in computer science.

LMP to expand this.

In addition to the Department's strength in research, members of staff have written textbooks, and developed innovative course modules and practical exercises. Several of the Department's contributions to Computer Science are now fundamental components of the undergraduate curriculum both in Edinburgh and elsewhere. There is vigorous and on-going debate about course content and teaching methods, with continual revision of syllabuses. Flexible procedures for course review and modification permit a prompt response to developments in our rapidly evolving subject, by staff who are themselves at the leading edge of those developments.

A six year equipment replacement cycle allows students to be given practical experience using state of the art facilities. Computer systems are supported by staff whose innovations have led to research publications, and who contribute to project supervision and tutoring where appropriate.

The Department of Computer Science fulfils the University's primary functions [?]. Its courses

provide an education in the conceptual framework and scientific principles of the subject, and also develop critical, analytical, communication and practical skills. The department combines scholarship, and the advancement of knowledge by the pursuit of research, with a commitment to spreading this knowledge through publication, education, and consultancy.

Departmental Organisation

Although organisational structures are discussed under the individual sections of the self-assessment, we think it helpful to outline the overall framework supporting teaching in the Department. In this section we give a brief overview of the mechanisms used by the Department to support

- Curriculum Design and Review
- Teaching Delivery and Assessment
- Student Welfare and Progress

The major organisational structures involved are shown in .

The Head of Department (HOD) is responsible for establishing the Department's organisational structures. A departmental committee structure allows decision making and executive responsibilities to be distributed appropriately to support different departmental functions. The membership and remits of Departmental Committees are contained in [?]. All committees report to the Departmental Meeting and the Head of Department.

.1 Curriculum Design and Review

Senatus is the University's academic authority; this authority is devolved to Faculties. Boards of Studies and External Examiners report to Faculty. The University Calendar contains details of all approved courses of study. Curriculum proposals are monitored and all Calendar changes approved by Boards of Studies.

Curriculum proposals arising within the Department are brought to Syllabus Committee for consideration. Resource implications and implementation details are considered by Policy and Teaching committees. Syllabus committee is responsible for preparing detailed formulations of successful proposals, which are then passed to Boards of Studies (BOS) for approval. For major changes, outline approval from BOS is sought at an early stage.

Major curriculum proposals are presented to the Information Technology Education Advisory Board (ITEAB), and discussed with external examiners. The British Computer Society is also consulted on all changes that might affect accreditation.

Syllabus Committee receives feedback on the curriculum, via Teaching Committee and Course Organisers, from Lecturers, Tutors, and Students, and also directly from Directors of Studies.

Within the Informatics Planning Unit it has been proposed to establish an Informatics Curriculum Committee which will formalise existing informal communication to coordinate curriculum developments within the member departments.

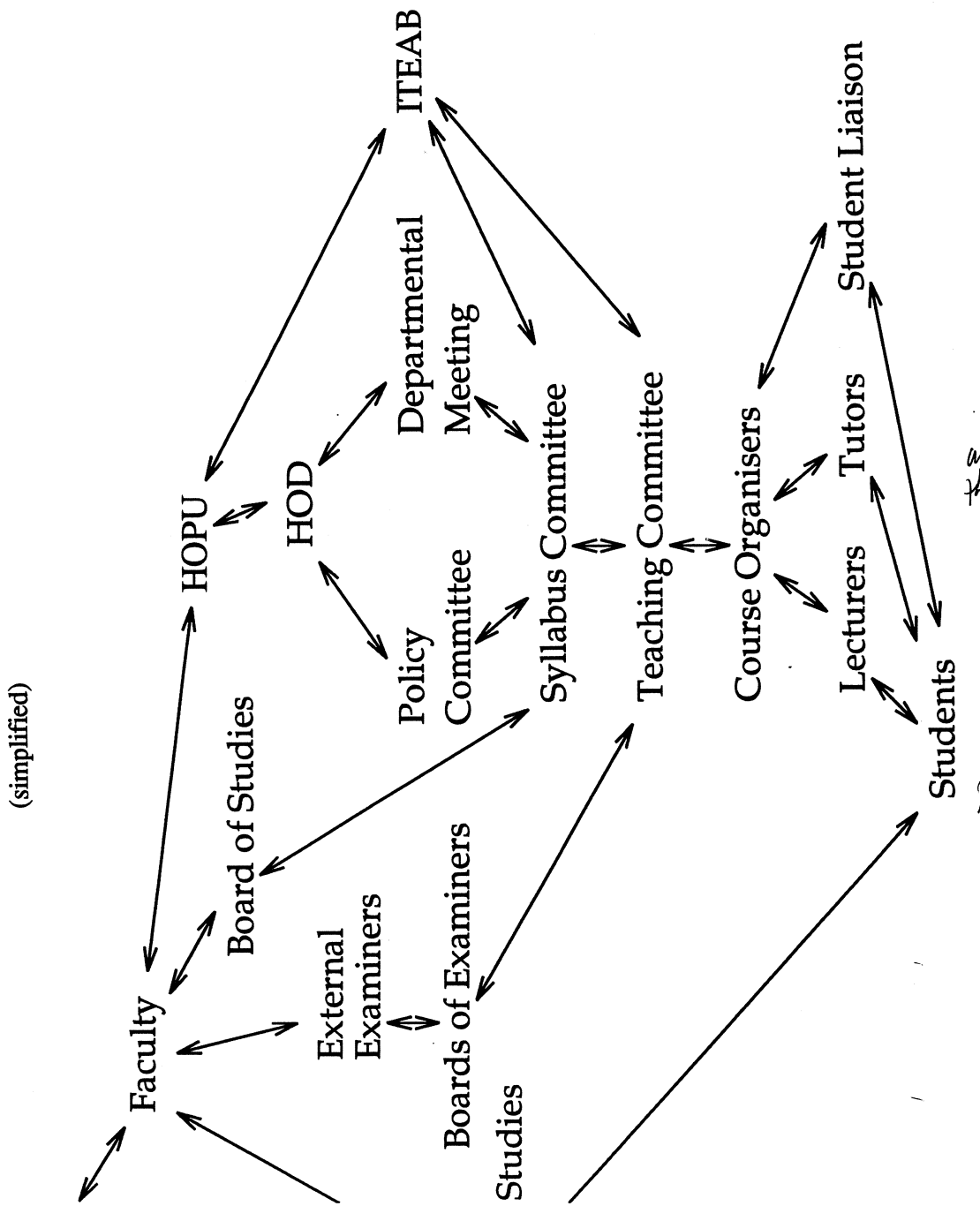
.2 Teaching Delivery and Assessment

Delivery of the curriculum is the reponsibility of Teaching committee. It is devolved to individual tutors and lecturers via Course Organisers.

Boards of Examiners are responsible for Assessment; each Board includes an External Examiner who reports independently to Faculty.

.3 Student Welfare and Progress

Directors of Studies are responsible for the welfare of individual students. In addition, Course Organisers provide annual reports to Teaching and Syllabus Committees on student progress. Staff-student Liaison committees for each year and student representation on Departmental Committees also provide valuable communication channels.Tutors



A Aims and Curricula

Formal Structures

Departmental aims are formulated in the *Academic Plan* prepared annually by the Policy Committee. In formulating the Plan, the Policy Committee takes account of University and Faculty aims. Teaching aims are discussed by the IT Education Advisory Board, and drafts of the Plan are presented to the Departmental Meeting for comment and approval. The Plan is forwarded to the University's Central Managagement Group, via the Head of Planning Unit and the Provost. This section presents the aims of the Department's undergraduate teaching.

Aims

The Department should provide a broad education in Computer Science, catering for variety in the preparation, aspirations and potential of our entrants. The curriculum should emphasise scientific understanding and its relationship to engineering practice.

The Department aims to develop well-rounded graduates with a high level of knowledge and skills, both theoretical and practical. Entrants come from a variety of backgrounds. The majority of our graduates enter professional careers as high-calibre systems and software engineers; some go on to research careers in Computer Science or related areas.

Computer Science is a comparatively young discipline; there is less consensus on the undergraduate Computer Science curriculum than there is for long-established degrees such as Physics. Edinburgh has played a seminal role in the development the subject, and has recently proposed a definition [?]. ~~This perspective shall inform our teaching;~~ two major issues should provide guidance in the development of the curriculum:

1. the subject is the study of the structure and dynamics of computational systems using mathematical, logical and empirical tools; and
2. this study must be informed by, and should cast light upon, a wide range of engineering design problems relating to the exploitation of computational systems in the human environment.

The mutual dependence between scientific theory and engineering practice [?] shall be reflected in their integration in the Department's curriculum.

- All our graduates must have the conceptual tools required to stay abreast of future developments in this fast-changing area. Therefore, the Department should emphasise an understanding of underlying principles; ~~which~~ are particularly important as today's practices and standards will quickly become obsolete.
- Equally, our courses should develop the engineering skills students need to apply their scientific knowledge to the specification, design and successful implementation of useful systems.

- Throughout the curriculum, our teaching should develop the analytical and mathematical skills that underpin engineering practice and scientific understanding.

The Department wishes to ensure that students benefit from its strengths as a leading research department with staff who are active in research. A perspective based on scientific understanding should inform courses in the earlier years; courses in the Honours years should transfer the specialist knowledge that resides in departmental research groups.

Students must also acquire appropriate general skills, for example: to be able to communicate effectively, both orally and in writing; to be able to seek out, and assess critically, information from both academic literature and other sources; to understand the wider context and implications of engineering activities; to be able to work co-operatively with others; and to have the determination to pursue the solution to a problem over an extended period, working independently and with the minimum of supervision. Course design should support the development of these skills.

The curriculum should also achieve a balance between the following subsidiary aims:

- to offer intellectually demanding courses that develop the potential of our high-calibre students;
- to cater for the less able by providing appropriate courses of study;
- to achieve an appropriate balance between developing specialist knowledge, and giving an awareness of a wide variety of subject matter and techniques;
- to develop the competence, skills and attitudes expected of a professional engineer, in particular to satisfy the requirements for professional accreditation of all Honours Degree programmes;
- to ensure that undergraduates gain from research activities, both by acquiring up-to-date specialist knowledge and by forming appropriate attitudes and skills for working in advanced research and design;
- to cater for those students who wish to broaden their curriculum;
- to cater for developments in students' interest and motivation during their university careers;
- to make available a range of Joint Honours degrees in complementary subjects, in cooperation with other departments in the University .

Curricula

The curriculum is designed to provide a progressive development of study skills, conceptual framework, and practical skills and experience. An overview of the degree courses is provided in [?].

Vertical integration is considered with respect to the development of four themes: Transferable Skills, Hardware, Software, and Theory. These are covered by the following documents [?, ?, ?, ?]

Horizontal integration aims at matching practical experience with conceptual development, and at matching teaching methods and practical exercises with the development skills.

The integration of these modules with coursework and projects is described in the student guides to individual years of the course [?, ?, ?, ?].

B Curriculum Design and Review

Curriculum design and review is the responsibility of the *Syllabus Committee,* which consists of all members of the teaching staff together with student representatives. Proposals for, and changes to, courses of study for degrees in Computer Science are formulated by Syllabus Committee, and forwarded to the *Board of Studies in Engineering and Informatics.* Boards of Studies report to the Faculty, and approve individual degree programmes within a framework established by Senatus.

The Syllabus Committee also develops and monitors the syllabus for individual modules. The *Teaching Committee* (see Section [?]) manages and assesses the delivery of the curriculum. Direct feedback on teaching comes to Course Organisers from students, lecturers and Directors of Studies. The Teaching Committee monitors this and, where curriculum changes are indicated, provides feedback to the Syllabus Committee.

The Syllabus Committee also reviews provision in relation to external influences: professional accreditation requirements; the teaching of computer studies in schools; and the needs of employers. The committee solicits input from the IT Education Advisory Board, a panel of external representatives from industry and commerce that meets annually.

The Syllabus Committee identifies opportunities for new modules. New material derived from progress in research is normally piloted at M.Sc. level, or as an optional final year Honours module. There is continual pressure for the earlier introduction of many topics, and this leads to regular review of the scope and content of the curriculum in all years. The Department has recently introduced a major reorganisation of first and second year teaching (largely in response to an increase in the teaching of computer studies in schools). This has given us the opportunity to review the curriculum, and to take full advantage of recent improvements in the computer systems available to our students.

The curriculum in the first two years is designed to provide appropriate entry points and courses of study for students from varying backgrounds. This provides three levels of entry, catering for students with:

1. no computing experience;
2. basic computer programming skills; and
3. significant formal computing education.

need more on CS2 3 and 4 here From Mike

C The Teaching and Learning Environment

Introduction

The Department of Computer Science is a large and diverse academic community, consisting of 25.5 teaching staff, 23 research staff employed on funded research, 12.5 computing officers, 15.5 other supporting staff, ????research students and ????taught students of whom ????are undergraduate students. Teaching accommodation is split between the Appleton Tower on the George Square Campus and the James Clerk Maxwell Building (JCMB) on the King's Buildings camous. The communication infrastructure is supplied by a computing network that is entirely run and maintained by the Department. Linking both sites, this network comprises a variety of computing equipment: Sun workstations, Apple Macs, PCs, Hewlett-Packard and DEC equipment. The network provides an integrated filestore that appears identical to all users, regardless of location, and is accessible from all the terminals attached to EdLAN the University local area network [?, ?]. Extensive help material and documentation is built into the system, and a collection of technical notes [?] provides information specialised to the local environment.

As a communication medium, the network provides electronic mail, which is used extensively for one-to-one communication: student to student, student to lecturer, student to tutor, etc. This also includes a fault reporting system which alerts the computing support personnel when a fault is discovered. The volume of electronic mail is high, since it provides easy and rapid communication for dealing with problems, answering queries etc. In addition, the network provides a news service, having a large number of bulletin boards carrying local, national, and international, news. Within the department, there is a structure for local news groups:

- special purpose groups covering particular interests, e.g., seminars, or a particular research group or organisation;
- course newsgroups, used to disseminate information directly relevant to undergraduate or postgraduate courses, and are commonly used by course organisers and course lecturers. Students are instructed to read these groups frequently; and
- general discussion groups, including one devoted entirely to questions, usually about the computer systems or some aspect of computing, giving students access to a wide range of instantly available expertise.

All members of the Department make use of these facilities and students gain exposure to a range of opinion and expertise. Students are informed of these services on their arrival in the department and are given access to most services. Responsible use of the network is stressed at all times[?].

Academic environment

Computer Science is a young discipline. Most of the knowledge that now comprises the core of the academic curriculum was unknown 30 years ago. Workers at Edinburgh have been actively

involved in the formation of this core knowledge, and also substantial parts of the undergraduate curriculum were developed at Edinburgh. The interplay between the research activities of the Department and teaching pervades the undergraduate and postgraduate taught programmes. Some illustrative examples are:

- Standard ML is taught in the second year and is used extensively in teaching and research. This programming language won a British Computer Society Award for technical merit, and is slowly gaining acceptance in the commercial world as better compilers and support systems become available. It remains an important research theme within the department. Courses on programming, compiling, semantics, structuring large systems, and program specification, all make use of Standard ML as a vehicle and exemplar of the design of a sound programming language. Current research work on the specification of programs using Extended ML is used in the third year programming methodology course;
- The Edinburgh Parallel Computing Centre (EPCC) [?] is a unit involving a number of members of the Department, active in researching parallel architectures and computing. Staff engaged in this activity provide courses on parallel computing, and the EPCC provides access to modern parallel computers for courses. In addition, the EPCC is an important source of proposals for final year Honours projects;
- The theory of concurrency is an important research theme and courses, and Edinburgh work on the Calculus of Communicating Systems (CCS) provides the basis for courses at undergraduate and postgraduate level;
- Work on semantics of programming language directly influences courses in the Honours years;
- All of the themes in the taught M.Sc. — Parallel Systems, Theory, and Computer Systems Engineering — draw extensively on research activity within the Department. In particular a number of software tools developed as part of research work are used to support teaching.

In the fourth year, students undertake a major project which contributes 20% of their final assessment. These are proposed by teaching staff, researchers and computing officers. The topics are often closely related to the research of staff members, and will involve the students interacting with a range of experts in their chosen topic. A similar structure holds in the taught M.Sc. course, with a large number (approximately 50%) of projects being joint with industrial sponsors.

The System Design group practical project[?], undertaken at the end of the third year (four weeks full-time, in groups of approximately nine), directly raises the issue of commercial applicability by requiring students to design a prototype product with a view to its commercial viability. Industrial involvement includes the presentation of lectures on systems design in advance of the project, the sponsorship of prizes for the best project, and the presence of company representatives on the panel assessing the final presentations.

Teaching accommodation

Teaching accommodation is arranged as follows:[1]:

Appleton Tower, George Square: First year courses are taught on this site. The location has large (300 seat) lecture theatres. This year, the Department has contributed 50% of the cost of a high-quality Barco data projector to support the use of direct display of Sun and Apple computer output during lectures. This is particularly important for the Computer Applications course which introduces students to a number of large modern software systems. In addition, the first-year teaching labs [?] are housed here, maintaining full integration with the departmental network.

The motivation for housing first year teaching in the City Centre is to give students access to the wide range of first year courses provided by other faculties. It also facilitates interaction with students from other faculties and gives our students easier access to many University provided facilities: the Main Library, Student Unions, and central sports facilities

JCMB, King's Buildings: The main teaching facilities at JCMB are three main lecture rooms plus a new sixth-floor lecture room, that are shared with the Departments of Physics, Mathematics, Geophysics and Geology, and Meteorology. These rooms have 200, 150, 100, and 90 seat capacities respectively, and are very heavily used. Since the size of some third year classes has grown, they cannot be accommodated in the main JCMB lecture rooms, and the Department now makes use of lecture rooms in the nearby School of Agriculture (about 100 yards away). Other teaching accommodation includes computer laboratories in the North and South machine halls and smaller lecturing and tutorial rooms drawn from a central JCMB pool. Teaching accommodation at JCMB is generally adequate, and of reasonably modern construction. There is a serious problem with study space however: the JCMB library is small and cramped, and the Department has only have a small area to allocate as a third and fourth year student workroom.

Specialist facilities

Most Single Honours students take a course in Computer Design which involves the use of tightly-scheduled laboratory resources to undertake construction work. The laboratories provide ????seats of accommodation and are equipped with .... In addition, a hardware laboratory is devoted to fourth year project construction work. In addition to specialised hardware laboratories, the Department runs a substantial suite of specialised software tools, including SOLO, MODEL and CADENCE ASIC design software, and a range of tools both locally produced and imported from other sites. The maintenance and distribution of the system across the multi-architecture computer network is devolved to package maintainers, who follow a carefully prescribed installation process to maintain uniform access across architectures where this is possible [?].

Needs filling in

[1] Recently the Department has had a wheelchair-bound student, and has found that all of the teaching rooms have adequate access

Ancillary facilities

Lecturers are all accommodated in single rooms that provide space for individual discussions and supervisions. The Department also has control of two meeting rooms that are bookable by staff and students for larger group meetings. Computing officers are also accommodated in single offices. Research staff generally share, with two per office, and postgraduate students share, with three per office. This makes supervision of students by these groups more difficult but, in future, the Department hope to have one or two bookable resource rooms available that can be used for supervision sessions. The Department shares the JCMB with a number of other departments, but the space used is fairly compact, and radiates from the recent purpose-built JCMB extension for Computer Science.

Physical environment

The physical environment is in a reasonable state of repair. The building is reasonably well maintained and suited to the use to which it is put. Repairs are generally carried out quickly by the University Works Department. The Department has a *Safety Committee*, and the Laboratory Superintendent, who is the departmental *Safety Officer*, pursues his rôle vigorously. All laboratories and office spaces are regularly inspected and, when safety problems are identified, they are logged and rectified quickly. The Department produces a safety handbook which is distributed to all staff and students. All members of the Department are required to sign a form stating they have read and understand this handbook before being permitted to use equipment.

Deployment of accommodation

Specialist laboratory accommodation is often tightly-scheduled during the teaching day, and is allocated each afternoon in rotation to the full group of users. Most computing resources have a booking scheme [?] which is constructed to ensure both that all students gain reasonable access to computing resource and that, in periods when pressure on resource is lower, students can use equipment on a casual basis. Recreational use of computing resource is discouraged, but the "Tardis" system [?] is a computer system made available, with software and hardware maintained by students, to support some recreational use and to provide valuable experience of organising and running a computer service.

D Staff Resources

Teaching Staff

The University of Edinburgh has traditionally funded Computer Science as an engineering discipline. That this was in line with national policy appeared to be confirmed by the level of funding awarded under the ETP expansion programme, and the additional funding for Computer Science provided by the UFC in 1985. When the UFC subsequently introduced guide prices, however, the Computer Science guide price was nowhere near this level. This has lead to savage cuts in staffing levels in the Department, reducing a complement of 31.5 FTE teaching staff a few years ago to a present establishment of 25.5 posts (one is joint with the Department of Artificial Intelligence).

This allows the Department to operate at an SSR of 12.5 on current student numbers, but it would not be possible to deliver the existing quality of teaching without the support given for tutorials and project supervision by computing officers, research staff and postgraduate students. Furthermore, the current resource level is insufficient to allow us to budget academic staff time for course development without sacrificing research activity. Fortunately, we expect this to be a temporary problem as SHEFC is reviewing the unit of resource in this area and we are confident that we can justify the costs of our type of teaching provision. If we are unsuccessful, the quality of our teaching will inexorably decline.

The previous normal lecturing load of two half-courses per member of staff is now set to rise, particularly as the Department implements its policy of encouraging sabbatical leave at appropriate intervals. Currently, the Department is able to cover all the compulsory courses in the first three years of the undergraduate courses, and to run a first year Information Systems course for students in other faculties. In the fourth year, up to a dozen modules (of which each Single Honours student takes six) are currently offered, though this level of provision is under threat from the reductions in staff numbers. In addition, the Department runs an advanced M.Sc. course that shares some modules with the undergraduate degrees.

Academic duties are allocated annually at a meeting of all teaching staff, prior to which all staff are given an opportunity to indicate their aspirations for the coming year. Final responsibility for the allocation rests with the Head of Department, who consults widely before the meeting. Normally all staff teach (at least) one course to the earlier years and one to the higher years. The duties list is a public document held on-line in the Departmental Compendium.

For each year of the course, one member of staff is appointed as *Course Organiser* (typically for a three-year term) with responsibility for the day-to-day running of the classes in that year. Course Organisers are *ex officio* members of the Teaching Committee, which has general oversight of the teaching process, and which reports through its Convenor to the Policy Committee.

All staff also undertake tutorials across the different years of the course, and supervise group projects in third year and individual projects both in the final undergraduate year and at postgraduate level. This strengthens awareness amongst staff of the whole range of course provision, and gives opportunity to develop teaching interests outside the allocated lecturing duties.

The vast majority of staff have Ph.D.s, are active in research, and normally have specialist knowledge in the areas in which they teach. Ages range from 29 to 58, with an average of 42, and the permanent staff includes five professors, two readers, three senior lecturers and 15.5 lecturers. Two of the professors (Milner and Plotkin) currently hold 5-year SERC Senior Research Fellowships, however, and one of the readers holds an SERC Advanced Fellowship. Their formal teaching loads are undertaken by three young lecturers, employed as replacements for the duration of the Fellowships, but the Fellows themselves all continue to make a vital contribution to the supervision of research staff and research students, and to provide academic and intellectual leadership.

Professors Milner and Plotkin are Fellows both of the Royal Society (there are only nine in total in Computer Science) and of the Royal Society of Edinburgh. Professor Ibbett is a Fellow of the Royal Society of Arts. A dozen staff are Members or Fellows of the British Computer Society (Professor Milner is a Distinguished Fellow and Professor Ibbett is an Honorary Fellow), one is a Member of the Institution of Electrical Engineers, and five are Chartered Engineers.

Support Staff

The department also employs 12.5 Computing Officers and 1.5 Computing Support Officers. Some have specialised skills to support, e.g., hardware and VLSI teaching, but the majority are involved in some aspect of the running of our departmental computing network. A mangement hierarchy, headed by a Principal Computing Officer who is a member of the Policy Committee, ensures the smooth running of the network, and visitors from overseas regularly compliment the Department on having one of the best such networks in the world.

Maintenance and development of the physical environment of the Department is the responsibility of the Laboratory Superintendent, who deals with purchase orders and liaises as and when necessary with the University's Works Department. He is also responsible for seven other technical staff who maintain the hardware of the computing network, provide front-line maintainance of workstations, and carry out safety checks on all departmental equipment. They also provide support for hardware laboratories and projects.

An Administrative Assistant deals with all matters relating to publicity, examinations, and arrangements for visitors to the department, from prospective students to visiting researchers. Our six secretaries provide support for Course Organisers, and for staff generally, and deal with correspondence and administration relating to postgraduate admissions. A part-time clerk assists the Head of Department in dealing with departmental finances.

Student Services

At the departmental level, the first line of student support is the Director of Studies (Section H). Directors are members of the academic staff who carry out the normal teaching and research functions within the department. In their role as Directors, however, they formally report directly to the Dean of the Faculty, through the Associate Dean (General), since they are responsible for approving the student's overall curriculum, which includes courses taught

elsewhere in the university as well as within the Computer Science department. Directors are appointed by the Dean and receive an honorarium from the Faculty in recognition of their work.

Staff Development

In a research environment, the prime need of staff in terms of development is to maintain contact with other researchers in their own areas both through attendance at national and international conferences and through meeting visitors to the Department's own regular colloquia series. Staff are entitled to apply for Faculty funds for up to two UK conferences per annum, and for University funds for one overseas conference per annum, provided that, in the latter case, they are presenting a paper. Many staff also have research grants that fund such visits, and the Department has some limited funding of its own to assist in some cases. Support staff also attend relevant conferences. Secretarial and administrative staff regularly attend IT skills training courses offered by the University's Computing Services.

New staff are encouraged to attend an induction course offered by the University's *Centre for Teaching, Learning and Assessment.* All teaching staff are also encouraged to attend teaching conferences relevant to their own specialist interests, and the University also offers, through its *Enterprise in Higher Education* programme, a number of management, presentation and interpersonal skills courses. These are coordinated by the Personnel Office which, each term, circulates a catalogue of courses to all staff.

The University's Staff Appraisal mechanism requires that all academic and academic-related staff are appraised by the Head of Department (or one of the professors, at the discretion of the appraisee) at 2-3 year intervals, and thus they have an opportunity to discuss their developmental needs. The Head of Department normally sees all appraisal reports and is thus kept aware of staff needs.

E Learning Resources

One of the aims of the Computer Science course at Edinburgh is to provide students with a wide range of knowledge about computing systems. Thus, it is necessary to support complex applications software, program construction and development tools, hardware design tools; and provide the means to construct, test and use hardware designs generated by students.

The main physical resource used in the delivery of the curriculum is the departmental computing network. This is based on Sun Unix workstations (mostly Sun-4) and it supports both the teaching and research of the department, providing an integrated filestore that is accessible to all users of the system. Although there are designated machines and user communities within the network, all users have essentially the same environment.

Experience of University-wide service provision has been that it cannot provide the Department with sufficiently flexible access to the kinds of tools and systems required to reflect modern practice adequately in the computing environment. The integration of teaching and research provision gives the Department great economies of scale, and also allows advanced facilities and equipment to be provided as and when undergraduate students require them. In particular, access to powerful machines with large storage capacity is required to run some of the prototype tools and systems used by students in final-year projects.

Since staff and student computing is integrated, students have easy access to on-line demonstration programs, as well as to lecture notes and overhead-projector slides in electronic form as a back-up to printed lecture hand-outs. Students are encouraged to use these as a learning resource.

Resources are distributed between the years of the undergraduate course as follows:

First year: In Appleton Tower, there is a 32-seat Sun laboratory with 32 Sun 3/50s acting as X-terminals, connected to three Sparcstation-2 compute servers. In addition, there are 16 Wyse terminals in an adjacent room to provide 'green screen' access to the compute servers. Students can also access these computers from any EdLAN terminal. This laboratory is used to service the Computer Programming 1h, Computer Science 1h, and Computer Applications 1h, courses and provides file-serving facilities for the Information Systems 1 service course. The laboratory runs a computing system tailored to the needs of learner programmers, providing easy-to-use support for programming and debugging simple programs. In addition, a wide range of applications are supported in order to resource the Computer Applications 1h course, which introduces students to modern computer applications. The laboratory is open from 9 am to 8:45 pm, Monday to Friday. Around 40% of that time is taken up with scheduled laboratory sessions, when the lab is staffed with three demonstrators; at other times, one demonstrator is always in attendance. Outside scheduled laboratory times, a booking system operates to regulate student access. Adjacent to the laboratory is a study area with a small collection of relevant texts and reference works. In addition to demonstrator support in recent years, female students in the later years have run programming support groups for women in first year, since many find the 'male' ethos of many first year students difficult to come to terms with.

Information Systems: Information Systems 1 is the service course run by the Department, predominantly for students in the Arts and Social Science faculties. This laboratory is run in conjunction with the University's Computing Service, and consists of around 50 Apple Macintoshes, networked to provide access to a filestore serviced by the first year laboratory equipment and terminal access to Computing Service Unix systems. An important consideration is that students are shown systems they will have easy access to in subsequent years — hence the concentration on Computing Service facilities. Students are exposed to a wide range of Macintosh and Unix applications during the course.

Course organisers to write about other labs

Second Year:

Third Year:

Fourth Year:

MSc:

Library and study facilities

The Department is aware that the JCMB Library is barely adequate to meet its needs. Pressures to cut journal subscriptions, and book purchase grants, has left a narrower range of journals and text books than would be ideal. The costs of both books and journals inflate far more quickly than the UFC (and hence the University) takes account of in purchase grants, and thus the Department must continually economise in this area. Cost-saving measures have been implemented, e.g., eliminating duplication of journal subscriptions by multiple departments within the University, and discontinuing many valued subscriptions, even those of journals that are not available elsewhere in Edinburgh. The use of Inter-Library Loans is less convenient, and also subject to increasing costs. A minimal level of provision has to be maintained, to support advanced research and, importantly, the needs of final year student projects.

Another problem has been that of security, since the Library is not staffed throughout its opening hours, and theft of books means the collection has major lacunae which the Department cannot afford to fill (or refill). A permanent solution to security problems awaits the construction of a new Science and Engineering Library at King's Buildings. The problem is mitigated, to some extent, by our practice of providing students with high quality photocopied notes, but the need for wider reference and experience in reconciling different accounts of the same phenomena are an important part of scientific education and until there is an adequate library, students will miss much of this important part of their training. In final year however, students mostly work from research papers which are available from staff and, increasingly, these are available electronically from other sites, which provides a useful background literature resource. Perhaps, as the Computer Science community increasingly becomes a global, electronically mediated, group, the need for library resources will lessen in the future.

Lack of study space in the JCMB Library is another problem, although it should be borne in mind that Edinburgh students do have access to other study locations (e.g., at the Main Library in George Square, and in Student Unions and Residences). These can be used in the evenings and weekends, but access is not convenient for Computer Science students during normal teaching

hours, since most students are at King's Buildings. Third and fourth year students have a small workroom, but this provides little accommodation given the size of the group.

A development plan for a new Engineering and Physical Sciences Library at King's Buildings has been in place for some time and, due to a recent large legacy to the University, it is expected to be opened in 1993.

F Course Organisation

Delivery of the curriculum is the responsibility of the Teaching Committee. The Department devolves responsibility for the day-to-day running of the classes in each year of the curriculum to a *Course Organiser*.

The Course Organiser acts as a channel for information between several formal bodies, and has responsibility for ensuring that their decisions are implemented. These bodies are: the Syllabus Committee (Section), which approves minor syllabus changes and liaises with the Faculty Board of Studies over major changes; the Teaching Committee (Section), which handles matters related to the delivery of the syllabus; and the IT Education Advisory Board (Section ??, which provides input on the quality and relevance of courses as perceived from industry. The Course Organiser also has responsibility for running a *Staff-Student Liaison Committee* for the year group. This brings problems concerning course content and organisation to the attention of the Course Organiser, and can play a useful rôle in suggesting improvements in these areas. Liaison Committees meet regularly (at least once a term) throughout the academic year. End-of-course questionnaires are mandatory for all courses in the Department, and the Course Organiser collates feedback from these.

There are number of informal mechanisms through which the quality of courses is monitored and associated problems are raised. These include: electronic mail (Section C), giving immediate and convenient access to members of staff; electronic bulletin boards (Section C), accessible to all staff and students, and including one specifically for each year group; and personal discussion between students, lecturers, tutors, supervisors and Course Organisers.

The exact activities of a Course Organiser vary with the structure of each year, but the principles are common to all. These are detailed in the document 'Guidelines for Course Organisers and Course Teaching Committees' [?], distributed by the Faculty. In summary, the Course Organiser:

- manages a team consisting of those members of the academic staff who give lectures and take tutorials for the course, and the associated technical and secretarial support staff;
- monitors course delivery and obtains feedback from the Staff-Student Liaison Committee and course assessment questionnaires;
- liaises with the University Registry, the Faculty, Boards of Examiners, and other departments as appropriate, on exam preparation, timetabling, lists of students permitted to sit exams, and similar related matters; and
- reports to the Teaching Committee.

G Teaching and Learning Practice

Introduction

Computer Science is a young discipline, having mostly grown up over the last 30 years. Thus, compared with well-established disciplines like Physics or Mathematics (in which students learn little of what has been discovered in the last 30 years), there is less agreement as to what constitutes the undergraduate curriculum. Edinburgh has been influential in developing much of the subject, and has recently tried to provide some definition of the subject[?]. In the intellectual turbulence that surrounds the development of such a young subject, two major issues stand out as providing guidance in the development of the science, and therefore of the undergraduate curriculum:

- that the object of study is the structure and dynamics of discrete systems, using mathematical, logical and empirical tools; and
- that this study of discrete systems should be informed by, and cast light upon, a wide range of engineering design problems relating to the incorporation of discrete systems into the human environment.

Thus, a continuing theme of the Department's undergraduate teaching is the acquisition of basic theoretical knowledge and skills, and their deployment in the solution of real-world design problems. The integration of theory into practice is, sadly, often lacking in current best industrial practice — because it is necessary to deal with powerful technological artifacts whose concrete performance is sometimes developing more rapidly than theoretical understanding. In this environment, much effort in the industry is devoted to 'keeping the wheels turning' rather than deepening understanding. The Department aims to provide an environment in which students can develop analytical skills, an understanding of real design problems, and the ability to apply those skills to the practical problems. In the long term, the Department sees its graduates as a strategic resource for the UK IT industry.

Structure of Teaching and Learning

For each year of the course, the year guidebook provides the overall coordinating framework for the learning environment for that year[?]. In the first and second years, the courses are team-taught, and the guidebook provides motivating framework, detailed lecture plans, timing of work, assessment criteria, book lists etc. In third and fourth years, the structure is looser at this level, and the guidebook provides coordination; more detailed description is delegated to the specialist course lecturers. These guidebooks are reviewed by the Syllabus Committee in terms of curricular aims, and by the Teaching Committee in terms of implementation objectives.

The main vehicle for the transmission of the bulk of the factual information in the course is the lecture. Lectures have their flaws: their duration exceeds the concentration time of the students, they provide less than perfect transmission of information, and they do not promote

active learning. However, they do provide an efficient means of exposing students to the informed opinion and enthusiasm of the subject specialist, can be interactive, and can often be used to rapidly respond to the needs of the class.

Almost all of the Department's courses have extensive course notes which are distributed (free of charge — at the moment) to all students. Notes are available at the lecture and from the course secretary on demand[?]. Most lecturers also make notes available on-line on the Departmental computing network, and some have their overhead-projector slides available in this form, along with supplementary material including the code for programs and suitable test data (Section E).

Lectures are also closely linked to practical material, and the experience of lectures is often enlivened by seeing the immediate application of some seemingly abstruse theoretical point in solving a practical programming problem. Such animation of theoretical material is a strength that is exploited as often as possible. For early years teaching, the use of data projectors can bring a point to life in the class by illustrating the running of a program or application in 'real time'. Many of our lecturers also use demonstrations and teaching aids to animate the main point.

Overall, we are aware of the deficiencies of lectures but they do provide the opportunity to interact with the entire class, and allow the lecturer to amplify and elucidate the lecture note material in a way that is impossible in any other learning situation.

Lectures in the first three years are supported by tutorials with eight to ten students and a member of staff or postgraduate student. In the first year, the Department tries to ensure that all tutors are members of staff, because of the desirability of providing a link with a permanent member of the department, and because it is felt that first-year tutors have a pastoral rôle that is not appropriate for graduate students. These close-ratio classes provide the primary setting for diagnostic and formative assessment. Tutors assess students' work, and this personal interaction allows: immediate diagnostic assessment of students and help with immediate problems; formative assessment, and the capacity to provide immediate remedies for gaps in background of the students or problems with course material; working with less able students to develop their understanding; working with more able students (pointing out other sources of material, problems that might interest them, or how their practical work might be developed further); and providing rapid feedback to the Course Organiser and lecturer on problems relating to the course material or its presentation.

Coursework

The coursework component of teaching and learning never accounts for less than 25% of the overall assessment of a particular course, and is a major focus of work for the students. Coursework takes a variety of forms throughout the years:

First year: practical exercises are coordinated to lecture material, to exercise and reinforce course material. These range in duration from one to three weeks, and are submitted to tutors for assessment and feedback. Immediate feedback is also supplied in the laboratories

by demonstrators who provide rapid diagnostic help to students, and a means of verifying the students' achievement via check boxes that are 'signed off'[?].

Second year: in the first and third terms, students undertake practical work of a similar nature to the first year practicals, but in second term[2], students work with low level systems in a laboratory, in a more constrained style with all work being marked by demonstrators on the spot. This style is suited to the more 'experimental' approach adopted for the portion of the course exploring the relation between computer system hardware and software.

Third year: students undertake: hardware construction work in a laboratory, paper and pencil coursework exercises, group and individual design and programming exercises associated with taught courses, and both individual and group major practical projects. This diverse range of coursework style is intended to closely match the objectives of the range of courses taught in third year. Students cover a wide range of topics, and attention is paid both to introducing consideration of the whole process of software and system development (including the human and organisational environment) and to integrating all of the material covered in the year. Particularly important to this is the System Design group practical project[?], which aims to integrate material from all of the taught courses, and to draw on the varying skills profile of students. The mix of students in groups is carefully made, to select students from different joint degrees to bring varied skills from other cognate areas. This project has taught input from industry, and is assessed by a panel including industrial representatives.

Fourth year: apart from coursework for individual modules, which has a similar character to earlier years, the students spend 40% of their time on an individual project. This allows the student to study one area deeply and, in cooperation with their supervisor, develop study, research and development skills over a long term project. One-to-one contact with active researchers (usually in weekly supervision sessions) provides students with an insight into the generation of new knowledge and results that cannot be acquired in any other way. The Department feel the project provides the more able with valuable insight into the nature of research, and the less able with the chance to develop their strengths by concentrating on their interests. The project also requires many different planning and time management skills from the shorter projects undertaken in earlier years, and also requires the student to provide an in-depth report of the work in the form of a dissertation[?, ?].

Overall, the design of the pattern of coursework takes account of the complexity of practical exercises along three axes: duration of the practical; level of structure provided within the practical; and level of group interaction required. Thus, first year students begin with short, individual, highly structured practicals and move to longer, more open-ended practicals by the end of the year. This process continues through second year and third year, culminating in the System Design project, which sets a complex task for a large group within a fairly loose structure, but still with tight deadlines. Long-term planning problems are confronted in the final year project.

[2]This pattern of work will change with the introduction of the new CS2 syllabus in 1993-4.

H Student Support

Introduction

The Department, and the University as a whole, recognises the need of all students for guidance and support. The central focus of such support is the university-wide *Director of Studies* system: each student has a Director of Studies, who is a member of the academic staff in the department of the student's degree specialisation (or in one of the two departments, in the case of joint degree students). The Director of Studies has an academic rôle: to advise students on their choice of courses and on university regulations and practices; and also a pastoral rôle: to help students with problems that are not strictly academic. Where necessary, the Director of Studies may refer students to more specialised departmental or institutional advisors. In cases of conflict between a student and the Director of Studies, the Faculty provides a mechanism for changing the Director if appropriate. In the Department of Computer Science, there are six Directors of Studies, each responsible for around 60 students. Amongst other members of staff, there is a general attitude of concern for students' well-being.

Pre-entry Support

The University's *Schools Liaison Service* makes general information available to all potential applicants, and organises Open Days for visitors. The School of Engineering and Informatics has a full-time *Schools Relations Coordinator,* who coordinates internal provision for applicants and also undertakes external visits. The Department makes an information pack available to potential applicants; this contains documentation on degree programmes, departmental organisation, careers opportunities, student feedback, etc. It also encourages visits to the Department: either on one of seven group visiting days during the year, or on an individual basis. The Department has a *Schools Liaison Officer,* who interacts with potential students prior to making applications, and a *Selector,* who interacts with potential students during the application process. When new students arrive, many events are organised by the University during *Freshers' Week* to introduce the academic and social environment; also during this week, students are introduced to the Department and meet their Director of Studies.

Curricular Support

The Director of Studies is the front-line contact for serious academic problems. For example, where a student's interests have shifted, possibilities for transfers to other departments would be investigated; where a student requires an additional period of study or a period of absence, the administrative and financial implications would be explored; and where a student has study skill difficulties, referral to specialist help at the University's *Centre for Teaching, Learning and Assessment* might be needed. The Director of Studies has a particularly important academic rôle in the first two years of study, since students follow courses in three different subjects. Guidance on the choice of subjects each year is given, backed up by departmental information sheets and by the annual University *Academic Fair,* at which students can discuss courses with departmental

representatives. During the academic year, the Director of Studies is the central monitor of the progress of each student, interacting with the different departments providing courses. In the final two years, when students are following courses in their chosen specialisation(s) only, this function is less crucial.

Within the Department, the Course Organiser for each year of study is available as a source of support for students who encounter problems that are related to matters such as the structure and delivery of the course, the required workload, or the assessment procedures. Within each Computer Science course in the first three years, tutors are available as a source of support for students who encounter problems that are related to the detailed delivery of the course; if necessary, lecturers and laboratory supervisors can back up such guidance. In the final year, where classes are normally smaller, lecturers also act as tutors for their specialist topics.

Personal Support

The Director of Studies is a front-line contact for personal support. For straightforward problems, discussion with the student, followed by administrative action if necessary, is sufficient. In more complex cases, particularly where a student is experiencing a degree of distress that is affecting their normal functioning, the Director of Studies may feel it advisable to refer the student to a more specialist agency. The University has several relevant agencies, including: the *University Health Service* (GP service and specialist services such as psychiatric consultation); the *Student Advisory and Counselling Service*; the *Edinburgh University Students' Association* (including the *Advice Place*); the *University Chaplaincy*; the *Student Accommodation Service*; and the *Committee for Students with Special Needs*. Students may also approach these agencies directly without referral from the Director of Studies.

Within the Deparment, there are no additional formal mechanisms for personal support. However, individual members of staff (especially Course Organisers and Tutors) have a concern for the welfare of students, and are prepared to discuss students' personal problems if they feel that they can help. When assessing the work of students, the Department makes strong efforts to ensure that any personal problems are acknowledged, and are taken into account if appropriate.

Vocational Support

The University's *Careers Service* is the main agency for guidance and counselling on job-seeking strategy. Its activities range from individual interviews with students, through group sessions, to large-scale, industrially-sponsored, *Insight into Management* courses. These are backed up extensive information facilities containing material on all kinds of work and professional training, postgraduate study, current vacancies, vacation work and vacation courses. The Careers Service encourages students in all years of study to plan well ahead for their future beyond university.

Within the Department, information on relevant employment and study opportunities is made available to students, and presentations by employers are arranged periodically. Several employers offer bursaries, and vacation employment, to students with the potential to be desirable employees after graduation. In cooperation with the Careers Service, the Department encour-

ages students to maintain a *Career Development Record*: a structured record of career-relevant activities during the years at university.

I ASSESSMENT AND MONITORING

Introduction

In the Department, assessment is controlled by a hierarchy consisting of, from bottom up: lecturing staff; Course Organisers, in consultation with course teams; and the Teaching Committee, Boards of Examiners and the External Examiner. The Teaching Committee is concerned with diagnostic and formative aspects. Boards of Examiners are concerned primarily with summative aspects, but address certain formative aspects.

Assessment is carried out by:

- lecturers and tutors, responsible for marking coursework and examinations, and discussing results with students;
- project supervisors, responsible for informal and formal feedback about project work;
- second markers, responsible for assessing project work;
- Boards of Examiners and the External Examiner, responsible for ensuring consistency of standards within and across courses.

Forms of Assessment

It is the Department's policy to use a combination of coursework with continuous assessment and formal end-of-year Degree Examinations as the normal way of performing summative assessment. Some specific courses and practical projects contain no examination element. Coursework and informal written examinations (known at Edinburgh as Class Examinations) are used together to provide diagnostic and formative assessment during the year. Oral examinations are used in a few cases: to help in the assessment of major practical projects where no formal examination is given; to decide final grades for candidates close to boundaries; and to help in monitoring consistency of standards.

The course guidebooks for each year contain an explanation of the form and weighting of assessment for all components. The procedures are agreed by staff involved, following the hierarchy of responsibilities described above. The guidebooks are given to all staff and students involved in the course.

Assessment of Assessment

The above hierarchy also ensures that assessment procedures are valid. For summative assessment procedures, the Board of Examiners and the External Examiner have ultimate responsibility since, unlike in some institutions, such assessment of students is governed by the regulations for Degree examinations. The course teams and Course Organisers review coursework and class

examinations on an ongoing basis. Staff-Student Liaison Committees, which publish minutes, allow student feedback to be taken into account. Course teams meet before and after courses to review aims and outcomes.

Students have recourse to Course Organisers, Directors of Studies (who are present at Boards of Examiners) and to the Head of Department in cases where they feel unfairly treated. For Degree examinations, the University operates an appeals procedure.

Monitoring and Feedback

The University requires the Department to operate a common marking scale, mapping numerical marks onto letter grades. Only grades are reported to students for work which forms part of summative assessment. Tutor-marked coursework is returned, and discussed, in tutorials. Other work (apart from end-of-year Degree examinations) is returned through tutors or lecturers with marks and comments written on it.

Course Organisers maintain databases of continuous assessment marks. Students with obvious difficulties are offered help through tutors, remedial tutorials, or remedial lectures, depending on the type of course. Directors of Studies receive copies of class examination results, and are also informed when students seem to be in danger of failing. As a last resort, students may be refused a Due Performance (DP) certificate, which prevents them taking the Degree examination. In many cases, students are allowed to catch up missing coursework in order to remedy this situation.

J STUDENTS' WORK

Course guidebooks, which are reviewed at all levels of the Department, contain details of coursework and the timetables for coursework. The Teaching and Syllabus Committees both check proposed coursework against the objectives of the associated course, and also External Examiners comment on coursework levels of attainment. Course Organisers are responsible for ensuring prompt assessment of coursework. This can be monitored using the database of continuous assessment marks for each course. If necessary, Course Organisers issue reminders to tardy markers.

The Syllabus and Teaching Committees both review coursework to ensure that it reflects curricular aims, and course teams agree plans to ensure complete coverage of the full range of aims. The Department has conducted a generic skills analysis of its courses to ensure that coursework (and examinations) do not expect skills that students have not received prior training in.

The rôle of the External Examiner is central to ensuring that the level of coursework is comparable with that at other institutions. In addition, several members of staff of the Department are, or have been, External Examiners elsewhere, and can provide valuable assistance based on their experience.

Student feedback on coursework is monitored through Staff-Student Liaison Committees and end-of-course questionnaires. These help to identify shortcomings but, in general, indicate that students have a positive learning experience. This is consistent with assessment results.

K OUTPUT, OUTCOMES AND QUALITY CONTROL

The Department seeks to: maintain standards of excellence, so that classification of Honours degrees matches required academic levels; enable students to achieve their full potential; and ensure the relevance of material taught, in both academic and economic terms. Performance Indicators are difficult to quantify since, by dropping standards, more students may appear to achieve higher levels. However, the Department monitors:

- the numbers completing its courses relative to intake. This is easily misinterpreted, since many students switch Degrees in the first or second year of study, but is clearly useful within limits;
- the proportions of students achieving grades at all levels;
- the perceived value of courses to students, via questionnaires;
- the perceived value of students to potential employers and the IT Education Advisory Board; and
- comparability with other institutions for published surveys and results: this involves the difficulty of establishing norms for apparently equivalent grades, and the inputs of External Examiners are crucial.

The hierarchy of control in the Department leads to monitoring and filtering of information. Responses are initiated by the Departmental Meeting, the Syllabus Committee or the Teaching Committee as appropriate.

Quality Control Arrangements are reviewed and improved continuously. A more explicit version of QA and QC mechanisms is currently being put in place, in line with University policy. The current practice has been found to be cosistent with this.

The Department has always placed a great emphasis on teaching. By achieving excellence in research, teaching is reinforced and excellence in learning follows. Staff appointment, appraisal and promotion procedures all require that teaching be accorded due weight.

Dean
Prof J MAVOR DSc FRSE FIEEE FInstP

Our ref: FB01
Your ref:

FACULTY of SCIENCE and ENGINEERING
The University of Edinburgh
King's Buildings
West Mains Road

Tel: 031-650 5646
Fax: 031-650 5738

28 May 1993

To: Heads of Planning Unit in the Faculty of Science & Engineering

Dear Colleague

Cash Allocations - 1993/94

I am writing to explain how cash allocations to Planning Units for 1993/94 are to be made.

I have decided this year to publish the entire allocations from Faculty cash, subject only to the need to protect individuals' rights to privacy on their salary details. I believe this is consonant with my general approach of open government, an approach which I believe is even more necessary now that the University is acting in a more managerial manner and taking steps to ensure accountability. I am also doing this to dispel any illusions that departments may have that there are large sums of cash available to make further allocations from Faculty.

Appendix I summarises the overall allocation of the approximately £2.6M cash available to me. Subsequent Appendices give a further breakdown of these budgets where appropriate.

The Faculty's recurrent allocation increased by 5.8% in cash terms (2.5% in real terms). I have decided to increase cash allocations to Planning Units by a slightly smaller amount. I believe that an increase of 4.8% achieves a reasonable balance between providing general rewards across Faculty as a whole and making specific provision, usually in the form of fixed term posts, for areas under particular pressure. I have also had to allocate increased sums at the Faculty level next session for Recruitment and Quality Assurance expenses. I am also making a modest investment in the Faculty's Centenary celebrations in the hope that this will be more than repaid through fund raising in future years.

The approach taken to calculating cash allocations is very similar to last year:

1. A single cash grant is being made to each Planning Unit to be allocated at the discretion of the HoPU. This subsumes what were separate Class, Demonstrating, Postage and Telephone Grants to 1991/92.

2. I will inform HoPUs in multi-departmental Planning Units of how the allocation was calculated from individual departmental allocations. Although I am making other information widely available, this will be restricted to HoPUs. It will be for them to decide whether their task in allocating departmental budgets will be made any easier by making this data available to HoDs.

3. I will again this year make an indicative split of the overall sum into teaching and research components. The ratio this year will be 65:35. This is the ratio for the University's general income from public funds. In arriving at the global sums for T and R, I have added back last year's actual DR transfer before calculating the 65:35

split. The DR transfer was then deducted again from the R component. This approach was necessary to produce the overall 65:35 ratio.

4. Planning Units are not constrained to spend the cash in the proportions allocated and must find any shortfall in one head from the total allocated. It does seem likely that the Government will force more formal accountability arrangements on Universities for the separate T and R allocations, but we believe that this will not now involve the need for separate accounting at the departmental level.

5. The T component has been allocated on a 90% historic/10% 'performance' basis. The historic portion was calculated *pro rata* to last year's departmental T allocation. The 'performance' component has been calculated in a slightly different manner. Whereas last year this was allocated *pro rata* to changes in FTEs between 1990/91 and 1991/92, this year I have used total FTEs weighted by the SHEFC unit of funding. I believe that total student numbers are now more appropriate given that the University has decided to stabilise intakes. I also believe it to be appropriate to weight the FTEs by the sum SHEFC is prepared to make available in each Subject Group. In the case of Computing and Mathematics, the weighting takes account of SHEFC's decision to increase the unit of funding for ex-UFC institutions over time until it equals that for ex-SOED institutions.

6. In calculating the R component I have been able to give a 50% weighting to 'performance'. The weighting is higher because the model is less sensitive to this. As last year, I have used the breakdown of the SHEFC R Grant as the 'performance' weighting.

7. The model leads to small falls in cash allocations for some Planning Units. As I believe these are sustainable, I am not applying a safety net this year. The model does produce an allocation for Mathematics & Statistics which might raise some eyebrows. I believe this is a reasonable reward for a hard pressed Department which has combined large increases in student numbers with significant increases in research income.

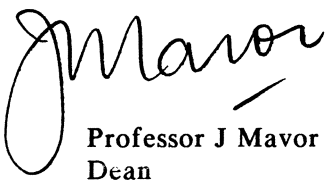
8. A further reason for the lack of safety netting this year is the University's decision to double the payment to departments in receipt of research grants which include a payment for indirect costs. This should ensure that all Planning Units will receive cash increases significantly above inflation.

The Faculty Officer will be in touch with details of the individual allocations within the next forty-eight hours.

I would stress that the cash allocations I am making now leave the cupboard bare. The sum retained as a Faculty Contingency is only sufficient to pay for a lecturer for a year. The sum in the Faculty Development Fund is even smaller. I have however taken the view that the combination of continued staff losses and increased student intakes has put departments under such pressure that the only sensible approach was to provide the maximum possible help for October. Planning Units must therefore plan to meet their commitments within the cash allocations made (including DR overhead income). I would be happy to provide budgeting advice to any HoPU or HoD where this would be helpful.

Lastly, I must comment about the date of this letter. The equivalent letter for 1992/93 was dated 22 September. The fact that I am able to announce decisions almost four months earlier is testimony to the advantages we are getting from the new planning and budgeting mechanisms.

Yours sincerely



Professor J Mavor
Dean

APPENDIX I

Faculty of Science & Engineering

Income & Expenditure – financial year 1993/94

INCOME	1992/93 £	1993/94 £
RECURRENT ALLOCATIONS		
Cash allocation	£1,430,001	£2,071,664
Vacation grants	£104,000	
OSRIS discontinuation	£29,000	
School of Agriculture cofunding	£383,000	
Liquid Nitrogen	£10,000	
Directors of Studies honoraria		£61,000
SUB-TOTAL	£1,956,001	£2,132,664
NON-RECURRENT FUNDS		
Academic Assistance Fund	£135,000	£285,000
Surplus on building work	£10,000	£0
Informatics/HCRC	£0	£10,000
Meteorology special factor	£4,500	£4,500
NAAS	£5,000	£3,500
OSRIS	£83,815	£145,632
External contribution to baseline salaries	£35,000	£38,878
Schools Liaison Office compensation	£14,000	£14,000
SUB-TOTAL	£287,315	£501,510
SUPPLEMENTARY BUDGET C/F	£117,708	£85,264
AVAILABLE TO ALLOCATE	**£2,361,024**	**£2,719,438**

ALLOCATIONS	1992/93 £	1993/94 £
RECURRENT FUNDS		
Cash allocations to departments	£1,274,256	£1,329,714
Vacation grants	£104,000	£110,000
Directors of Studies honoraria	£0	£70,000
School of Agriculture cofunding	£383,000	£390,000
OSRIS discontinuation	£29,000	£0
Chemistry – 'Whitby' adjustment	£0	£20,000
Chemistry – Liquid Nitrogen	£0	£10,000
SUB-TOTAL	£1,790,256	£1,929,714
NON-RECURRENT FUNDS		
Academic Assistance Fund	£119,435	£292,652
Assistance to departments	£244,877	£259,685
Contingency Fund	£29,000	£35,000
Development Fund	£0	£25,000
Faculty general	£58,692	£90,867
Liquid Nitrogen	£10,000	£0
Meteorology special factor	£4,500	£4,500
NAAS	£5,000	£3,500
OSRIS to departments	£0	£60,000
Schools Liaison Office compensation	£14,000	£14,000
SUB-TOTAL	£485,504	£785,204
UNALLOCATED	**£85,264**	**£4,520**

m:\data\123data\finance\finc9394.wk3

28-May-93

APPENDIX II

Faculty of Science and Engineering

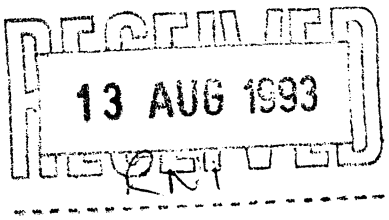
Academic Assistance Fund and Faculty Reserves 1993/94

Planning Unit	Academic Assistance	Faculty Reserves	Total	Breakdown of Allocations into posts / cash				
				AT/AR	AA/AD	Technical	Clerical	Cash
Biology	£0	£96,209	£96,209	4.0				
Chemistry	£105,563	£80,574	£186,137	2.5	1.0	4.0	0.5	yes
Electronics	£0	£18,248	£18,248	1.0				yes
Engineering	£82,646	£20,020	£102,666	3.66	0.33		3.0	
Geology	£27,491	£0	£27,491	1.0				
Informatics	£43,545	£19,634	£63,179	2.0	1.0		1.0	
Mathematics	£14,181	£25,000	£39,181				1.0	yes
Physics	£19,226	£0	£19,226	1.0				
Total	**£292,652**	**£259,685**	**£552,337**	**15.16**	**2.33**	**4.0**	**5.5**	

m:\data\123data\finance\aafre934.wk3

To: Professor Roland Ibbett
Department of Computer Science
James Clerk Maxwell Building
King's Buildings

copy to Professor Michael Anderson



From: Mrs Elizabeth Mackay
Senior Administrative Officer
Estates and Buildings Office
Old College
e-mail:E.Mackay@ed.ac.uk

Tel 650 2080

13th August, 1993

Concerning: Appleton Tower, level 3

I should be glad if you could meet with Professor Anderson and me on Tuesday 7th September at 3 p.m to discuss the Computing Services' proposals for a Training Area at Appleton Tower. I enclose a copy of the case which is being made.

It would be helpful to meet on level 3 of Appleton Tower, as this is the area which the Computing Services propose to use. I hope this will be convenient for you.

Elizabeth Mackay

Proposals for reorganisation of Appleton Tower Level 3

Earlier this session a need was identified for a consolidated computer training area in the Central Area. An initial proposal was developed which involved the creation of a suite of purpose-designed training rooms within part of level four of the Appleton Tower 4 (AT4). This proposal was received sympathetically by EUCS senior management, but was eventually rejected on the grounds that it was undesirable to break up the existing large open area on AT4. EUCS was asked to investigate alternative locations. A number of alternative sites have been explored, leading to this modified version of the original proposal, based on a suite of existing rooms on AT3.

1 Summary of proposals

If the University is to achieve its stated academic and administrative objectives with respect to IT and other information-handling skills, it is essential that EUCS and MIS are able to deliver effective IT training. This requires effective teaching and learning materials and personnel but it also needs properly managed and equipped facilities.

In place of the present dispersed and, in some cases substandard, computing training facilities, it is proposed to create a suite of purpose designed training rooms in the west end of Appleton Tower Level 3 (AT3).

Converting AT3 to computer training would require considerably less funding than the original proposals for AT4, where, as well as associated rewiring and refurbishment, it would have been necessary to construct walls between classrooms and strip out the residual infrastructure left over from the floor's time as a chemistry laboratory. The only major structural work would be the building of a soundproof sliding partition down the centre of the large room (7/8 in diagram), and there would probaby have to be some rewiring. It is likely that the cost would be much less than the University's Works Department's global estimate of £80,000 for AT4. (As before, the cost of ethernet wiring would be met by EUCS.)

With the exception of the Computer Science rooms equipped with workstations and terminals (9 and 10 in diagram) alternative locations would have to be found for the teaching and studying at present carried out in the AT3 rooms which are the subject of this proposal; most of this appears able to be housed without too much disruption on other floors of the building. It is recognised that this may cause some difficulties for the departments concerned, but, in the absence of any apparent alternative location for a training area, the University is asked to evaluate the overall costs and benefits of alternative uses of the AT4 accommodation

2 Present provision

At present EUCS has training facilities in three locations in the George Square area, on levels 2 and 4 of the Appleton Tower and the first floor of the University Library. The present accommodation is as follows:

First floor, Library	PC equipped training room with adjacent hospitality area
Level 2, Appleton Tower	PC equipped training room (486) with adjacent seminar room
Level 4, Appleton Tower	Mac training room (SE/30 room shared by public access and training),; use of public access facilities in open area (to discontinue after summer); seminar room and a coffee/hospitality room.

3 Why change is needed urgently

3.1 Dispersed nature of EUCS training facilities

The dispersed provision of facilities makes their management and support extremely difficult and does not allow an economic use of staff resources.

3.2 Need for cross-platform training

Some courses are delivered on a mixture of machines In particular there is a need to be able to run courses using PCs, Macs and workstations in one location. This can only be done if there are facilities which allow PCs and Macs to be physically near enough each other to be moved when necessary, and for the lecturer to move between the two environments with ease.

3.3 Changing requirements for a learning environment

EUCS is looking at alternative methods of training - or rather learning. Given the number of staff and postgraduates who must be taught, the ever-increasing diversity of systems and software they wish to learn about, and the finite space, equipment and staff to be used to do this, it is vital to explore other solutions, such as open learning areas. Indeed, Edinburgh is one of five universities currently bidding for TLTP resources to set up a prototype open learning centre. There is thus a need for rooms which can be adapted for both formal courses and learner-driven activities (with help at hand).

3.4 Need for learning about computers to be in a comfortable environment

Learning about computing should be done in an environment which is welcoming and comfortable. The present training facilities in Appleton Tower are very poor: the rooms are scattered, the wrong shape, too hot or cold, dirty and tatty, poorly signposted. The overall impression is one of gloom and shabbiness. Regardless of what is done, a major upgrade will be needed.

3.5 Sub standard training facilities on Level 2

Over Easter 1993 this room was equipped with 15 486 machines and now holds the most up-to-date and powerful systems for training staff and postgraduates in the Central Area. The room in which they are located, however, is structurally difficult for the kind of teaching required, and its distance from level 4 and the Mac teaching facilities also makes it impossible to obtain economies of scale which can emerge from teaching across the PC and Mac platforms at the same time.

3.6 Need to meet MIS's training facilities requirements

The 486 machines were bought jointly by EUCS and MIS, which is entitled to roughly 40% use of these machines. MIS, which also requires better facilities than available on level 2 and in particular the opportunity to have small and large training areas, supports these proposals.

4. Why not somewhere other than Appleton Tower?

A number of other locations within the Central Area have been considered in the last few months, notably High School Yards and accommodation with the George Square/ Buccleuch Place area. Unfortunately, it has emerged that, if, within existing resources, the training facility is to be provided with adequate staffing cover, it has to be in a location where EUCS already has a staffed presence. Kings Buildings is too far from the majority of the market for courses (and especially from MIS); it is also facing a major crisis of space in JCMB. Given rising student numbers and book stock overflows from elsewhere, there is no reasonable chance that EUCS can expand further within the Main Library. Thus Appleton Tower is the only area that can be used, unless annual staff costs, estimated as well in excess of £30K, are incurred through the establishment of a fourth staffed site.

5 Proposals

It is proposed that central area training facilities should be brought together on one site, on Appleton Tower Level 3. (The room numbers correspond to the numbers in the diagram.)

5.1 Training rooms

Rm 7/8 large training room, equipped with 486 machines, with a half-wall between the window and pillar in the middle and then a folding partition, to create two smaller rooms when required. At present there are 15 486 machines; this space could probably hold up to 20 machines.

Rm 4 Mac training room. This would house the 11 machines or equivalents (10 student plus one tutor) at present in the SE/30 room on level 4.

Rm 2 small PC training room, equipped with six 386 machines, suitable for small courses.

Rm 3 small flexible, room equipped according to needs of a particular event, eg with a mixture of Macs and PCs for a small DTP training session. Normally this room would house four 386 machines (with space for other machines to be wheeled in as required.)

Rm 6 Open Learning Area. This would accommodate a small number of student workplaces, some with PCs or Macs with CD-ROMS, others with video machines, etc. If open learning expands as anticipated, then this activity will spread to other training rooms and probably to EUCS public access areas, but this room would remain the open learning centre.

5.2 Other rooms

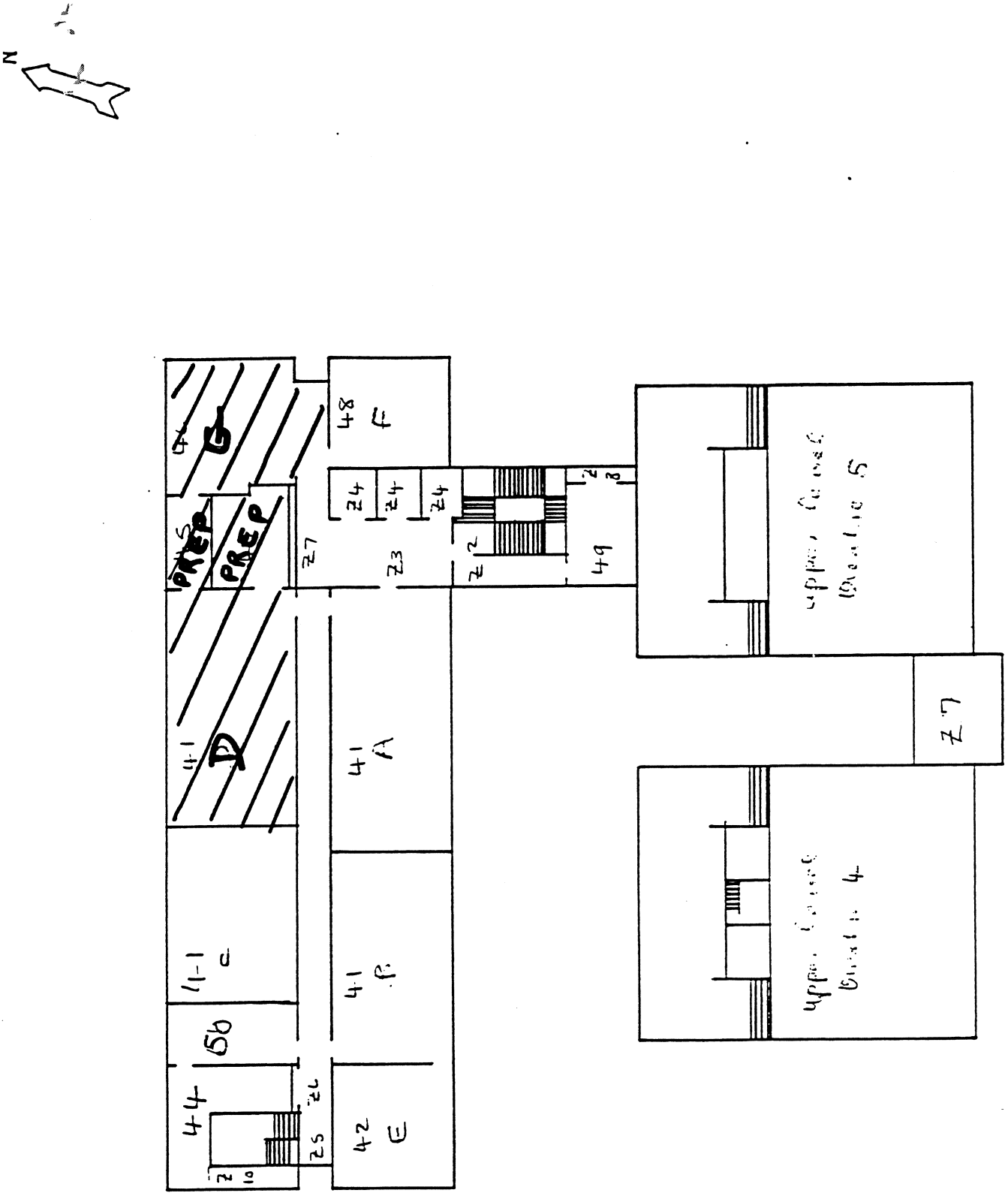
Rm 5 EUCS office for Gerry Coughlan, who looks after training equipment and runs the EUCS file transfer service, and for training staff, and for secure storage.

Rm 1 small reception/discussion/coffee area. This room could serve as the arrival point for participants and be used for discussion and as a coffee room by small groups. It is far from ideal, as it is really too small and has no plumbing. The existing coffee facilities on level 4 would have to be retained for larger and commercial courses. (Ideally we would prefer to convert room 12, at present a general classroom, releasing the coffee room on level 4, which is not so convenient, for other uses.)

5.3 Implications

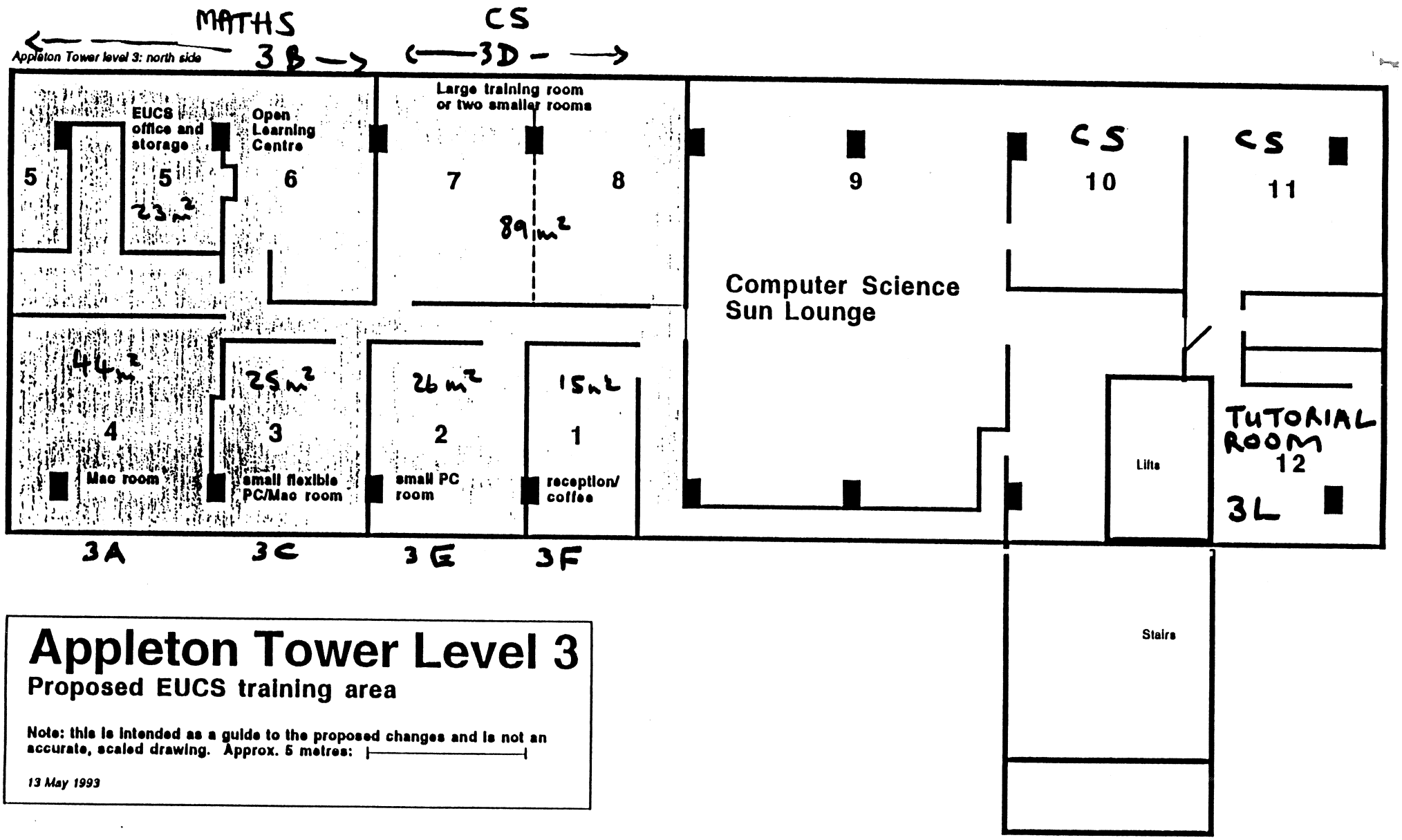
The proposals would release training facilities on level 2 and the training area in the Main Library for use by EUCS (which is hard pressed for space there).

There would be a loss of space used for study and classes, in particular by the Maths and Computer Science Departments. It is hoped that it would be possible to accommodate these uses, which are not so location-dependent as the need to run an integrated computing training activity on behalf of the Univversity as a whole. In particular the rooms vacated by EUCS on level 2 could be made available to Maths or Computer Science. It would, of course, be important that these departments did not have to find the funds to improve the environment in these rooms, and to meet any costs of the moves.



LEVEL 2

Date: 29/11/85	University of Edinburgh	Drg. No. 201
Sheet 4 of 11 sheets		APPLETON TOWER



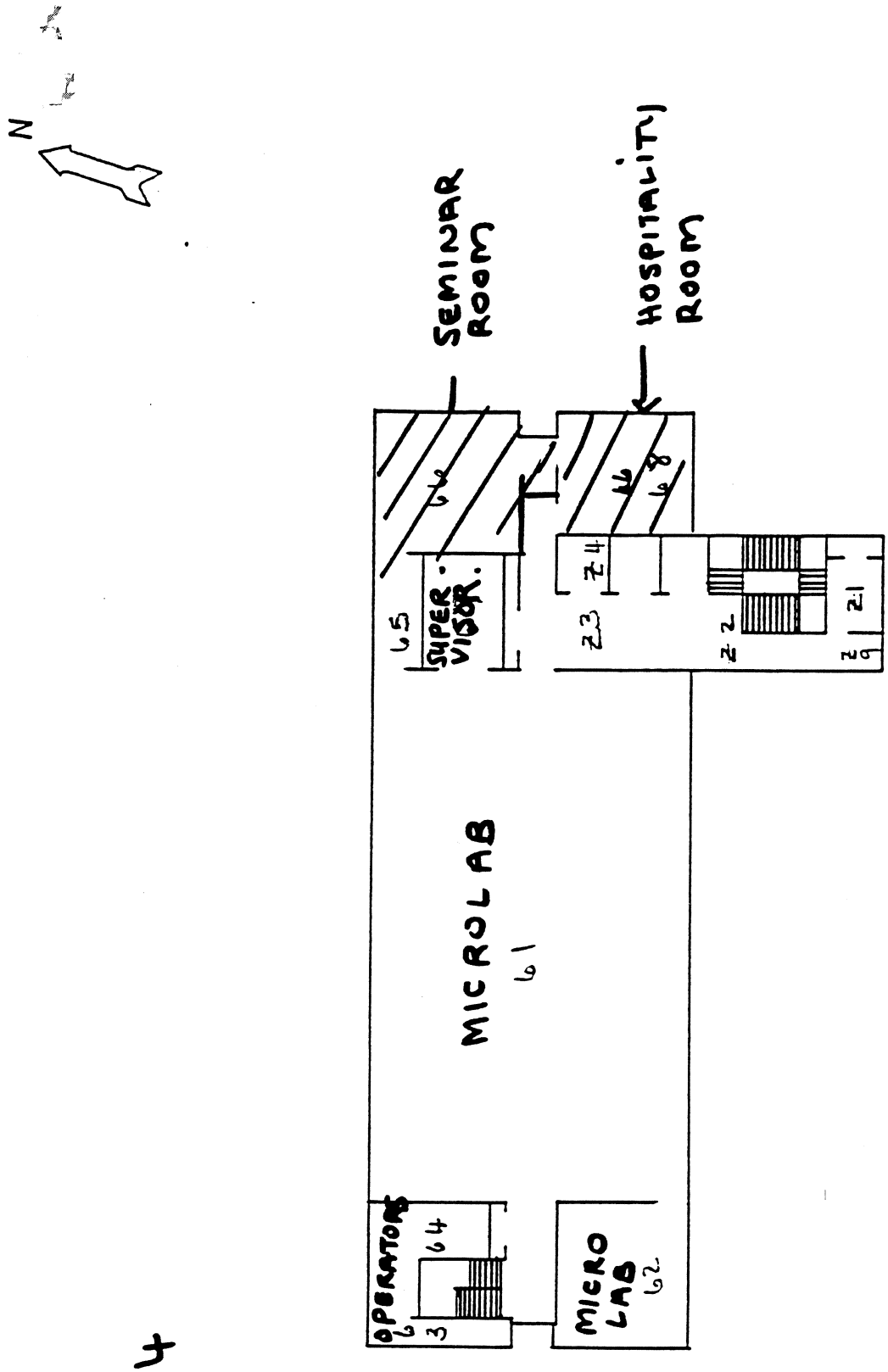
Appleton Tower Level 3

Proposed EUCS training area

Note: this is intended as a guide to the proposed changes and is not an accurate, scaled drawing. Approx. 5 metres: |——|

13 May 1993

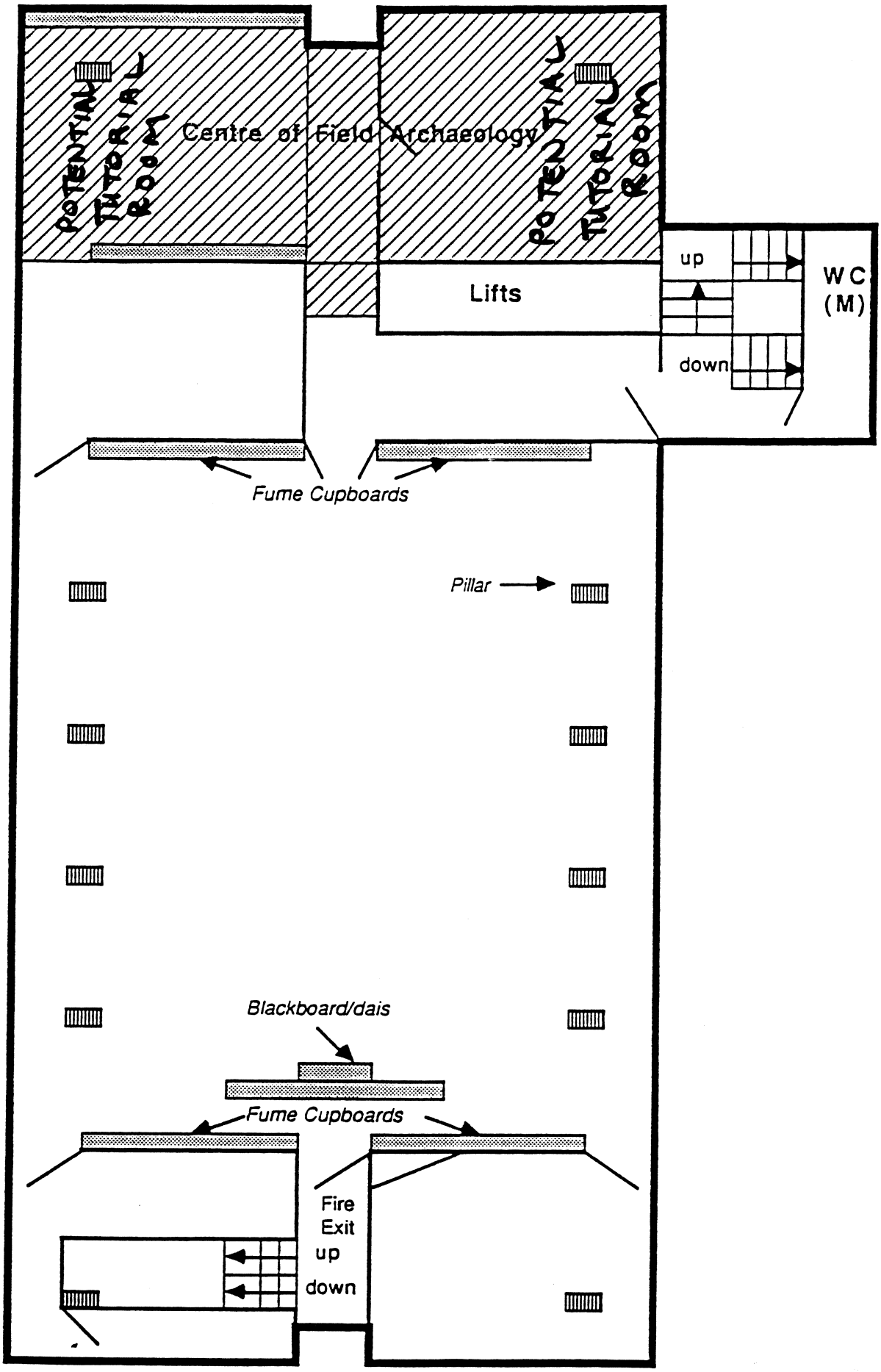
222m²



LEVEL 4

Date: 2/12/85	University of Edinburgh	Drg. No. 201
Sheet 6 of 11 sheets		APPLETON TOWER

Appleton Tower - Level 5 (not to precise scale)



LEVEL 5

01 SEP 1993
HOD

To: All Heads of Department
cc All Provosts, Deans and Faculty Group Officers

From: Vice-Principal Michael Anderson
Department of Economic and Social History
William Robertson Building
George Square

Date: 30 August 1993

In the last couple of years Senatus, Planning and Resources Committee, PEG and CMG have reiterated or established a number of procedural rules or guidelines governing various aspects of the information infrastructure that fall within my remit. Since these have been promulgated in a rather haphazard form, I thought that heads of department might appreciate a summary of the different points. (This letter brings up to date similar advice I circulated on 19 March 1992). As a result of a recent audit of academic computing in the University, advice on actions required in the computing area will follow in due course.

1. Library implications of new developments

By a 1981 ruling of Senatus, "Faculties are obliged to certify, when new academic developments are proposed, that the Library has been consulted on the adequacy of resources, and to declare any implications for the Library". This has been taken in the past to mean, and should continue to mean, that, before any new course is established in any degree, the Librarian is consulted about any possible implications for Library provision. This is best done before the course is submitted to Boards of Studies and I would suggest that the convener of any Board should be asked, where this is not already done, to satisfy him/herself that contact has been made with the Library and that the Librarian's comments have been obtained. Since, normally, any expenditure on new materials will come from within the indicative budget for faculty needs within the Library grant, it is perhaps appropriate also in most faculties to send a copy of any communication to the convener of the appropriate faculty library committee.

However, as I indicated at Senatus in February 1992, it has recently become clear that developments other than new courses can also have serious implications for Library provision. In particular, major changes in teaching methods and very substantial increases in class sizes can have a deleterious impact and I believe that it is now appropriate under the terms of the Senatus ruling that Library comment should also be sought over any major changes in the way that courses are taught or assessed. Experience with one major change in essay-setting suggests that, if this is not done, it may not prove possible for the Library to meet the new demands being made on it and at the same time provide adequate cover for the needs of other students. I would therefore urge all departments to consult the Library before they introduce any major change in how a course is taught or assessed, if the change could in any way impose extra demands on Library services, accommodation or equipment, or

involve increased opening or service hours. It may also be helpful at this time to remind heads of department that, in an environment of declining unit of resource, they need to take particular care to ensure that adequate textbook provision is maintained (even if necessary at some cost to research journals), that enough duplicate copies of monographs are available where honours class sizes increase and/or that teaching methods change (for example, by spreading tutorial and essay writing on any one topic over a larger part of the year). From experience elsewhere, it is known that the teaching assessment exercise includes some quite detailed investigation of whether departments take adequate account of library needs when developing or revising courses or curricula.

2. Computing implications of new academic developments

Where any development has implications for use of the University's central computing facilities, a similar procedure to the one outlined above for the Library should now be followed, with communications addressed to the Director of Computing and Information Technology Services, and a copy to the convener of the appropriate faculty computing committee.

3. Computing equipment purchases from general funds

More than fifteen years ago, the former Court Equipment Committee ruled that no computing equipment should be purchased from the University's Equipment Grant without the approval of the Computing Equipment Panel of what is now the Computing Policy Advisory Committee. The Panel assesses applications to ensure that they are compatible with the University's Computing Strategy and advises Deans of its views on the appropriateness, cost-effectiveness and management implications of the proposed purchase. More recently, there has been a firm expectation, through the University's endorsement of an integrated Computing Strategy, that equipment acquired other than with Equipment Committee funds should also be compatible with the Strategy. Departments are advised that the Computing Services will not normally be willing to offer any assistance or support for equipment which has not been recognised by the Panel; this point is particularly important in the context of donations (and at times equipment bought from research grants), which frequently turn out to have major "hidden" costs or problems. The first step in obtaining approval from the Panel is for departments to contact their Computing Services Faculty User Support Team.

The University of Edinburgh, like all UK universities, is bound by the terms of the EC Procurement Directives which came into force in December 1991. This obliges the University to follow special procedures for the purchase of computing equipment, **in addition** to those described above relating to the Computing Equipment Panel. Purchases of all computing equipment, irrespective of the source of funding, are covered by the arrangements listed in **Appendix I.**

4. Audio-visual Equipment Panel

Following a recommendation from the Audio-Visual Management Group, CMG has approved the establishment of an Audio-Visual Equipment Panel. In the first instance, this Panel will be concerned to ensure that the University develops a more coordinated and cost-effective policy (especially with respect to maintenance) on the acquisition of audio-visual equipment (cameras, video/audio recorders, video monitors, 35mm slide projectors, overhead projectors, screens, etc). Deans have been asked to ensure that no equipment in these categories is purchased from University Equipment or General funds without prior advice from the Panel. The Panel, which is to include members of a selection of University departments and central services, will aim to

deal rapidly with requests, at any time of year, if the necessary details are provided on application forms which are available from Audio-Visual Services. Information about any intended purchases, with completed application forms, should be sent to Mr Ben McGleave at Audio-visual Services, 55 George Square.

5. Printing and Reprographic Equipment

Planning and Resources Committee decided in 1990 that no printing, desk-top publishing, photocopying or other reprographics equipment with a capital value of more than £5k should be purchased without comments being requested from the Heads of Printing Units Group which meets normally twice a year under my chairmanship, and without the approval, in the light of these comments, of the appropriate Dean. Requests for consideration should be sent to the Secretary to the Group, Mrs J P Rennie, in the Secretary's Office. I should also remind you that the Court has ruled that no photocopying contracts of any kind should be entered into with any supplier, other than through the Head of the Printing and Supplies Division. This ruling includes contracts funded out of research grants or endowments, or any other funds which might leave the University liable for payment should difficulty arise with the contracts concerned.

6. Charging for Photocopying and other Printing and Reprographic Activities

Planning and Resources Committee also ruled that, where a department provides photocopying, printing and any other reprographic services (including, for example, slide reproduction) to other departments or to staff or students of other departments within the University, such charges shall be set at a level which covers all consumables and an appropriate share of equipment replacement/leasing costs. Where staff support is also provided, charges should be set at a level which covers an appropriate share of these costs. Departments should monitor the revenue that they receive from sales of such services and should the revenue received in any year exceed £5k this should be reported to the Dean who may take the information into account in the allocation of equipment grant. A copy of the report should be sent to me or my successor. Where departments make any sales to individuals or organisations external to the University, they must in addition clear their charges with respect to VAT with the Finance Office.

7. University Archives

Sir John Burnett, when he was Principal, wrote to all departments, Deans and Faculty Officers, asking them to notify the Special Collections Librarian of any archive material which they held, and of any that it was necessary to dispose of. A similar concern that unique material is being destroyed has recently been expressed by the Library Committee. In particular, where departments have such unique items as minute books of Boards of Studies or student records of a kind or period which are not likely to be held in central administrative or faculty offices (eg, in particular, if they date from before about 1960), they should not dispose of these without consulting their Faculty Officer and the University Library. Departments are also encouraged to keep copies of at least a systematic sample of course booklets and other material which might allow a future scholar to explore the development of teaching within their department. If such material becomes bulky in a situation where space is short, advice should be sought from the Librarian before it is disposed of.

8. Off-air recording

This is also be an opportunity to remind departments that the University currently holds (and is paying a substantial subscription for) a licence from the Education Recording Agency (ERA) which allows us to record on video 'for the educational purposes of the establishment' all television programmes made by their members. In practice this means any programme other than Open University/Open College programmes which have a separate licence scheme, and some satellite channels which require a subscription/decoder. Multiple copies may be made and recordings can be carried out by staff at home, although tapes should be labelled with date, time of recording, channel and title, and care must be taken not to distribute such material outside the University, unless to another ERA licence-holder. Compilations of and extracts from programmes may also be made, but, before doing this, advice should be sought from Dr Keith Winton (ext 5781) to check that what is being done is compatible with the licence.

Michael Anderson

The University of Edinburgh

AUDIO-VISUAL EQUIPMENT PANEL

Application to Audio-Visual Equipment Panel
for technical advice on audio visual equipment purchase

This form should be completed and sent, via your head of department, to the Convener of the AV Equipment Panel - address opposite.

In most cases a reply should come within about 2 to 3 weeks.

Convener of the Panel:
Ben McGleave,
Operations Manager,
Audio Visual Services,
55 George Square (ext 4098)

Department or Unit:

Address:

Departmental contact for this application:

Telephone No:

Head of Department:

HOD's signature Date

---

1. Title and brief summary of proposed purchase
   (please send brochures, specification, etc.)

---

2. Why have you chosen this particular model?

---

3. What do you propose to use the equipment for?

4. Name and address of proposed supplier

---

5. Approximate cost including VAT

Capital: £ Recurrent: £

---

6. Is this a replacement for an existing piece of equipment?
YES/NO

If YES, please identify the existing item, including age and reason for replacement

If NO, please give justification for need of item selected (use continuation sheet if necessary)

---

7. Has a source of funding for servicing/routine maintenance been identified for this equipment?

The University of Edinburgh
Guidelines for Procurement of Computing Equipment

This is a description of procedures to be used when purchasing computing equipment. It includes new measures occasioned by the EC procurement directive. It covers all computing procurement, not just the equipment affected by the EC regulations.

1. This guideline covers the period January 1993 to June 1994.

2. **EC Affected Equipment.**

Any single procurement over 200,000 ECUs (converted as £141,431 for a period of two years from 1st January 1992) must conform to the EC guidelines with respect to tendering, evaluation and contract placement. Any such procurement should be discussed with the Deputy Director of Computing Services, Mr. Brian Gilmore (ext.4974), *at least* three months in advance of any expected purchase date.

If the aggregate value of equipment purchased by the University in a particular class is expected to exceed 200,000 ECUs in one financial year the EC guidelines must also be followed. In the period for which this guideline is valid three classes of equipment have been identified, tenders issued, and "Framework Agreements" put in place. The classes of equipment affected are:

a) IBM compatible PCs
b) Apple Macintosh systems
c) General purpose Unix workstations

Note that additional peripherals (e.g. disks, memory, printers) or lap-top or notebook versions of these systems are not included in these classes of equipment, but that the favourable terms negotiated with the contracted suppliers may extend to such systems.

Other classes of equipment may be affected by the EC regulations during the period of the guidelines. If this becomes the case you will be notified.

3. **Approved Suppliers.** Any purchase of EC affected equipment must be made from the suppliers with whom the University has a "Framework Agreement". No other supplier may be used, *irrespective* of the source of funds. Purchasers may deal directly with any of these suppliers, or may purchase through the Computing Services who provide a full installation and support service. This latter route is strongly recommended for departments which may not have the resource to ensure that orders are configured correctly or to install the equipment and ensure correct operation. Computing Services will resolve any such difficulty and assist the department with any problems.

4. **Approval to Purchase.** The situation with respect to getting approval to purchase equipment is not changed by the EC directive:

a) All UFC funded purchases must get approval from the Computing Equipment Panel (CEP) before placing an order for computing equipment.
b) Purchases from research or external funds do not need approval from the CEP, but it is strongly recommended that advice be sought from CEP. Research or externally funded purchases of EC affected equipment may only be made from the nominated suppliers.

5. **Exemptions**. Under certain conditions, purchases of EC affected equipment may be made from alternative suppliers. Conditions for this might include where the "standard" equipment is not adequate for the purpose (e.g. is not fast enough, is not compatible with special hardware, or does not run needed software), or where the equipment is for extension of an already established installation, and integration of a new component from a "listed" supplier would result is significantly increased cost or incompatibility. **Any exemption must be clearly documented** - the University must be able to defend its position in any such decision.

For exemption purchases from **UFC funds** the case for exemption must be clearly made in an application to CEP.

For exemption purchases from **research or external funds**:

a) Consult the Deputy Director of Computing Services. If exemption is clearly in order immediate approval will be given subject to a brief note being lodged. It may be necessary for the Deputy Director to consult with individual members of the CEP.
b) If further consideration is required or in the case of an appeal against a negative decision above a full application shall be made to CEP.

6. It should be noted that not all "approved" suppliers' equipment is supported by Computing Services. Departments should note the level of support on requested equipment. The level of support from Computing Services and the technical capability of the department will be taken into account by CEP in considering the technical and economic suitability of applications.

7. Purchasers are requested to note that all the suppliers with whom a contract is concluded will have been subject to a careful scrutiny. This covers not only the technical quality and value for money of the equipment, but also other aspects such as quality of technical support and maintenance, as well as financial soundness of the company.

8. Under the EC directive certain reports on purchases (aggregated over classes) must be made, even for "sub-threshold" purchases. It is not yet clear how detailed this reporting must be, or how information is to be gathered. The University is appointing a procurement officer, and it is expected that he or she will oversee the establishment of procedures to ensure adequate reporting. Note that this will probably need additional co-operation of departments during the period of this guideline.

9. Within the boundaries permitted, the procedures have been designed to be as flexible as possible. Prospective procurers should not hesitate to seek further advice in case of doubt. Contact either your Computing Services support team, or George Cleland, Convenor of the CEP (ext.5199, cleland@ed.lfcs) or Brian Gilmore, Deputy Director of the Computing Services (ext.4974, B.Gilmore@ed).

George Cleland
Convenor, Computing Equipment Panel
January 1991

University of Edinburgh
Department of Computer Science
Policy Committee

Realising the Potential of Our Computing Officers
September 21, 1993

This is a draft of a report prepared for policy committee. I hope it will stimulate discussion on how we should best undertake a review of activities which provide the computing infrastructure and support computing for teaching, research and administration in the Department.
I believe this is an important topic meriting the fullest discussion. I have been deliberately provocative in some parts of this report because we tend to be rather complacent when it comes to discussing computing officers and their activities. This is not intended to be a definitive report.
I *propose*

- we establish a small working party of the policy committee which is representative of teaching, research and administrative concerns and has knowledge of the kind of infrastructure we require. The remit of the committee shall be to review the activities of CO's.
- we determine a suitable budget for the working party so they can call in external consultants to aid in the review process if this is deemed necessary..

Stuart Anderson

1 Background

- We have 12.5 CO's and 1.5 CSO's, their salary costs plus the equipment spend exceed £500,000. Overall this accounts for between 25 to 35% of the departmental budget.
- The writing between the lines in the 1991 savings targets was that we should achieve more of our target from CO's and other support staff than from teaching staff. In fact most of our savings have been achieved by teaching staff losses.
- One might argue that the high cost of support staff is inhibiting developments in teaching and research.
- Teaching staff now account for both their teaching and research activities. The research assessment and teaching quality audit and assessment frameworks provide (excessively bureaucratic) means of accounting for teaching staff activity. We have no strong mechanism for ensuring accountability from support staff.

These points cover the main changes which convinced me we need to have a better structure for the deployment of CO resource in the department. If we do not improve the situation I believe that we will see further pressure on teaching and research and growing resentment from teaching staff who will see the CO's as "privileged" with respect to teaching staff.

2 The Problem

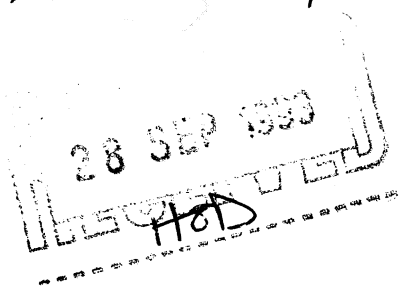
The problem is a complex one and it has multiple facets

Management: ,,,

3 Solutions?

1. In the long run we must see either a reduction in the cost of the CO operation or an increase in the level of support given to teaching and research which justifies the level of expenditure on computing officers. These changes may be long term but we must begin to plan now to bring this about.

cc: JKB, JCD, GLC For information



SC\IA

COMPUTING SERVICES

The University of Edinburgh
James Clerk Maxwell Building
The King's Buildings
Mayfield Road
Edinburgh EH9 3JZ

Telex 727442 UNIVED G
Fax 031-662 4712
Telephone 031-650 1000
or direct dial 031-650 **4947**

24 September 1993

Dear Head of Department

Departmental Relocations
Guidelines for Voice and Data Communications Provision

1. Introduction.

1.1 These guidelines are to assist departments when they either move to new accommodation or alter or expand their existing accommodation. When such moves take place, there are inevitable consequences for the voice and data networking requirements of the department. The responsibilities for ensuring that service changes are met falls jointly on the Estates and Buildings Division of the Secretary's Office and Computing and Information Technology Services and they co-ordinate their activities where necessary to ensure minimal disruption for the department.

1.2 The funding of such moves and changes depends upon the circumstances of the move and will either fall upon the department, Estates and Buildings, or within the budget for a new building. This is explained in detail below.

1.3 The remainder of this document outlines the steps to be taken by a department which is relocating or refurbishing. The process may be seen as having two primary aspects, the first being establishing the funding and the second being the technical details.

1.4 There are three possible reasons for changes to communications: a department re-organising within its own space, a department moving at the request of a University committee or a department moving into a new or refurbished building. They each require separate procedures

2. Internal Departmental Re-organisation

2.1 Where a department is re-organising within its own accommodation then the costs of altering the communications falls on the department.

2.2 The department should inform, in writing or by e-mail, both the EUCS Network Services Manager (NSM) and the Telephones Manager (TM) as soon as possible that some changes are forthcoming, giving the timescale of the changes, and stating that they are paying for the work.

2.3 If structural work, not related to communications is required, then the department must inform the Director of Estates & Buildings. Any structural work, such as providing cable routes, directly associated with communications will be included in the service provided by the TM or NSM and they will liaise with Estates & Buildings as necessary.

2.4 When the department has defined its plans (normally marked up building plans are required), these should be sent to the TM and NSM (if appropriate) normally in the form of a quotation request.

2.5 For EdLAN connections, the normal EdLAN costs and procedures apply as outlined in the EdLAN Technical Notes. The department should request a copy of these if they do not already have one.

2.6 Separate quotations shall be given by the TM and the NSM and the department must provide a written acceptance before any work can be scheduled.

2.7 While every effort will be made to accommodate the work requested, departments should be aware of the very high workload for communications installations and should give as much notice as possible for any changes.

3. Relocation by Agreement

3.1 Where a re-organisation is agreed as part of a local (building or area) or university-wide plan, then the cost will normally be met by the University through the Estates and Buildings budget.

3.2 These costs cover the provision of equivalent communications facilities, i.e. the same number of telephone or data outlets as the department had in the area it is giving up. Additional outlets must be paid for by the department.

3.3 Where a department moves to an area with better provison, i.e. more ports, it may either take over those ports along with any recurrent costs, or it may reduce the number of ports at no cost.

3.4 The department should ensure that the appropriate committee writes to the Director of Estates and Buildings (DEB) seeking the necessary budget. Detailed plans of what is required will be needed at this stage. This letter, along with the plans, should be copied to the TM and the NSM as they will often have to give budgetary estimates.

3.5 When agreement has been reached between the DEB, the department and any appropriate committee, the department, along with the TM and the NSM, will be informed in writing.

3.6 If the department has asked for additional facilities, it must confirm with the DEB, TM and/or NSM that it wishes to proceed. If not, the department must present revised plans to all parties.

3.7 Where additional facilities have been requested for EdLAN outlets, the real cost of the provison will be charged to the department. This will normally be an estimated share of the total cost of the provision.

4. Relocation to a New or Refurbished Building

4.1 Where a new building is to be constructed, or a major refurbishment of an existing building is to be undertaken, then the communication costs will normally be included in the budget for that building. Again the department should write as above to the Director of Estates and Buildings, at the building planning stage.

4.2 Normally all reasonable communication costs are met centrally, even if the provision is superior to what the department enjoyed previously.

4.3 The DEB is responsible for providing the TM and the NSM with the appropriate plans, once agreement has been reached with the departments.

Yours sincerely

J. Andrews

pp Murray Clayton, Telephones Manager, EUCS
Scott Currie, Network Services Manager, EUCS
Neil Oliver, Director, Estates & Buildings

AGENDA FOR DEPARTMENTAL MEETING

to be held on

Friday 1 October 1993

Time : 3.30 p.m.
Venue : COFFEE LOUNGE (2510)

Raised by

1. Minutes of last meeting
2. Matters Arising
3. Convenor's Business
4. Matters for Report
   (a) Policy Committee Action List — rni
5. Matters for Decision
   - Continuation of IPU Degree Working Party — stg
     A discussion of the WP Report will take place at a pizza lunch on 8th October
     The IPU report can be found in the file /home/dept/IPU/report.dvi
   - First Year Mathematics for Computer Science — kk
6. - Matters for Discussion
   - WP Report: Duties Weighting — dts
7. Any other competent business
8. Date of next meeting

gf 3650

Report of Working Party on Degrees

Informatics Planning Unit, University of Edinburgh
May 1993

Strategy

The Working Party[1] first refined the definition of its purpose, given in its remit. Its task was twofold: to collect information on existing curricula, and to consider future developments.

We decided to collect information not in the form in which departments now hold it but in a common format, to provide the best possible platform for future development. The second task – to consider future developments – was soon seen to be open-ended, requiring the Working Party to define the most useful initial segment which could be carried out in its timescale. It was unanimously agreed that the most pressing, but an achievable, subtask was to propose a modus operandi for the IPU to develop the curricula and organisation of its taught courses.

The Working Party strategy has therefore been to offer a platform for joint development of IPU teaching with two ingredients: complete information about existing practice in a common format, and a mechanism for carrying out the development efficiently. Underlying this strategy is the belief that Edinburgh's potential in informatics teaching can best be realised by joint endeavour across the IPU.

Documentation

The main document produced by the Working Party is **Degree courses in Informatics at Edinburgh University, 1993.** It comprises

- Part I: descriptions (in uniform format) of the curricula of existing degrees, explaining their philosophical basis and enumerating their component half-courses and modules;
- Part II: descriptions (in uniform format) of all existing half-courses and modules, as defined below;
- Appendix: a list of new modules, half-courses and degree themes currently under consideration.

The Working Party has also written a brief discussion entitled **Possibilities for distance-learning in Informatics.**

Underlying the main document is the realization that virtually all MSc and third and fourth year undergraduate taught units are about 18 lectures plus appropriate tutorials and practical work; we shall call this unit a *module.* (We also

[1] See Appendix for membership and remit

count as a module a work-item, such as an operating systems practical, which carries the same assessment weight as a taught module.) Similarly much of the first and second year material either is, or will be, easily expressed as *half-courses*, which are roughly twice the size of a module. A *unit* is a module or half-course.

We propose that these documents are made freely available within the IPU.

Recommendations

Our general recommendations are, in outline:

1. **All taught material (and where possible other assessed material) offered by the three departments should take the form of modules or half-courses, and be described in a common form.**

2. **All degree curricula in which the IPU is involved should draw from this pool of modules and half-courses. Subject to exclusion and prerequisite constraints, any unit should be available to any suitable degree curriculum.**

3. **A Curriculum Committee (IPUCC) should be set up within the IPU, with membership from all three departments. It should meet as and when required to examine proposals for new units and new degree curricula. A possible mode of operation is set out below.**

4. **A common format should be adopted for proposals to the IPUCC, both for individual units and for degree curricula. Possible formats are set out below.**

5. **Undergraduate admissions should be coordinated across the IPU; if possible, selectors should be nominated to Faculty by HoPU after consultation with HoDs.**

6. **A proper relationship should be established between IPUCC and the Modular MSc committee, which currently reports to the Faculty of Science Postgraduate Committee.** [2]

7. **These specific recommendations should all be seen as aiming both to promote and to facilitate cross-fertilization of teaching among the IPU departments, and indeed between them and other departments.**

[2]The Modular MSc committee has members in Cog Sci, CS and AI, and also Meteorology; Geography may join. But the bulk of its business (courses and students) are in IPU. Part of its work is to assess new modules and revisions to course structures; this part could well be done within the IPUCC, particularly as the sharing of modules between undergraduate and MSc courses may increase with the trend towards modularisation. Another part of its work involves administrative work such as timetabling of lectures and exams, advertising etc; we have not considered whether IPUCC should perform such functions.

The Working Party noted that at least two new undergraduate degree curricula are currently under discussion, but at too early a stage to permit detailed assessment by the Working Party (acting as a prototype IPUCC). In any case the Working Party are convinced that these developments will gain from the framework proposed here; we therefore add a specific recommendation

8. **Current discussion of two new undergraduate curricula, Software Systems and single honours AI, should henceforth be conducted within the proposed framework.**

The IPU Curriculum Committee

The proposed IPUCC should not replace existing groups (e.g. syllabus committee) within each department; its purpose is to focus the deliberations of those groups and to advise HoDs and HoPU on proposals for Boards of Studies. Informally, it would smooth the way to a Board of Studies decision to adopt a proposal. We propose that IPUCC should

- keep existing unit and degree descriptions up-to-date, online (using current best practice to ensure unique master version);
- receive submissions for new units or degree curricula from an appropriate group (e.g. syllabus committee) in one or more IPU departments;
- study the implications of each submission in the light of the University's quality assurance strategies, and ensure its discussion by appropriate groups (e.g. in sister IPU departments);
- advise HoDs and HoPU accordingly – for example, on submission to Boards of Studies.

It is essential that the committee be seen in a positive light by all IPU departments. To achieve this, its membership should overlap where possible with e.g. department syllabus committees, and its minutes should be made public. Some of its deliberation could be public too, via e-mail.

Format of submissions

An agenda item for the first meeting of IPUCC should be to settle the format in which it wishes to receive submissions. Here we offer suggestions. For new modules and half-courses the format can be quite similar, and may consist of

- Title;
- Which degree curricula it should serve;
- Aims of the course;

- What the student ought to know by the end, and why;
- Syllabus;
- What skills, perhaps not specifically to do with the course topic, are also fostered:
- Activities : lectures, tutorials, lab sessions, discussion groups, etc;
- Assessment : how credit is divided between exams, exercises etc;
- Context : prerequisites, relevant other courses, etc;
- References : books, papers, where to get course notes.

For the format in which to propose a new degree curriculum, the IPUCC may consult a checklist for new and revised single courses produced by Faculty (part of its guidance notes on Procedures Relating to Teaching). We also suggest the following less detailed list:

- What need is the degree filling, and what evidence is there of such need?
- Proposed admissions standards, normally and for well-qualified and mature students.
- Degree structure, year by year: core and optional components, prohibited combinations, combinations needing special approval. With pictorial map!
- Assessment criteria, year by year: what a student has to do to get through each year and finally get the degree.
- Get-out considerations: what happens if a student fails a stage, or wishes to change from one degree to another.
- Intellectual skills progression, both subject-specific and general.
- How it will be administered.
- Resource requirements for administration and teaching: impact on existing modules, requirements of new modules, accommodation, library, staff, computing generally, administrative loading.
- Resources required at the set-up stage.
- Proposed calendar changes.

First Year Mathematics for Computer Science

Document submitted for discussion and approval by Departmental Meeting held on 1 October 1993

§1. Brief Proposal and Context. The Maths needs of Computer Science fall into two categories:

1. basic methods and techniques,

2. skills in reasoning within mathematical frameworks (of varying degrees of formality).

A good example of the first requirement is the ability to solve recurrences (for analysing algorithms). For the second requirement we could include the *true* understanding of methods of proof such as induction (useful in a very large number of areas, e.g., language semantics). An equally important skill is the ability to understand such things as the scope of quantifiers as used in Mathematical arguments. Naturally the two aims are not independent but the first one is certainly easier to outline, possibly as a set of recipes with intuitive rather than rigorous justification.

The interests of Computer Science students would be best served by a Maths 1Y course, i.e., one that follows the broad aims of Maths 2Y and even takes over some of the material (e.g., simple recurrences, counting, basic logic). In the original proposal for the Maths 2Y course it was stressed that:

> 'It is very important that our students learn to reason about formal objects in an informal but rigorous manner. In particular they ought to develop a feeling for plausible as opposed to dubious arguments ...'

A Maths 1Y course should start to lay the foundations of such an understanding. However it is very likely that there would be quite a few methods that we feel are essential for our students to know—some of them simply in recipe form. In Maths 2Y we had quite a bit of room for choosing topics whose aim was mostly to help with the lofty aims of the quote. But of course doing the stuff (just about any of it) is the best way to achieve the aim. A possible syllabus for a Maths 1Y course is given below (see §4).

§2. The current position. At the moment all the Computer Science degrees (single or joint) require a second level maths course (normally Maths 2Y, but with exceptions for joint degrees) for entry into third year. (The only exceptions to this requirement are the Ordinary degree in Computer Science and the joint degree in Computer Science and Management Science which can be taken without s second level Mathematics course provided the premission of the Head of Department is given.) Thus a first year maths course is also compulsory except for those who have an exemption. (In 1990-91 about 20 exemptions were offered to an intake of 120. A fair number of exemptions are declined each year and it seems reasonable to assume that even more would be declined in the presence of a Maths 1Y course.)

Computer Science (including various joint honours degrees) represents a sizable block for Maths 1C. If a Maths 1Y course were offered it would be compulsory for *all* our intake (excluding of course joint degree students with other requirements and those with exemptions). The number of our students on such a first year course would be higher than it is now, e.g., due to fewer students accepting exemptions. The current requirement for attending Maths 2Y would be kept.

§3. Joint Degrees. Our largest group of joint degree students is with Artificial Intelligence but there should be no great conflict here as regards Maths requirements.

The second largest group is with Engineering—such students currently attend Maths 1D. Given that the Maths 1C syllabus is fairly similar to Maths 1D there has not been any great problem about a common background. In the presence of a Maths 1Y course we would be faced with a new situation (not totally new since we have had Maths 2Y running alongside Maths 2D for four years, the current year being the fifth). Engineering seems to require considerably many

more mathematical methods, or recipes, than Computer Science from its students. On the other hand Computer Science has a much greater concern about the techniques of mathematical reasoning. On balance it seems to be in the best interests of the students to attend Maths 1D. We must be careful not to marginalize such students whose maths courses would inevitably miss out some material or methods that we, in Computer Science, regard as essential.

So far as basic knowledge is concerned it would be reasonable to give students some vacation reading in order to fill out any gaps. The more difficult problem comes from the wish that students should develop intuition about proofs and formal ideas in general. It is likely that Maths 1D will take more of a recipe approach than we would find desirable. It is possible that this will still provide enough groundwork for students to develop the basic skills that we want but the situation must be monitored closely. (The Computer Science modules which make most demand on proof techniques are mostly in third and fourth year where students can exercise choice.) Naturally Computer Science lecturers will need to take account of the situation, e.g., by giving *brief* descriptions of their course's requirements and suggesting sources of information. In fact we have already collected this sort of information as a result of a request from the coordinator and the other lecturers of Mathematics 2Y. (It is not in a form that can be given to students but each lecturer could easily rework the information.)

While the solution proposed above seems best for the majority of students we must bear in mind that one of the aims of a Scottish University is wide choice and mobility in the lower years. There are bound to be students who wish to keep their options open even if they attend Maths 1Y rather than Maths 1D. In order to help with such mobility, discussions have been held with Electrical Engineering about the level of Calculus necessary in order to give students a realistic chance of entering Maths 2D (*after* some extra, and probably compulsory, vacation reading). It is largely as a result of these discussions that we have included a fair amount of Calculus in our proposal (of course even if students do not opt for any Engineering they still need to know some Calculus). We would expect that the current calendar entries which simply refer to Mathematics 1 (without naming any particular strand) would be left as they are. Those entries which exclude Mathematical Studies 1 as an acceptable prerequisite would also be left intact, so that Maths 1Y would act as a prerequisite for Maths 2D (possibly, as mentioned above, with a requirement for vacation reading—the availability of printed notes is very helpful in this respect).

§4. An Outline Syllabus. The following gives a general idea of the sort of course we'd like to see. Each topic is assigned a certain number of lectures. Naturally these figures are not fixed but they do serve to illustrate the relative weight of each topic. We would expect some revision of the figures in the light of experience (however the total of 21 lectures on Calculus is an absolute maximum).

We have a very strong preference for a course which is made up of two short fat half courses (each consisting of 12 weeks with 3 lectures per week together with 1 tutorial). This fits in much better with virtually everything else that our students study. It should be stressed that although topics are grouped together, some of them would be best taught by spreading them out to other relevant parts of the course (this applies particularly to generalities such as equivalence relations).

It will also be seen that the Calculus part is much more detailed than the rest. This is simply to ensure that the agreement between our Department and Electrical Engineering is not violated accidentally.

§4.1. First Half Course.

General background: Sets, functions, relations, various bits of notation such as summation. [*3 lectures*]

Basic functions: Floor, ceiling, logarithms, exponentials, polynomial functions (including a feeling for the growth rates of the last three types of functions—through graphs rather than analysis). (See also the Calculus part of the second half course.) [*2 lectures*]

Counting: Permutations, combinations, binomial coefficients and theorem. [*3 lectures*]

Recurrences: Simple things to introduce basic ideas and notation—stressing their relationship to the analysis of algorithms. Ability to solve straightforward recurrences (with simplifying assumptions), for example $T(n) = aT(n/b) + dn^\alpha$ where n is assumed to be a power of b. [*7 lectures*]

Basic probability: Discrete spaces only, conditional probability, expectation, variance. Just enough to let Maths 2Y build on top of it. [*6 lectures*]

Graph theory: paths, cycles, adjacency matrices (counting paths of a given length), Eulerian cycles, trees. [*5 lectures*]

Number theory: greatest common divisors (Euclid's algorithm), residues and equations—efficient computation of a^n mod m for large m, solving $ax \equiv b \pmod{m}$, mention connection with RSA cryptosystems. [*4 lectures*]

Propositional logic: Distinction between validity, truth and soundness. Syntax, semantics (truth-tables), natural deduction. (This topic is used in various disciplines so it needs to be placed sometime in the first term.) [*6 lectures*]

§4.2. Second Half Course.

Geometry in $\mathbb{R}^2$*:* Equation of a straight line (implicit and parametric), condition for perpendicularity, the region defined by $ax + by + c = 0,\ > 0,\ < 0$. Line segments and their intersection. Angle between two lines. [*4 lectures*]

Algebra: Univariate polynomials, division with remainder (algorithm), greatest common divisors (Euclid's algorithm for polynomials), Gaussian elimination hinting at linear algebra. Matrices, inverse and determinant (2×2 and 3×3 cases only, hinting at the general case), tie in with rotations in Geometry. [*8 lectures*]

Calculus:

Preliminaries and differentiation: Functions, limits, tangents, definition of derivatives, derivatives of x^n, $x^{1/2}$. Differentiation of sums, products, quotients. Composite functions. Higher derivatives. Stationary points, tests for maxima and minima, partial differentiation (brief definition only). [*6 lectures*]

Integration: Definition of integral, properties, evaluation of definite integrals by using fundamental theorem of Calculus. Integration of x^α for general α. Rational functions, examples that don't work out trivially. Integration by parts, integration by substitution. Areas from $\int y\,dx$, volumes from $\int \pi y^2\,dx$ [*6 lectures*]

Logs and exponentials: Definition and properties of $\log x$, e^x. Derivatives, graphs, series (no formal proof). Integration by parts applied to $\int xe^x\,dx$, $\int x \log x\,dx$ etc. [*3 lectures*]

Trigonometric functions: Radian measure, sine and cosine for genral angles, addition formulae, $\sin(\pi/2 \pm \theta)$, $\cos(\pi \pm \theta)$, tangent and brief mention of other trigonometric functions. Notion of inverse trigonometric functions (mention existence and problems arising in their definition). Derivatives of $\sin x$, $\cos x$, $\tan x$, graphs of these funtions. [*4 lectures*]

First order differential equations: Basic introduction with simple examples. [*2 lectures*]

Complex numbers: Basic definition and operations, Argand diagram, de Moivre's Theorem (explain link to exponential function—no proof), roots of unity, primitive roots of unity. [*3 lectures*]

If Maths 1Y does go ahead then a much more detailed syllabus will be produced together with illustrative examples from Computer Science and related areas. Some changes to Maths 2Y will also be necessary but there should not be any difficulties with these.

No specific section is devoted to the notion of rigorous proof—this should be a natural byproduct of the course. The only way to learn rigorous mathematical reasoning is by seeing it

and doing it. There is a danger that at least some of the course will be taught as though it were a Pure Maths course. This must be avoided at all costs principally by drawing on examples from Computer Science and related disciplines. In particular the course should not take the format of definition–theorem–proof but give motivation both for studying a topic and for the way in which it is studied. It is important to spend enough time discussing how certain arguments can go wrong rather than simply 'laying down the law'. For some topics rigorous proof would get in the way of intuitive understanding, e.g., the general solution of simple recurrences of the type given above (however solutions to particular recurrences *should* be verified thus providing excellent training in various forms of induction). For these topics it is much better if the students gain confidence by seeing and doing lots of representative examples leading to a statement but not a rigorous proof of appropriate theorems. This approach can be used to help students develop dexterity in manipulating mathematical expressions—a skill which is often underrated or wrongly assumed to be present.

It is very important that the course should provide either printed notes or be based on a suitable book. This would free both the lecturers and the students from the mere writing down of symbols and allow time for discussion of the material. A reasonable starting point for a book which covers many parts of the course (but not Calculus) is: *Discrete Algorithmic Mathematics* by S. B. Maurer and A. Ralston, Addison-Wesley (1991). The current price is around £20. This book gives a very large number of examples and really does do things algorithmically (down to analysing algorithms). An agreed text would also make it easier to help the joint degree students as well as those who are misguided enough to enter directly into second year from school and thereby lose a year's worth of education. Ideally printed notes should be supplied for any topics which are not covered by the course book—indeed it would be much better if the whole course was supplied with printed notes (as is common practice in Computer Science).

Kyriakos Kalorkoti, September 1993

Working party on workload accounting
Report to departmental meeting, 1st October 1993

Introduction

This working party was set up in May 1993 to examine potential ways of quantifying the amount of work being done by members of teaching staff, with a view to setting up a workload balancing scheme. One motivation was to enable members of staff to "buy" themselves sabbatical leave by carrying an above average load in previous years.

The status quo

Currently, each full-time member of teaching staff is expected to teach two lecture courses, two tutorials, one lab and to supervise two CS4 projects, with a few exceptions to take account of special circumstances. The enforcement of this scheme is entirely informal, and seems to disregard tutorials and labs.

Benefits of a workload accounting scheme

A workload accounting system could make the allocation of work *fairer* by:

- taking proper account of differences in the amount of work required to teach a brand new course and a long-standing course;
- taking account of the differing numbers of lectures/tutorials in different courses;
- taking account of *all* duties; and
- ensuring that the agreed allocation of work is enforced.

It could make the allocation of work *more flexible* by:

- enabling staff to carry a non-standard load (e.g. extra CS4 projects and fewer tutorials);
- enabling a heavy administrative load to be balanced by a lighter teaching load, or vice versa; and
- enabling a heavy load in one year to be balanced by a lighter load, or by a sabbatical, in another year.

An alleged disadvantage of such a scheme is that it is too bureaucratic. But with resources being stretched almost to breaking point, and in a department as large as ours, the informal arrangements in place are inadequate. All the other large UK Computer Science departments we contacted (Manchester, Glasgow, Newcastle, Imperial) already have a more or less formal scheme in place. The scheme proposed below adopts the main points of the schemes in use in Glasgow and Manchester.

Accounting for workloads

The attached spreadsheet lists the duties of each member of teaching staff for the academic year 1992/93, as far as we have been able to ascertain them, in three categories: teaching, administration, and research. The general idea is to account for the time required to do the work. Please note that the units used in the three categories are different, and that the degree of precision attempted for administration and research is much less than that for teaching, since nothing better seems achievable.

Teaching. The entries for lectures, tutorials and labs indicate number of contact hours; the entries for supervision (of projects, major practicals, etc.) are for the number of projects etc. supervised. The small numbers along the top of the spreadsheet are weightings; the subtotal at the right is the weighted sum of the entries. Lectures are classified into three categories:

N: completely new course (e.g. CS1 in 1992/93)

F: major facelift of existing course, or lecturer teaching existing course for the first time

O: the rest (course taught by this lecturer before, perhaps with a minor facelift)

The weightings are intended to be such that a unit is the time required to teach a 1-hour lab (i.e. 1 hour plus a bit of preparation time). For simplicity, lectures and tutorials in different courses are regarded as requiring the same amount of work, and only the first supervisor of an M.Sc. or Ph.D. student is taken into account.

Administration. The entries are 1 except where a duty is split or where somebody has two units of that duty. The numbers along the top are weightings, according to the following scheme:

1: very light

2: light

4: normal

8: heavy

16: very heavy

Duties requiring only a few hours per year are not listed; these have an effective weighting of 0, and it is assumed that everyone has a few such duties. The subtotal at the right is the weighted sum of the entries.

Research. Two figures are given for each member of staff. The question of which of these should be used, or if a weighted average of the two should be used, has been left open for now, so there is no subtotal listed for this category. A "subjective" figure was supplied by the member of staff concerned, according to the following intentionally coarse scale (where "average" means average with respect to the department as a whole):

1: less than average research activity

2: average research activity

3: a lot more than average research activity

An "objective" figure was computed by counting the nominal number of RAs working on funded research projects held by the member of staff during 1992/93. ("Nominal" because this takes into account multiple principle investigators, grants running for less than the full year, etc. The number of positions is counted, not the number of people actually in post.)

We propose that these accounts be computed each academic year. Whether a lecture course counts as N, F or O should be the decision of the syllabus committee, not the member of staff concerned. Each member of teaching staff should be informed of his/her account each year so that errors can be corrected. The accounts should probably be made public (within the department).

Balancing workloads

The subtotals on the spreadsheet are intended to indicate the amount of work each member of teaching staff did during 1992/93 in each of the three categories. A fair way of balancing workloads would be to require the weighted sum of these three subtotals (according to some agreed weights — see below) to be roughly the same for everybody. To take account of fluctuations from one year to the next (e.g. accumulating points to buy sabbatical leave), it would be necessary to compute annually the accumulated surplus/deficit with respect to the average workload, and require this to be greater than some small negative number.

We see no reason in principle why non-standard distributions of duties (either within a category or between categories) should not be allowed. The fact that the work required for different duties has been quantified should guarantee fairness; if not, then the weightings may need to be adjusted slightly to take account of "market forces". In practice, the choice of duties has to be constrained: each job has to be done by somebody, and for a lecturer to maximize his/her points by changing courses each year is a waste of resources. So the assignment of duties is a matter for negotiation with HOD and at the academic duties allocation meeting, as usual. There should probably be a "soft" ceiling on the maximum number of points anybody is allowed to accumulate in any one year.

A difficult question is what the relative weights of the three categories of work (teaching, administration, research) should be. We believe that some experience with the accounting scheme is needed before a decision can be made on this. Another question is how best to account for research activity. We propose that these decisions be made at the end of the 1993/94 academic year.

Tim Hopkins, Kevin Mitchell and Don Sannella (convenor)

28th September 93

To: all teaching staff

From: tmh

Workload accounting proposal

Don, Kevin and I were asked to investigate ways of accounting for the teaching, reasearch and admin loads on each member of staff. The subject is on the agenda for this Friday's departmental meeting, and so we are circulating in advance the draft accounting spreadsheet we have produced.

The spreadsheet is divided into three sections: teaching, research and admin. For each of teaching and admin, we have identified the major jobs, listed the jobs done by each staff member (as far as we have been able to ascertain them), assigned what we think are suitable weights to each job, and calculated totals for each person. For research, we have not come up with a satisfactory way of easily accounting for a person's load. In the spreadsheet, we have listed two measures which have been suggested, neither of which is entirely satisfactory: number of RA's supervised, and self-rating on a 1-2-3 scale.

Workload accounting experiment, 1992/93

		First year					Second year					Third year						Major practical				Fourth year				
		Lectures			Tut	Lab	Lectures			Tut	Lab	Lectures			PI	Tut	Lab					Lectures			MDP	Proj
		N	F	O			N	F	O			N	F	O				O1	T1	O2	T2	N	F	O		
	Weighting	12	8	4	2	1	12	8	4	2	1	12	8	4	12	2	1	36	0	36	12	12	8	4	2	18
Anderson	Stuart				24	63		25		34				18		9										2
Arvind	Damal		18		30											9										2
Bradfield	Julian				24	48										9								18		1
Brebner	Gordon							6	17	34				18		9					1					2
Burstall	Rod									34																1
Candlin	Rosemary				30																			18		2
Cole	Murray		18		20	20																				2
Fourman	Mike	18			10										1						1					2
Gilmore	Stephen									34						18							18			2
Heywood	Todd															9						18				
Hopkins	Tim								19	34				18		9	24				1					2
Ibbett	Roland				10											9					1					1
Jerrum	Mark					15								18		18								18		1
Kalorkoti	Kyriakos				10									18		18								18		1
Luo	Zhaohui		16		24											9	24							27		1
McKenzie	Eric	6		9	20									18		9								18		2
Milner	Robin									34																
Mitchell	Kevin																			1	1			18		2
Plotkin	Gordon									17														18		1
Pooley	Rob	18			54	48				17											1			27		2
Proctor	Rob	6	18		30									18		18										1
Rees	David	12			10	15								18				1			1			18		2
Sannella	Don															18								18		1
Smaill	Alan				30									18		18										2
Stacey	Frank				20																					
Stirling	Colin				20																					1
Thanisch	Peter	6		12																						
Topham	Nigel		18		10																					
Wight	Alex		20		24	48																				

MSc				PhD						
Lectures			Proj	Lectures			1st	Total		
N	F	O	1st	N	F	O	Super		*Research activity ...*	
									No of RAs	Self rating
12	8	4	18	12	8	4	36			
		9					5	721	0.89	2
		18	2				2	438	0.5	3
	18		1				0	366		2
			1				1	376		1
		18					5	338	3.25	3
		18	1				6	474		2
		18	2				2	420		2
		18	1			2	5	574	3.04	2
	18		1				2	518		1
18			2				0	486		3
			1				0	324		1
		18	2				5	356	2.5	2
							1	249	0.5	1
							0	218		1
							1	212		3
			2				2	424		1
						2	4	152	3.04	3
						2	3	382	1.04	2
							2	72	2.04	3
			1				4	724		2
			2				1	472		2
			1				2	425		1
							6	216	1.5	3
							0	186		1
			1				0	286		1
		9					3	310	2	2
			2				3	408	0.6	2
							3	422	2	2
		18					1	382		1
								10931	22.9	55

Admin duties ...

DOS		Admissions			Course Organisers							Projects		Joint Degree Tutor	Head of Dept & Info PU	Deputy Head of Dept	Recruitment/ Schools Liaison	Open Day	Publications DB	Acad Audit/ Teaching QA	Boards of Studies	Enterprise Coordinator	Book List/ Library	Colloquia	LFCS Director	Room Allocation	Total
UG	MSc	UG	MSc	PG	CS1	IS1	CS2	CS3	CS4	MSc	PG	CS4	MSc														
8	4	4	4	4	8	8	8	8	8	8	2	4	2	1	16	4	2	2	2	2	1	1	1	2	8	2	
											1																2
										1																	8
			1																								4
1																	1	0.5			1						12
	1																							1			8
					1																						4
																		0.5									8
									1																		1
							1							2													8
															1												0
1														1													10
1																							1				16
1																								1			1
													1	1								1					10
1												1															4
																											8
1		1												1													1
				1																			1				12
								1																		1	3
						1																					8
																											8
																											162

The Edinburgh University Computer Science Service

\subsection*{Introduction}

The Computer Science Department provides its own service to support teaching, research and administration within the Department. The service aims to provide state-of-the art facilities to its users.

% The next bit was lifted verbatim from the annual report and it would save
% effort if this duality could be preserved (wishful thinking?)

The computing resources of the Department of Computer Science and LFCS comprise mainly Unix workstations and support servers networked together {\em via} Ethernet and FDDI local area networks. Sun SPARC workstations running Sun's version of Unix BSD 4.3 predominate, though there is a small number of HP and DEC Unix machines.

The 160 or so workstations are supplemented by 90 X and 140 RS232 terminals. Computation is done either on desktop machines or on one of the dozen or so compute servers ranging in size from the 70+ MIP LFCS Sun Sparcstation SS/10s down to the 25 MIP Sun 4/75s.

Of these some 35 workstations, 60 X terminals and six compute servers are dedicated to student teaching.

The Department also supports some 50 or 60 Apple Macintoshes and 30 PCs (used for student ECAD and systems-related teaching)

All machines, Macintoshes and PCs included are attached to the Department's Ethernet. The Macs can access the Ether directly or through Appletalk/Ethernet gateways. the PCs have direct PC-NFS Ethernet connections. All can fileserve from the Unix mainframes and may access a variety of special purpose peripherals including high quality laser document printers and plotters as well as line printers. The Department has always maintained a high degree of consistency across its network and has recently produced conference papers describing the innovative work in this area.

A rich variety of software is available at Edinburgh and visitors from well-appointed CS laboratories around the world find the environment very familiar. As well as standard network services e.g. Internet FTP, GNU and \LaTeX products, we offer AutoCAD, Maple, numerous programming languages, the ObjectStore database, spreadsheets and presentation graphics packages. Additional material is constantly being retrieved from the Internet. Electronic mail and USENET news are integral parts of the environment and are extensively used.

\subsection*{Philosophy}

\subsubsection*{Flexibility}

The service operates in a very volatile environment. The rate of change of technology and of user habit and expectation is rapid and has to be catered for. Though any service has to be planned in advance it is recognised that planning horizons are short and that a key design aim of the service must be flexibility to change direction as demand dictates without wrecking the underlying strategy.

\subsubsection*{Reliability}

The service must achieve a high degree of reliability as it underpins virtually all other departmental business and activity.

\subsubsection*{Economy}

The service must at all times be striving to become easier (i.e. cheaper) to manage. A look at any measure of size and complexity over the years (figure 1) shows that if effort required becomes a function of network size then it will quickly become unmanageable.

```
\subsubsection*{Anticipation}

The service must at all times look ahead and attempt to anticipate the
requirements of its users

\subsubsection*{General Excellence}

The department should have the aim of remaining a centre of excellence in the
development and maintenance of advanced Unix networks. It is easy to forget that
as well as an impressive pure academic record, the service here is also world
class. This enviable position should not be allowed to disappear through
neglect.

\subsection*{Quality of service}

\subsubsection*{Suitability}

The service has to meet the requirements of its users which means there must
be a statement of requirements by the users and some form of service evaluation
and accountability on behalf of the service providers. This is achieved through
management and committees and is described in the section describing management.

\subsubsection*{Priorities}

Services have been ranked in priority (see Appendix 4) as "core",
"important" and "rank and file".

Core services have an impact on *all* users. The impact might be unavoidable
and immediate (mail server crashes) or it might not have an immediate
visible effect but the consequences could be very serious (if we lose
the DNS master then no one can swap equipment round elsewhere)

Important services have a critical impact on a particular group of users or a
minor impact on all users. Home directories are an example.

Rank and file services will generally affect one particular user (a client
machine for example) or be more important services which are duplicated. There
will always be some kind of way of working around a failure in a rank and file
service.

\subsubsection*{Reliability}

Reliability is achieved by the following:

All critical hardware should be as uniform as possible and of a type which is
replaceable immediately by existing non-critical equipment or a hot spare.

Binaries are replicated wherever possible and arranged such that replacements
can be switched in by a simple reconfiguration.

Software should be installed in such a way that it can be
immediately and easily re-instated. Wherever possible, it should
simply be necessary to start the software up on another similar machine.

Training, communication, documentation and scheduling of systems staff leave is
sufficient that there is always someone available who is capable
of rebuilding a core service quickly.

Maintenance contracts ensure that there is no slow attrition of broken
equipment. These are no longer seen as offering a satisfactory quick response
to problems on core services.

\subsection*{Staff and Management}

\subsubsection*{Structure}

% jhb,glc,paul,gdmr,ajs,morna,jtb,jst,rs,ddr,arch,rwt,dwb,cc,carol,jenny
```

The department currently supports 14 COs and 2 CSOs. All are paid for by the department except one who is paid for out of research contract money.

There are two logical groups within this structure, the LFCS maintaining its own association through one Principal CO, the research contracted CO and one CO allocated to the LFCS from the department (see Appendix 6)

\subsubsection*{Staff Deployment}

Responsibility for allocation of duties is shared between the Service Manager and a historical variety of departmental committees including the CO staff committee, Policy committee and now the Action committee.

\subsubsection*{Staff Development}

Systems staff have been fortunate in recent years and market forces plus a less than ideal grading structure mean that COs are relatively well paid compared to pure academic staff of equivalent experience. Promotions have been obtained where good cases have been presented but nonetheless there is a major problem in that most staff especially those who would normally expect to be well on the way up their career grade are now stuck at or approaching top of scales.

If such staff are to be retained then some new form of motivation must be found. The service has retrenched in recent years so responsibilities will not generally expand. Job satisfaction must be provided instead through intrinsic interest in technical challenges. This means that time and resources must be made available to allow staff to retrain and move around. Additional stimulus should be provided through in-service courses and where affordable, access to conferences.

```
        Planning mechanisms
                Policy
                Prioritisation
        Notification and consultation
        Feedback mechanisms
```

Input is received by
representation at Policy Committee, referred down as direct instructions to the service manager and through the Systems Requirements Committee as scenarios presented to Policy Committee. The service is managed on a day-to-day basis by the service manager who interacts with the Action Committee.
(etc. etc.)

```
        Accountability

\subsection*{Computing facilities}
        Aims and intentions
        Sun Unix
        Other Unix
        Other machines
        Peripherals

\subsection*{Core Environment}
        Aims and intentions
        Integrated file systems
        Architecture independance

\subsection*{Communications}

\subsubsection*{Aims and intentions}
```

The service assumes any student, visitor or staff member will expect full access at all times to the world Internet and that large numbers of users will critically depend on Internet communication to be able to work with colleagues. For this reason mail and news and the communications services they depend on have top priority.

\subsubsection*{mail}

Mail is provided on a stand-alone server. The MMDF mail agent is currently used but it is expected that the Mail service will follow current practice amongst peer organisations and will at some point soon switch to PP. This will probably be done during the switch to the Solaris 2.x operating system.

Three mail user agents are supported - GNU rmail, (x)mh and ream. It is expected that new user agents will appear in which case support for some existing mailers may have to decline. One motive for change will be the emergence of mailers offering more integrated directory services or intelligent handling of application-dependant mail bodies (contents).

All users, students included have completely free access to mail anywhere in the world.

\subsubsection*{news}

News also is provided on a stand-alone server. A wide selection of news groups are maintained and again, there are no restrictions on access to news groups.

\subsubsection*{Other Internet Services}

FTP and gopher access is provided and the department offers an FTP service outbound, principally for ML.

\subsection*{Administrative support services}

\subsubsection*{Aims and intentions}

The aim is to provide a convenient, friendly and efficient service to handle fault reports and technical queries. The service operates through mail and an automated tracking mechanism, the aim being to ensure continuity of service even if key people are absent.

\subsubsection*{Quality}

The faults and support services operate 09:00 - 17:00 weekdays. At weekends and over holidays a "best endeavour" service is maintained, depending on who happens to come in or notice something is amiss. Most systems staff have home modems and the servers are arranged to ensure most software recovery procedures can be undertaken from home.

\subsubsection*{limitations}

The support mechanisms do not expect to be able to answer all questions and users are expected to offer help amongst themselves for the most esoteric queries. The newsgroup "cs.questions" exists for this purpose.

\subsubsection*{backup}

User files on all main file servers are backed up to streamer tape in the small hours at the end of each working day. Note this leaves some areas vulnerable at weekends. The aim is to be able to recover a file within *** ?

\subsection*{Systems support}
teaching courses
research
community

\subsection*{Resource provision}

\subsubsection*{Aims and intentions}

The department aims to provide the best general level of hardware resource that funding allows. It is the ultimate aim that all visitors, PostGraduate studentsd and members of staff will have access to the systems via their own bitmap

screen. Current equipment pricing make it impossible to realise this by providing all users with their own workstation but the aim should be attainable by judicious provision of a mixture of workstations and X-terminals.

The department has an installed base of some 280 such devices. If equipment is to be written down and replaced on a 7-year cycle (long by industry standards) then 40 screens per year will require replacement to achieve a steady state. This is not currently being attained.

\subsubsection*{Mechanisms}

Mechanisms for determining and allocating resource are currently somewhat haphazard.

\subsection*{Documentation}
Paper tech notes
xtn

\subsection*{Key applications}
Languages
Text processing
Editing

\subsection*{Administrative information}
Accounting

\subsection*{Non-computing services}
Copiers
Locks

\subsection*{Appendices:}

Appendix 1: Network diagram

Appendix 2: Server/service list

Appendix 3: Extract from package list

Appendix 4: Service priorities list

1) Core services - drop everything else and fix, target within 1/2 day:
mail
dns *service* but not necessarily DNS *master*
yp master
news

2) Important: fix within 1 day
sources server
binary servers
home directories
external X29/FTP server

3) Rank and File:
printers
compute servers
ftp
clients
tapehost

Appendix 5: Other University Services

The Department of Computer Science and Edinburgh University Computer Services (EUCS) were jointly involved in the setting up of an Apple Macintosh microcomputer laboratory in Appleton Tower at the central University site. This is connected to EdLAN, giving access to CS facilities but also the central University Computing Services machines (principally two Sequent Symmetry Unix and a Vax 8600 using VMS). For more compute-intensive problems, Supercomputer time may be

negotiated with the Edinburgh Parallel Computing Centre (EPCC), which offers a range of services on its machines which include a Connection Machine CM-200 and Transputer and i860 arrays.

Appendix 6: CO organisation chart

\end{document}

Dean
Prof J MAVOR DSc FRSE FIEEE FInstP

Our ref: PA09
Your ref:

FACULTY of SCIENCE and ENGINEERING
The University of Edinburgh
King's Buildings
West Mains Road

Tel: 031-650 6443
Fax: 031-650 5738

19 November 1993

Heads of Planning Unit
Faculty of Science and Engineering

Dear Colleague

Planning for 1994-95 to 1996-97

1. Introduction

The second cycle of the University's new planning mechanisms is now underway. You will recall that these were introduced to address problems with the previous system, which was widely felt to be:

- reactive, with too much *ad hoc* decision making
- centralised
- vague in its decision making structures

The main features of the new systems are:

- structured planning mechanisms producing agreed budgets for units and their activities
- emphasis on thinking rather than technical planning issues
- Planning Units (PUs) as the basic planning and budgeting unit
- planning for 3 different resource scenarios and on the basis of strategic guidance
- proactive and devolved, with clear decision making structures
- gradual devolution of budgets, initially to FG level but eventually to PUs

I believe that the new planning systems have already delivered a number of significant advantages for departments and the University.

- stabilisation of the University's financial position, thus creating a platform on which to build the future e.g. by the gradual reestablishment of University reserves.
- they have allowed a focus on the identification of choices for the use of resources at each level in the hierarchy under various planning scenarios. I believe that this has led to better resource allocation decisions.
- they have improved the coordination between academic and resources planning decisions
- they have allowed better identification of the consequences of plans for other parts of the University, e.g. through better interaction with Support Groups.

The major changes in this planning round are:

- an *extended planning horizon*. Faculty Groups are being asked to produce a 3-year strategic plan as well as detailed plans for the year ahead reflecting the different budgetary scenarios.
- *Faculty Group staff budgets* for 1994/95 will be set in *cash* terms rather than Academic Equivalent Posts (AEPs).
- first attempts at including *premises and equipment planning* within the planning and budgeting process
- Faculty Groups to be asked to identify *relevant measures of performance* against which to judge the success in achieving their principal strategies for the Faculty Group.

2. Planning Unit input

Heads of Planning Unit should submit their unit's formal academic plans to me by **28 January 1994**. The required format for the plans is given in the accompanying document 'Preparation of the Faculty Planning Statement'.

3. Planning context

Plans are to be reviewed and developed in the light of the strategic guidance presented in the University's 'Planning Guidance 1993/94' and the Faculty's 'Faculty Planning Guidance, November 1993', and in the context of the indicative budgetary scenarios in this letter. The University document was developed from the University's Corporate Plan to 1996/97. The Faculty document was also developed from the University's planning guidance, with strategic input from the Dean's Committee.

The core elements of the University strategy are:

- protecting and enhancing research excellence
- increasing postgraduate research numbers and improving PGR facilities
- consolidating other home/EC student numbers
- protecting and enhancing teaching quality
- improving management information systems
- promoting financial flexibility, especially in relation to staff costs

The University also wishes to address a number of other strategic issues. Of particular relevance to this Faculty are:

- the facilitation of interdisciplinarity
- the implications of the Science White Paper - especially regarding new-style MSc courses
- the implications of accountability for SHEFC research funding

4. The core elements of the Faculty strategy

In the previous planning and budgeting round, the priority in the Faculty had to be dealing with those areas of severe pressure on teaching resources caused by the rapid expansion of student intake. While there clearly remain many areas of the Faculty where student numbers are causing problems, the most serious difficulties are now being addressed and we must turn our attention to the requirements of selectivity in resource allocation. There will thus be some change of emphasis in the core elements of our planning strategy.

The core elements are:

Academic issues

1. Responding to the Science White Paper, which affects all areas of Faculty, especially with regard to new-style MSc courses, which are seen as vital to the support of postgraduate research. This may well involve the establishment of a Faculty-wide postgraduate teaching organisation in addition to Graduate Schools covering specific disciplines.

2. Consolidating as soon as possible into baseline funding certain of the widely dispersed posts supported by the Academic Assistance Fund.

3. Protection of the position of departments with research Grade 5 by giving relative advantage in formula-driven allocations of equipment funds and by priority in filling of staff vacancies in these departments.

4. Selective support of the Grade 4 departments regarded as most likely to attain Grade 5 in the next Research Assessment Exercise.

5. Preserving as far as possible an ability to support the needs of those appointed to Chairs during the coming year, giving them a measure of priority for equipment and minor works.

6. Establishing a Faculty Development Fund to give backing to specific proposals likely to enhance the research strength of departments, and in particular to bids which may benefit wider areas of the Faculty.

Support issues

1. Developing facilities at King's Buildings to a level more appropriate to the needs of students and staff.

2. Refurbishment of the Joseph Black Chemistry building.

5. Faculty themes for the planning round

In the last two Faculty planning exercises the concentration was on each Planning Unit reviewing its own position and producing plans for the immediate future. I have decided to widen the focus of the current round, in part by asking PUs for comment on some general Faculty-wide issues, in part by asking PUs to review specific areas of their activity where I believe this necessary, but in the main by extending the planning horizon beyond even the University's 31 July 1997 end date to ask PUs to look towards the millennium.

I would like each Planning Unit to consider what changes it sees in its area between now and the year 2000, whether these are changes that will be forced by external developments or changes that the PU would itself like to bring about. These should not necessarily be changes which will require additional funds, but as this is a long-term forward thinking exercise PUs should not be constrained by the 1994/95 budgetary scenarios. I am asking for this thinking in an attempt to shift us from a mode in which we concentrate on whether a particular post will be filled, the equipment grant will go up by 2% or 3%, etc. I think it vital that we now develop in each PU our 'Vision 2000' to influence tactical planning decisions in the next few years.

There are also issues of immediate importance. We are still waiting for necessary developments in Government and Research Council thinking on the White Paper in order to start making detailed plans. I will however be asking PUs to start thinking about major issues raised by the White Paper - both on the new emphasis on wealth creation and the quality of life [WCQL] and the proposed new style MScs. CMG has indicated to me that because of the critical nature of the decisions on the implementation of the White Paper eventually taken by the Research Councils, it is prepared to take a flexible approach to this planning round in order to be able to respond to late announcements. I have therefore not included any staffing consequences of the White Paper in the indicative budgetary scenarios.

I am also asking for input on three other Faculty-wide questions. First, the provision of amenities for staff and students on the King's Buildings site. Second, thoughts on a continuation strategy for the Faculty's Centenary PR activities (other than through the Centenary Appeal) in order that the considerable investment of time and money by Faculty and departments is not lost when the celebrations end next September. Finally, the appropriate levels of Faculty contingency and development funds.

6. Budgetary scenarios

Faculty Group level

The Faculty Group has been asked to plan on the basis of three resourcing scenarios for 1993/94, respectively labelled A, B and C. The three staff budget scenarios are, like last year, expressed in Academic Equivalent Posts (AEPs), although the final outcome for Faculty Groups will be a cash salaries budget. Unlike last year the scenarios for cash allocations represent **changes** in *cash* rather than *real* terms.

The negative scenario (scenario A) is to allow planning for a reduction in the University's income in real terms. This could occur because of a relatively poor PES settlement for higher education which I have recently highlighted. I must stress at the outset the importance of PUs planning seriously for this as a possible outcome. Scenario B represents no change in volume terms, but allows for the repayment of 2.0 AEPs for the loan from Faculty Groups 1 & 2. The loans were made at the beginning of the University's Recovery Plan in recognition of the difficulties that the Provost foresaw in the Faculty being able to achieve more than the 32 AEP staff losses by September 1992 which we were eventually required to achieve. Scenario C allows for a modest increase in the volume of the University's expenditure.

Planning Unit level

In general I am continuing to set different planning scenarios for each PU, to allow redistribution of resources within our Faculty Group. In setting scenarios for PUs for 1993/94 I have taken a number of factors into account. These include:

- quality of the unit's teaching and research
- current student intakes and likely growth in student FTEs over the next few years
- latest statistical information available to the Faculty Office

The three resourcing scenarios for each PU are:

Staffing

	Indicative budget scenario		
Planning Unit	**Scenario A**	**Scenario B**	**Scenario C**
Biological Sciences	-2.0	-1.0	1.0
Chemistry	1.0	2.0	2.5
Electronics	-3.0	-2.0	-0.5
Engineering	0.5	1.5	2.0
Geology and Geophysics	-3.5	-2.5	-0.5
Informatics	-2.0	-1.0	0.0
Mathematics & Statistics	0.0	1.0	1.5
Physics	-2.0	-1.0	1.0
Faculty Corporate	0.0	1.0	1.0
FACULTY	**-11.0**	**-2.0**	**8.0**

Cash / £k

	Indicative budget scenario		
Planning Unit	**Scenario A**	**Scenario B**	**Scenario C**
Biological Sciences	-£1	£1	£5
Chemistry	£4	£15	£20
Electronics	-£1	£1	£5
Engineering	£4	£15	£20
Geology and Geophysics	-£1	£1	£5
Informatics	-£10	£0	£3
Mathematics & Statistics	-£1	£1	£5
Physics	-£1	£1	£5
Faculty Corporate			
Contingency	£50	£50	£0
Development	£0	£0	£60
FACULTY	**£43**	**£85**	**£128**

The figures in both tables are for *marginal* changes in resources compared to the 1993/94 financial year resources already allocated to you. For staff, they assume achievement of the September 1993 baseline staffing targets i.e. any oversaving or shortfall should be added to the figures in the table to produce the actual figures to be used in planning.

For equipment you should assume that your cash allocation will be identical to the formula allocation for 1993/94.

HOPUs in multi-departmental planning units may wish to set unequal scenarios for constituent departments, after consultation with HODs. In some cases the very different circumstances in which departments find themselves may make this absolutely necessary.

I would stress again that the planning scenarios are indicative. It is the quality of the submitted plans which will determine allocations between PUs in the Faculty and between Faculty Groups at the CMG level.

7. Content of submissions

The philosophy behind the process is that planning units should carry out a critical self-review of their strengths and weaknesses, and the effects and influences of the outside

world, and then produce plans for the future in the light of these. This was the philosophy behind the Faculty's summer 1991 planning exercise and the University's 1993/94 planning round, and you will therefore recognise many of the questions. I would stress again though that the emphasis should be on thinking, and that when judging between plans considerably greater emphasis will be put on issues such as whether the proposals are academically desirable, fit well with other activities, and whether the PU can deliver rather than on whether the costings are correct in all their detail.

Although a major element of the exercise will be taking decisions on the allocation of University resources, planning should embrace all the Planning Unit's activities. It is particularly important that the University knows of PU plans for externally funded activities where these have implications for University budgets e.g. space needs for new research activities.

To reinforce the emphasis on thinking, I have attempted to make the questions even simpler than last year, particularly those on costing new activities. In essence, PUs will be asked to say for each scenario what new activities it plans to start (and current activities to cease). I will provide *pro formae* for you to provide details of these in order of PU priority.

At the very least, plans should consist of a prioritised list of:

- activities to cease
- new activities requiring no additional resources
- activities (current or new) requiring additional resources

The latter may be simply a proposal to deploy additional resources on current activities, although Heads will appreciate that additional resources are more likely to be given to activities which generate additional funds for the University. In particular plans are more likely to attract additional resources if they contribute to the achievement of the University and Faculty strategic aims.

8. Consultation

Consultation is a vital element of the new process. I would expect each HOPU to make arrangements to consult with all academic staff in the departments in the planning unit, and with support staff where appropriate using standard local arrangements.

Equally important is consultation with other parts of the University which may be affected by your plans. This will include other HOPUs, possibly in other Faculty Groups. It may also include the Library, EUCS and the Estates and Buildings Office. I will provide details of contact arrangements with the Support Groups shortly.

9. Timetable for responses

A timetable is attached. The most important points in this are:

- the meeting in early-January to present ideas informally to other HOPUs and representatives of SGs
- submissions to reach me by **28 January 1993**
- an informal meeting of each HOPU with the Vice-Dean, the Faculty Officer and me the following week
- the formal meeting of FGP&R Committee in early February. (There will be no joint meeting with Dean's Committee this year.)

Jen Gordon will contact you shortly to find slots for the various sessions.

10. Assistance from the Faculty Office

The Faculty Office will try to help with the new processes in the following ways:

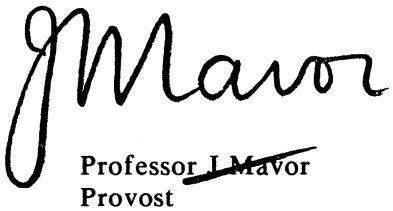
- The Faculty Officer is happy to visit each PU individually to advise on the planning processes.
- The Faculty Officer and Vice-Dean will provide informal advice on the development of plans and their content
- Information. If there is information which would help you with the planning processes we will do our best to provide it.

It may also be possible to provide a limited amount of administrative help with the planning exercise to departments **without** administrative staff.

11. Status of the planning material

This letter and its supplements should be made available to **all** Heads of Department in multi-department PUs and to appropriate heads of section or institute in other large departments. In line with my policy of 'open government' within the Faculty I would be very happy for HOPUs to make the material available to all staff, although the material is **confidential within the University.**

Yours sincerely



Professor ~~I Mavor~~
Provost

c.c. Dr D E S Truman, Vice-Dean
Dr D B Nelson, Faculty Officer
Ms J Gordon, Administrative Officer

Professor C R W Edwards, Provost, Faculty Group of Medicine and Veterinary Medicine
Professor D N MacCormick, Provost, Faculty Group of Law and Social Sciences
Professor J S Richardson, Provost, Faculty Group of Arts, Divinity and Music

Vice-Principal A Miller
Dr M J B Lowe, Secretary to the University
Vice-Principal C Bell

Mr M D Cornish, Deputy Secretary

Enclosures

1. University's Planning Guidance 1993/94
2. Faculty Planning Guidance, November 1993
3. Preparation of the Planning Unit's Planning Statement
4. Individual questions for Planning Units (except Informatics)
5. Summary of the planning timetable
6. Faculty Estate Strategy
7. Minutes of Faculty Group Planning and Resources Committee

To follow:

1. Planning *pro formae*

AGENDA FOR DEPARTMENTAL MEETING

to be held on

Friday 3 December 1993

Time :	**3.30 p.m.**
Venue :	**COFFEE LOUNGE (2510)**

	Raised by
1. Minutes of last meeting	
2. Matters Arising	
3. Convenor's Business	
4. Reports from Committees	
(a) Policy	rni
(b) Academic Staff Subcommittee	
(c) Teaching	soa
(d) Syllabus	mikef
(e) Technical Resources & Safety	ram
(f) Systems Requirements Subcommittee	mikef
5. 1993/94 Planning Statement	
6. Any other competent business	
7. Date of next meeting	

The Edinburgh University Computer Science Service

John Butler

December 1, 1993

this document is still in preparation and though the COs are aware of it no open discussion has been held. Until then it must be regarded as a collection of JHB ideas for limited circulation

Introduction

The Computer Science Department provides its own service to support teaching, research and administration within the Department. The service aims to provide state-of-the art facilities to its users.

The computing resources of the Department of Computer Science and LFCS comprise mainly Unix workstations and support servers networked together *via* Ethernet and FDDI local area networks. Sun SPARC workstations running Sun's version of Unix BSD 4.3 predominate, though there is a small number of HP and DEC Unix machines.

The 160 or so workstations are supplemented by 90 Xterms and 140 RS232 terminals. Computation is done either on desktop machines or on one of the dozen or so compute servers ranging in size from the 70+ MIP LFCS Sun Sparcstation SS/10s down to the 25 MIP Sun 4/75s.

Of these some 35 workstations, 60 X terminals and six compute servers are dedicated to student teaching.

The Department also supports some 50 or 60 Apple Macintoshes and 30 PCs (used for student ECAD and systems-related teaching)

All machines, Macintoshes and PCs included are attached to the Department's Ethernet. The Macs can access the Ether directly or through Appletalk/Ethernet gateways. the PCs have direct PC-NFS Ethernet connections. All can fileserve from the Unix mainframes and may access a variety of special purpose peripherals including high quality laser document printers and plotters as well as line printers. The Department has always maintained a high degree of consistency across its network and has recently produced conference papers describing the innovative work in this area.

A rich variety of software is available at Edinburgh and visitors from well-appointed CS laboratories around the world find the environment very familiar. As well as standard network services e.g. Internet FTP, GNU and LaTeXproducts, we offer AutoCAD, Maple, numerous programming languages, the ObjectStore database, spreadsheets and presentation graphics packages. Additional material is constantly being retrieved from the Internet. Electronic mail and USENET news are integral parts of the environment and are extensively used.

Philosophy

Flexibility

The service operates in a very volatile environment. The rate of change of technology and of user habit and expectation is rapid and has to be catered for. Though any service has to be planned in advance it is recognised that planning horizons are short and that a key design aim of the service must be flexibility to change direction as demand dictates without wrecking the underlying strategy.

Reliability

The service must achieve a high degree of reliability as it underpins virtually all other departmental business and activity.

Economy

The service must at all times be striving to become easier (i.e. cheaper) to manage. A look at any measure of size and complexity over the years (figure 1) shows that if effort required becomes a function of network size then it will quickly become unmanageable. It is also necessary to explore ways in which aspects of the service may be "deskilled" to allow high-quality expertise to be used to best effect.

Anticipation

The service must at all times look ahead and attempt to anticipate the requirements of its users

General Excellence

The department should have the aim of remaining a centre of excellence in the development and maintenance of advanced Unix networks. It is easy to forget that as well as an impressive pure academic record, the service here is also world class. This enviable position should not be allowed to disappear through neglect.

Quality of service

Suitability and Accountability

The service has to meet the requirements of its users which means there must be a statement of requirements by the users and some form of service evaluation and accountability on behalf of the service providers. This is achieved through management and committees and is described in the section describing management.

Priorities

Services have been ranked in priority (see Appendix 4) as "core", "important" and "rank and file".

Core services have an impact on *all* users. The impact might be unavoidable and immediate (mail server crashes) or it might not have an immediate visible effect but the consequences could be very serious (if we lose the DNS master then no one can swap equipment round elsewhere)

Important services have a critical impact on a particular group of users or a minor impact on all users. Home directories are an example.

Rank and file services will generally affect one particular user (a client machine for example) or be more important services which are duplicated. There will always be some kind of way of working around a failure in a rank and file service.

Reliability

Reliability is achieved by the following:

All critical hardware should be as uniform as possible and of a type which is replaceable immediately by existing non-critical equipment or a hot spare.

Binaries are replicated wherever possible and arranged such that replacements can be switched in by a simple reconfiguration.

Software should be installed in such a way that it can be immediately and easily re-instated. Wherever possible, it should simply be necessary to start the software up on another similar machine.

Training, communication, documentation and scheduling of systems staff leave is sufficient that there is always someone available who is capable of rebuilding a core service quickly.

Maintenance contracts ensure that there is no slow attrition of broken equipment. These are no longer seen as offering a satisfactory quick response to problems on core services.

Staff and Management

Structure

The department currently supports 14 COs and 2 CSOs. All are paid for by the department except one who is paid for out of research contract money.

There are two logical groups within this structure, the LFCS maintaining its own association through one Principal CO, the research contracted CO and one CO allocated to the LFCS from the department (see Appendix 6)

Staff Deployment

Responsibility for allocation of duties is shared between the Service Manager and a historical variety of departmental committees including the CO staff committee, Policy committee and now the Action committee.

Staff Development

Systems staff have been fortunate in recent years and market forces plus a less than ideal grading structure mean that COs are relatively well paid compared to pure academic staff of equivalent experience. Promotions have been obtained where good cases have been presented but nonetheless there is a major problem in that most staff especially those who would normally expect to be well on the way up their career grade are now stuck at or approaching top of scales.

If such staff are to be retained then some new form of motivation must be found. The service has retrenched in recent years so responsibilities will not generally expand. Job satisfaction must be provided instead through intrinsic interest in technical challenges. This means that time and resources must be made available to allow staff to retrain and move around. Additional stimulus should be provided through in-service courses and where affordable, access to conferences.

Planning mechanisms

Policy

Organisationally this is laid down by the Policy Committee, aided by recommendations from the Systems Requirements Committee. (see Appendix ?)

Prioritisation Notification and consultation

Feedback mechanisms

Input is received by representation at Policy Committee, referred down as direct instructions to the service manager and through the Systems Requirements Committee as scenarios presented to Policy Committee. The service is managed on a day-to-day basis by the service manager who interacts with the Action Committee. (etc. etc.)

Accountability

At a broad level accountability is achieved by the presence of the Service Manager on Policy and Systems Requirements committees where he can be called to account by the Head of Department or users' representatives. It is being stated that a finer degree of control is required and a working group has been set up to look at this.

Computing facilities

Aims and intentions Sun Unix Other Unix Other machines Peripherals

Core Environment

Aims and intentions Integrated file systems Architecture independance

Communications

Aims and intentions

The service assumes any student, visitor or staff member will expect full access at all times to the world Internet and that large numbers of users will critically depend on Internet communication to be able to work with colleagues. For this reason mail and news and the communications services they depend on have top priority.

mail

Mail is provided on a stand-alone server. The MMDF mail agent is currently used but it is expected that the Mail service will follow current practice amongst peer organisations and will at some point soon switch to PP. This will probably be done during the switch to the Solaris 2.x operating system.

Three mail user agents are supported - GNU rmail, (x)mh and ream. It is expected that new user agents will appear in which case support for some existing mailers may have to decline. One

motive for change will be the emergence of mailers offering more integrated directory services or intelligent handling of application-dependant mail bodies (contents).

All users, students included have completely free access to mail anywhere in the world.

news

News also is provided on a stand-alone server. A wide selection of news groups are maintained and again, there are no restrictions on access to news groups.

Other Internet Services

FTP and gopher access is provided and the department offers an FTP service outbound, principally for ML.

Administrative support services

Aims and intentions

The aim is to provide a convenient, friendly and efficient service to handle fault reports and technical queries. The service operates through mail and an automated tracking mechanism, the aim being to ensure continuity of service even if key people are absent.

Quality

The faults and support services operate 09:00 - 17:00 weekdays. At weekends and over holidays a "best endeavour" service is maintained, depending on who happens to come in or notice something is amiss. Most systems staff have home modems and the servers are arranged to ensure most software recovery procedures can be undertaken from home.

limitations

The support mechanisms do not expect to be able to answer all questions and users are expected to offer help amongst themselves for the most esoteric queries. The newsgroup "cs.questions" exists for this purpose.

backup

User files on all main file servers are backed up to streamer tape in the small hours at the end of each working day. Note this leaves some areas vulnerable at weekends. The aim is to be able to

recover a file within *** ?

Systems support

teaching courses research community

Resource provision

Aims and intentions

The department aims to provide the best general level of hardware resource that funding allows. It is the ultimate aim that all visitors, PostGraduate studentsd and members of staff will have access to the systems via their own bitmap screen. Current equipment pricing make it impossible to realise this by providing all users with their own workstation but the aim should be attainable by judicious provision of a mixture of workstations and X-terminals.

The department has an installed base of some 280 such devices. If equipment is to be written down and replaced on a 7-year cycle (long by industry standards) then 40 screens per year will require replacement to achieve a steady state. This is not currently being attained.

Mechanisms

Mechanisms for determining and allocating resource are currently somewhat haphazard.

Documentation

Paper tech notes xtn

Key applications

Languages Text processing Editing

Administrative information

Accounting

Non-computing services

Copiers Locks

Appendices:

Appendix 1: Network diagram

Appendix 2: Server/service list

Appendix 3: Extract from package list

Appendix 4: Service priorities list and timings

Services

- Core services - drop everything else and fix, target within 1/2 day:
  - mail
  - dns *service* but not necessarily DNS *master*
  - yp master
  - news
- Important: fix within 1 day
  - sources server
  - binary servers
  - home directories
  - external X29/FTP server
- Rank and File:
  - printers
  - compute servers
  - ftp
  - clients
  - tapehost

User-related services

- New user accounts
  - Same day as notification unless notified late on
- File restore
  - Low priority. exceptions:
    - Restore entire home directory
    - Appropriate tape already loaded
- Faults acknowledgement
  - Target under an hour - variable
- Crippling single-user problem
  - Too variable to quantify
- Irritating single-user problem
  - Too variable to quantify

Appendix 5: Other University Services

The Department of Computer Science and Edinburgh University Computer Services (EUCS) were jointly involved in the setting up of an Apple Macintosh microcomputer laboratory in Appleton Tower at the central University site. This is connected to EdLAN, giving access to CS facilities but also the central University Computing Services machines (principally two Sequent Symmetry Unix and a Vax 8600 using VMS). For more compute-intensive problems, Supercomputer time may be negotiated with the Edinburgh Parallel Computing Centre (EPCC), which offers a range of services on its machines which include a Connection Machine CM-200 and Transputer and i860 arrays.

Appendix 6: CO organisation chart

Appendix 7: Committee remits

Summary of major items of work requiring effort in the near future plus work in progress, specific tasks etc.

ML — in progress

Support for ML has languished since Russ left. This is now being rectified. Julian Turnbull is clearing his desk and undertaking what will be a fairly long learning exercise.

Staff/PG machine support — in progress

Rainer Thonnes is beginning to learn about the systems with a view to taking over a significant fraction of Chris Cooke's work. He will require support from all the other COs as, again, there is a major learning exercise here

Backups — up for grabs

Backups have a nasty tendency to eat up peoples' time. There are a number of proprietary backup management packages around. It would be a good idea for some to review them and see if a) we learn anything and b) if there is anything we should consider purchasing. One benefit of a better backup mechanism would be the ability to deskill it and possibly involve the technicians more. It should not be necessary to tie up a CO or CSO just to put a tape in a machine at the right time.

Solaris

The window for upgrading to Solaris draws ever closer. Paul is probably most aware of what needs to be done but he needs to work with the DCS end and things need to be progressed. AJS is now coming to the end of his PC lab-building and I have asked him to resume his Solaris-based work and do a review of what needs to be done and begin to work (with GDMR in the first instance but with others as well) to identify the critical tasks and push them along. Localise for instance.

Solaris side-effects

[Paul] Work on Solaris may force us to rethink our management procedures & tools Many of our procedures are currently very shakey indeed - localize is the most obvious one, but Paul has been trying to think about the wider implications that includes things like AMD maps, DNS configuration, NIS, security etc etc. Problems like slow/crashing systems and people racing around trying to fix things tend to be symptoms of higher level problems like this - these get worse as the procedures/system rot like they are presently doing.

Secretarial/more general computing environment

Creation of the CS1 computing environment has shown that this approach could be useful elsewhere. It would be useful to see if the ideas can be adapted to produce a consistent environment for secretaries. It should also be noted that CS2 next year may expect something similar to what they have been using this year. It seems that the general user environment is decaying and needs an overhaul which can now be done in the light of new experience from CS1.

Information dissemination mechanism — in progress

Jo has been working on a number of threads aimed to provide a more consistent, user friendly and more accessible means of getting at the large amount of information available locally and elsewhere over the net. Over to you Jo to explain this better.

LISA

There may be ideas coming out of LISA which should be followed up. Paul has put most of his ideas in a separate paper though the most important ideas have been picked up here.

Mail

Several developments in the offing here:
1) Port of mail to Solaris
2) Switch of mail agent to PP
3) Introduction of X500 directory
4) Advent of new mailers which handle mail body parts intelligently

Locks, Copiers, Fax, Phone accounts

At present all this is fragmented, labour intensive and difficult to monitor. Rainer has put some of it together to prepare a petty cash account generating suite but there is a lot still to do. JHB needs a vac slave to move the locks program off the Atari ST to drive it like the copier accounts.

Security

At present this is a little ad hoc. We need at least two things:
1) An investigation and assessment of the tools and mechanisms we have, possibly creating or importing new ones to plug holes. This may well overlap work done on editors
2) A document describing good general practice and our policy
3) A document describing approved practice for people who want to be extra secure (e.g. prepare exam scripts on-line)

Topology, Scalability

The current network topology has a few gotchas buried in it, in particular the reliance and potential overloading of the trunk wire 'A'. This need to be reviewed
1) In the short term, to fix or at least limit known loading problems
2) In the longer term we need to project forward and see what we need to do to prevent bottlenecks (e.g. requiring 25 hours/day to do over-network backups

Database

A lot of work has been put into exaining database requirements. The problem is very ill-defined and solutions are not obvious. The work done so far needs to be presented though.

DNS

This service is so vital that its functions and management details need to be written down but also someone needs to be brought up to speed to shadow GDMR so expertise is not concentrated in one individual

The Edinburgh University Computer Science Service

John Butler

December 1, 1993

Use of external resources

The department makes use of external services where these are available. Criteria are that such services must be

- Appropriate
- Sufficiently reliable
- Of sufficient scale that their use justifies the learning exercise

The department makes extensive use of networking services provided by EUCS and in the past has abandoned its own direct lines in favour of lines routed via EdLAN.

The department made extensive use of central services (mainframes) until the advent of workstation computing at which point our equipment base and mode of working diverged from EUCS for a while.

The main central service of interest at present are the PC/Xterm laboratories at KB level 2, JCMB level 3 and and AT level 5. The presence of large numbers of such X client machines allows us to concentrate student resources on servers, allowing the central labs to make up any shortfall in our own provision of clients.

Use of Research Equipment by Students - General Guidelines

The terms of funding bodies which provide support for equipment usually limits the amount of general use outside the specific area of research. It is important therefore that any use by students is carefully controlled.

General Guidelines:

Scheduled coursework should not normally be expected to be done on research funded equipment.

Student projects which are in the domain of the research area funding the equipment would normally be allowed access to research funded equipment.

Other student projects requiring resources not normally available on Departmental systems may be allowed access to research systems, but this should be negotiated carefully with the custodian of the resource required.

In all cases access to and use of resources must be managed carefully so as not to unduly affect normal purpose and use. Any specific high resource needs (e.g. cpu cycles, memory etc) should be discussed with the relevant system manager in advance. Efforts will generally be made to accommodate such use by for example scheduling out of working hours access.

University of Edinburgh
Department of Computer Science
Draft Planning Statement
1993-4

This document is a revision of the 1992-3 departmental planning statement. Changes to last year's statement are marked by a changebar in the left hand margin.

2 Review of the Department's strategic position

i. *What are the Department's main strengths?* On all measures the department is one of the top four or five in the world, arguably the best in Europe and is preeminent in the UK. The members of the department work well together, there is little fragmentation resulting in well focussed research, teaching and infrastructure. In detail:

Research: The department has two of the eleven FRSs in Computer Science and three members of the Academia Europa. Recently Prof. Robin Milner was awarded the Turing Award by the ACM for his contribution to the subject. Research in the department has two main concentrations along with other work which coordinates with these large units:

Laboratory for Foundations of Computer Science (LFCS): This unit was established in 1986 and consolidates a history of outstanding research in theoretical computer science beginning in the 1960's. Research in the Lab is structured into 5 themes: complexity and algorithms, concurrency, formal development of programs and systems, logic and proof, and semantics. Each theme is subject to internal review to assess the research carried out under the theme. The Lab has a very high national and international reputation. The Lab receives roughly 25% of annual SERC expenditure on Computer Science and is involved in a number of important European research consortia under the Esprit Basic Research Action programme. Funding under the EC human capital and mobility programme for the European Institute in the Logical Foundations of Computer Science provides infrastructure and fellowships to facilitate interaction with European centres of excellence and to disseminate work more broadly through the scientific community. Interaction with US researchers is also well established, a steady flow of top US researchers spend short and long visits at LFCS. Though the primary rôle of the Lab is theoretical an important activity is the construction of systems based on theoretical developments and in the application of that theory. Thus the Lab is a centre of significant work on innovative systems. In recognition of this the ML team was awarded the BCS award for technical achievement in 1988 for its work on the programming language ML. Recently we have also developed *applied science* projects involving industrial collaborators as an important mechanism for technology transfer.

Edinburgh Parallel Computing Centre (EPCC): This recently established unit is a joint venture with the department of Physics working on parallel architecture and their application to real-life problems. Funding for the unit is derived from SERC, Industrial Affiliation, DTI/SERC and the Computer Board. The unit has already established a good reputation within Europe. Already there is some synergy between EPCC and LFCS with collaboration between programming language/concurrency workers in LFCS and implementors in EPCC, we expect such

collaboration to develop further. Recently this has led to the funding of a joint SERC proposal.

Other Research:

- Work on high-performance computer architecture funded by ESPRIT complements the work of EPCC on approaches to meeting the need for large amounts of computation.
- Parallel computation work in the department has been strengthened by the funding of a project investigating the simulation of parallel systems. This brings together work on algorithms, architecture, models of parallelism and simulation which have been pursued independently within the department.
- We have a small group involved in performance analysis which is well-established. This group coordinates the BCS Performance Engineering Specialist Group and has hosted three international conferences in the last three years.
- We have other funded research in: database systems, simulation and human computer interaction.

Teaching: The computer science degree at Edinburgh is among a small group of degrees taught in the UK which aims to provide a solid grounding both in engineering design and in the theory of computing. Our degree requires both depth of knowledge and breadth across the spectrum of systems. In consequence we see very strong demand for Edinburgh graduates (both in Industry and for PG training) in the more demanding areas of the computer industry. The industrial members of the School of IT Education Advisory Board consistently point out that graduates from the Edinburgh degree are much better able to take on complex design problems than graduates from most other UK departments of Computer Science. We also intend to commence a new degree entitled *Software Engineering* which will allow students to concentrate more closely on software design issues. Unfortunately, the SHEFC guide price for cost centre 18 subjects based on UK average costs is somewhat below the cost of a student educated at Edinburgh.

Infrastructure: The departmental computing officers and technical staff provide the necessary infrastructure for research and teaching. Research carried on at Edinburgh requires state-of-the-art hardware and software both to support the development of new systems and to facilitate system interchange amongst international researchers. This requires rapid evolution of the environment and our system is the "lead site" within the University and beyond. Our strong involvement in research "networks of excellence" requires innovation in the support of research communication and we have a heavy commitment to develop greatly improved communication support for these research networks.

Teaching support involves maintaining a wide diversity of systems used in teaching systems and the provision of adequate lab facilities to support hardware teaching. In addition to supporting the most sophisticated systems in the department our computing officers supply a wealth of support and consultancy to EUCS and other parts of the University.

We have begun to consider mechanisms which will require greater accountability from systems staff — we expect this will lead to an increase in the effectiveness of our computing officers.

ii. *What are the Department's main weaknesses?* There are two main categories of weakness: *structural* weakness relating to personnel and resources and weakness in our *coverage* of the subject:

Structural:

- We have a smaller proportion of promoted staff compared with most other departments in the Science Faculty. As a consequence we are unable to participate

as fully as we would like in policy formation nationally and internationally. A further consequence is that our senior researchers are overburdened with administration. Over a ten year planning period we should also consider the recognition of research leadership in a number of younger members of staff. We believe three or four members of staff justify promotion to personal chairs now and will pursue their promotion over the next two to three years.

- Premises present us with continuing problems. The teaching of first year courses at Appleton Tower imposes additional staff and equipment costs. Accommodation within JCMB is a continuing disincentive to expanding research activity. The lack of coherent planning for adequate provision for visitors, researchers and doctoral students is a major consideration in taking on new grants.

Coverage:

- We feel our linkage with industry and industrial contract income could be improved. We have worked hard over a number of years to increase such contact but it still remains low. The LFCS affiliates programme and EPCC links with industry provide good and productive interaction with industry which we feel could be further expanded.
  Recently the establishment of a teaching company and the funding of collaborative projects have improved the situation somewhat. We will explore the scope for collaboration in *applied science* projects as a matter of priority. Developing this further is a strategic priority, recently a staff member has taken on industrial liaison as a duty.
- Some aspects of our systems research activity which was a major feature of the department in former years are now at a low level. Some activity of LFCS and EPCC (both independent and in collaboration), performance analysis, and computer architecture can be classed as systems research but areas of former strength (e.g. operating systems and distributed systems) see little activity.
- Our teaching related to commercial practice is at a level which is satisfactory for the purposes of accreditation but is not an area of active interest amongst our staff. This is partly due to recruitment problems and partly due to the nature of our degree. We feel that much of this material is best taught in a vocational setting and including more of this material in our course would require the exclusion of technical material we consider essential to any computer science degree. The new degrees in Software Engineering and a revised CS & Management Science degree should address this.

iii. *What are the core areas of (a) teaching and (b) research in the Department?*

Teaching: We believe our single honours degree and the joint degrees with Artificial Intelligence and Electronics provide the best general education in these areas in the country. Our joint degree with AI is unique in providing a strong grounding in both subjects while containing more AI than is common in many single honours degrees with that title. The particular strengths of these degrees are the breadth and depth of coverage and the linkage of theory and practice. Our students are in high demand both in industry and as postgraduate students.

We also believe our postgraduate teaching, particularly the theory PhD programme is unique in the UK in providing a thorough preparation for research in theoretical computer science. At the moment we are extending this style of course to our other PhD students and are attempting to collaborate with European institutions to make components of the Edinburgh programme more widely available in Europe.

Research: The research of the department is focussed in two main units LFCS and EPCC (see answer to () above), in addition we have a small group actively pursuing work in performance/modelling of distributed systems. The level of research activity in the

department is very high. We support a community of around 30 full-time researchers, 50 PhD students and a number of international visitors. Most of the research interaction is centred on special interest "clubs" which bring together groups of around 10 to 20 researchers, staff and students together to discuss new work. Currently there are around 8 clubs, spanning the research interests of the department. A number of clubs provide a forum for discussion across areas of interest.

Infrastructure: We have a large and active group of researchers who require a modern computing environment in order to work effectively. We also require a good distributed system to support teaching. At the moment we have a group of highly skilled Computing Officers who do substantial innovative development work to meet the needs of research and teaching. Without continual development of our computing infrastructure maintaining our research standing and excellence in systems teaching would be impossible. We believe the area of infrastructure support is a core departmental activity which has substantial benefits for the University as a whole.

iv. *What current activities of the Department are peripheral to the core areas listed under () above?*

Teaching: The joint honours degrees with Statistics, Mathematics, Physics and Management Science all have low numbers and negligible resource requirement. We could abandon these but it may have some adverse affect on recruitment.

We teach one service course: Information Systems 1. This could be abandoned, but we believe it provides very high quality provision for students in the Arts/Social Science faculties. If we were to abandon this course then some other provision would be necessary and we believe any replacement would be poorer than the current course. It may be that we can reduce our commitment to a half course while maintaining the quality of the course by offering a combination of a revised IS1Ah course followed by our Computer Applications 1h course.

Research: We believe our research activity is well focussed — there is no peripheral work going on in the department.

Infrastructure: Our computing officers provide support for a number of EUCS activities. Though these may be important at a faculty/university level they are of small importance to the running of the department. In addition our rôle as the "lead site" in the University has substantial "trickle-down" benefits for all University users.

v. *What are the major developments in the world outside the University impacting specifically on the Department?*

- The requirement to be an accredited course, at C. Eng level, by the British Computer Society.
- The low level of SHEFC funding for CS undergraduates. We believe that unless this level is raised (albeit selectively) then our teaching must undergo a radical review. If we are funded at the current guide price we *cannot* maintain the resources necessary to teach the style of course we currently teach indefinitely.
- A number of departments of Computer Science in other institutions (e.g. Imperial, Manchester, Oxford) which rate highly in teaching and research are being funded at per-capita rates which are considerably higher than that prevalent at Edinburgh. If this continues companies and funding bodies will believe Computer Science is better supported at these institutions and will prefer to invest there rather than at Edinburgh.
- The low rate of SERC funding of alpha-rated projects in CS. Each year we see a number of very highly rated projects refused on funding grounds. This is extremely demoralising for the researchers involved. Though we do raise a high level of research income from SERC we believe the situation needs to change.

- The development of a European Institute in the Logical Foundations of Computer Science funded by the CEC, involving leading European theoretical Computer Science departments with Edinburgh as lead site. A small nucleus network grant has been funded and this is now developing as fellowships are awarded. Also we are involved in several other European networks of excellence which will develop within the planning period. These developments will place further pressure on an already scarce and poorly structured resource — Accommodation.
- The White Paper on Science and Engineering will clearly have a great impact on our activities. The influence on post-graduate education is the most direct, yet difficult to assess because of the lack of clarity from the funding councils and government. We believe this could cause substantial problems for our postgraduate programme:
  - We do not yet know how the creation of the MRes degree will affect advanced course MSc support. We would like to see assurances that this will be continued.
  - In the area of theoretical computer science we already run a 6 month taught course which is tailored to introduce students to work in theoretical computer science. The existing structure does not fit well with the MRes proposals — yet we believe the course we run is the best preparation for research provided in the UK.
  - We would like to increase both Home and Overseas postgraduate numbers. The MRes will mean a drop in funded PhD places — we have buoyant demand for such places and would like to expand.
  - We are concerned that a faculty postgraduate school will dilute the identity we have as an excellent department in PG education and that proposals to run faculty-wide courses will lead to a rather bland MRes which will neither provide a good training for industry nor a good preparation for graduate work.

3 Vision 2000

This exercise has been dealt with at a Planning Unit level. What follows is some remarks on the PU document from a departmental point of view.

- Informatics is in a unique position by comparison with all other planning units, because our subject is still in the process of formation much of the Vision 2000 statement concerns the shape of the subject as we would like to see it, rather than planning for the development of the PU within the established constraints of the subject. The Vision 2000 statement identifies the enormous potential we have in Edinburgh to shape the emerging subject of informatics.

- *Applied Science* is last to develop in the emergence of a new scientific discipline. Because it links basic science with engineering practice it requires time for both to become established. In the department of Computer Science we are developing a strand of applied research which we believe can forge stronger links with industry, will develop engineering practice and provide the basis for new courses in Information Systems Engineering. Edinburgh is uniquely place to make a contribution to the development of applied science.

- Concretely our department will attempt to develop the following over the period up to 2000:

  - We will explore the possibilities of a graduate school in informatics aimed at strengthening interaction at a graduate level while maintaining the identities of the individual units in the Planning Unit. This school should interact strongly with the European Institute in the Logical Foundations of Computer Science.

- Develop undergraduate teaching, aiming at increasing the (already considerable) number of EU and other non-UK students. This will involve seeking to establish a European Diploma in Informatics and in furthering teaching excellence.
- Develop industrial links through a portfolio of applied science research and further downstream activities involving bilateral collaboration with companies and the exploitation of arrangements like the teaching company scheme to transfer applied research into engineering practice.

4 Academic aims for the 1993-96 planning period

In answering the questions in this section we outline the initiatives we are currently pursuing — we see all of these as priorities which we will pursue during the planning period. Few of these will have direct resourcing implications for the University though some human resource will be invested in pursuing these.

vii. Assuming steady state funding in 1994/5 – 1996/7 outline the planned changes to and developments in the Departments teaching and research portfolios.

(a) *Changes in teaching.*

- Maintaining CEng accreditation for our single honours courses.
- Securing funding for a high level of UK candidates on our MSc course.
- Exploring the possibility of a five-year European Diploma in Informatics with our German and French collaborators. Developing the number of EU and non-EU non-graduating students.
- Introducing the Software Engineering degree.
- Exploring the possibilities of new degrees within the Informatics area, in particular developing links with Cognitive Science.
- Promoting direct entry to widen the intake of undergraduate students. Developing intake policy to attempt to improve the intake quality by targeting applicants more precisely.
- Introducing a Safety Systems theme into our MSc programme.

(b) *Priorities being pursued in research.*

- Securing a larger number of funded PhD places, if necessary outside the usual (SERC) funding arrangements.
- Developing other sources of funded PhD students outside the UK.
- Securing the established research units within the department. In particular looking to recruit staff to replace those lost in an uncontrolled manner during the moratorium on recruitment. In particular:
  - Replacing staff critical to the health of LFCS since we lost 2.5 staff critical to that unit (this is approximately 20% of the academic AEP's in the unit). For example, replacing Alistair Sinclair is seen as critical to maintaining work on Algorithms and Complexity.
  - Strengthening work on parallel systems/computation, in particular the recruitment of a replacement for Rosemary Candlin on her retirement, since there is a considerable sum available for research in this area.
- Developing connections with Europe further. In addition to existing collaborative projects under the ESPRIT programme, the CEC Human Capital and Mobility programme encourages the establishment of networks. We are involved in a number of networks whose motivation is to bolster both research and research training. LFCS have already been successful in 3 such applications as well as 6 other ESPRIT projects. We anticipate further success in other networks and projects. These will result in a significant increase in research staff numbers.

- We already have a commitment to TEMPUS (3 projects) and expect to continue to devote some effort to fostering further links with Eastern Europe through the planning period.
- We are in the process of developing further industrial links involving a teaching company with Adelard (London) and potential projects with DEC (Livingston), Shell Expro (Aberdeen), Motorola (Ayr), and other collaborative projects and consultancies with UK and European industry. Industrial collaboration is time consuming and we anticipate devoting a fairly high level of resource to this activity.

5 Proposed plans for 1993/4

viii. The following table summarises our response to the question:

	Budget Scenario		
Issue	Scenario A	Scenario B	Scenario C
Student Nos.	In all scenarios we will seek to expand numbers of highly qualified direct entrants into second year of the undergraduate degrees. We intend to secure the levels of MSc students at around 30-40. We intend to expand PhD numbers both of home and overseas students.		
Staffing	In this scenario it may be necessary to look at some form of redeployment — we are aware however that we must seek such savings in technical and computing support staff rather than academic staff. The loss of such staff could seriously impair support for research infrastructure. It may also impair the development of the Software Engineering degree.	In this scenario we believe that we will be achieve our savings targets without recourse to redeployment etc. But this leaves the academic research base impaired and may impair the development of the Software Engineering degree.	In this scenario we can maintain most of our current activities and develop the Software Engineering degree. We still need to explore the balance of support and teaching staff and explore how to achieve the desired balance.
Courses	We will bring forward enabling calendar entries for the proposed Software Engineering degree and are still considering a European diploma but will require that any resource implications be met from EC sources as a prerequisite to going ahead with such a programme. Any change in funding would be targeted to enhance research capability first.		
Research	Loss of support for research could seriously impair developments of the European Networks we are currently developing — we could absorb losses but they would impair our capability.	Even during the moratorium on appointments we have increased research income despite increasing teaching and administrative loads. Level funding will maintain the current level of pressure on research time — long term this could lead to a decline in activity	Staff appointments could begin to repair the gaps in research capability amongst the academic staff, but this would only be possible if there were some reduction in the level of support staff.
Income	We are exploring the possibility of expanding our course programme but the recession means attendances tend to be low. We will present a larger number of courses in 93–4 than in 92–3 and should generate some small income from this activity. We have recently launched a Teaching Company scheme and this gives us a significant human resource in support of applied research which is on stream this year. We may investigate the possibility of further such schemes. We have also seen some increase in consultancy work from companies.		
Other areas	The main implication for others is in the area of accommodation. Expansion in numbers is largely independent of the level of funding from the University. To accommodate externally funded workers we will require significant extra space and restructuring of our existing accommodation. In all scenarios we will consider our computing provision in the light of the University IT policy — our initial impression is that the increased University provision could be used to cope with some peak demand from our students.		

ix. *For all indicative budget levels which involve a reduction in PU staff resources, please outline your plans for coping with the proposed reduction by 31 July 1995.* **Emphasise we cannot cope with further teaching staff losses — particularly in certain areas — problems of accreditation and research capabilities. In particular we want to protect:**

- **Existing strengths, LFCS and EPCC since we have large committments there e.g. European Institute and Networks, EPCC work.**
- **Parallel Computation — SERC programme on the way.**
- **Applied science — SERC/DTI programme in 95?**

6 Strategic questions

x. *Please comment on the general strategic issues raised in the Faculty's strategic guidance document.*

We are broadly in agreement with the document but we are concerned that we are in the position of responding to the *fait accompli* of the White Paper. Our belief is that it rests on a number of dubious propositions, most critical is the close linkage between scientific activity and wealth creation. We believe the link is far more complex than that assumed in the White Paper and believe that the reform of graduate education proposed in the White Paper could cause long term damage to the UK's ability to carry out scientific research. At a faculty level this means we should be exploring a wider range of proposals to reform PG education and should look to see how *academically well-founded* proposals might fit within future funding arrangements rather than rushing to implement what we believe is the preferred research council model.

xi. *Please let me have the department's thoughts on the strengths and weaknesses, advantages and disadvantages, of the proposed model. Please let me have departmental thoughts on the new-style MScs particularly on their ability to introduce these at short notice, probably within current resources.* Since we already run a modular MSc across the planning unit whose pattern of work is not too deviant from the outline MRes and we have 16 years experience of running a taught PhD programme in theoretical computer science we have no doubt we could run an MRes with existing resources. We do, however have serious reservations on the MRes itself and the proposed implementation within the faculty

- The link between research and WCQL is far too direct and simplistic — this influences the design of the MRes in an inappropriate way.
- The MRes as it stands seems to be directed both to industrial and research training — we do not believe these are fully compatible.
- As a department with a considerable portfolio of basic research we believe the reduction of the number of PhD places will impair the basic research base long term and will cause the loss of critical mass in a number of UK basic research sites. Eventually it may be appropriate to cease training UK PhD students and look solely to EU and beyond for funded students.
- We are concerned that the creation of a faculty-wide graduate school could erode the individuality of Informatics PG education. This has a high international reputation which should be maintained at all costs.
- We see problems in trying to harmonise the generic research skills components of the MRes between the Mathematical and Experimental sciences and between those students intending to progress to PhD and those who intend to work in industry.

- We believe faculty should be considering a wide range of alternative models for PG education rather than proceeding in a purely reactive mode — by exploring appropriate alternatives we may discover a well-founded programme of PG education which can be funded by MRes mechanisms.

xii. *What additional staff and student amenities do you believe are urgently required at King's Buildings? To what extent would you be prepared for faculty to forego funding for academic activities to contribute to the cost of these?* We believe we require:

- A conference building that would double as a performance and exhibition space.
- Adequate sports facilities for a campus of nearly 5000 students.
- High quality eating and social spaces for staff and students. At the moment staff cannot entertain guests anywhere on campus without calling in external caterers.
- A commitment to increased student accommodation close to KB.

At the moment the KB campus is a strong disincentive to undergraduate students — improved facilities would help recruitment enormously. An adequate conference facility on campus with accommodation on site could greatly stimulate scientific activity on the KB site — spin-off in terms of contact with PG students etc. would certainly be beneficial.

We feel this should be funded by external fund raising, perhaps even going to entrepreneurial organisations to fund a conference centre with accommodation. We would certainly not advocate reducing funding to departments to fund new building.

xiii. *Which of the Faculty's centenary events ...* **Should we say that most of us feel rather alienated from faculty since it seems we are the whipping boys? Or is this rather impolitic? I can think of no activity I'd like to see continued.**

xiv. *Do you support the notion of increased Faculty contingency and development funds? If so, what sums should these be? Do you support the idea of facilitating major equipment purchases? If so, which of the two models do you support?*

Faculty contingency and development funds are too low, they should be doubled over a two year period. We support the banking method for facilitating large equipment spends provided appropriate accounting methods can be agreed to take account of the period of any loan.

xv. *Are there other planning issues this Faculty should be bringing to the attention of other Faculty Groups?* **I can think of none.**

xvi. *In what areas would you like to see more support ...* We are rather independent of most of the support facilities in the University — we would rather not see more resource diverted to these groups. However, we are aware that as teaching staff are now subject to quality framework in both teaching and research we would like to see some (very lightweight) structure introduced to assure quality and efficiency from the support groups. It often appears that administrative expenditure is subject to much less stringent scrutiny and control than teaching and research expenditure.

xvii. *What strategic questions should the University be asking over the next twelve months?*

- How to maintain the capacity to do research in the face of decreasing real levels of resource.
- How to support innovation in teaching.

INFORMATICS PLANNING UNIT - VISION 2000

It is now widely accepted that information is "all around us"; that it has computational, cognitive and social aspects, all of which demand academic study and research. The IPU is clearly a focus for integrating the study of these various aspects.

Although it is widely accepted that information is ubiquitous, its nature is not widely understood. A phrase with common currency is "Information Technology" (IT); its use acknowledges the enormous breadth of potential application for information processing, but often presumes that the technology rests upon existing science.

The perception of the informatics community, which is represented in Edinburgh more broadly than in almost any other University worldwide, is that the IT which we now have is the beginning of the application of a science which is far from developed; this science was perhaps born of the computer, but transcends it in many ways.

The Nature of Informatics

The science of informatics can be classified, for discussion, under the following headings:

- Foundational
- Engineering
- Experimental
- Cognitive and Social

The foundational aspect has mathematical logic at its core, but it also consists of a fast developing nexus of concepts which have exact mathematical expression, concerning both the structural and the quantitative properties of information and algorithms. These concepts both underpin the engineering aspect and extend the logical foundation.

The engineering aspect embodies principles for the design of hardware and of software; taken together as systems engineering, these represent the state-of-the-art in industry. The principles have arisen both from practice and from the fast developing underlying science of informatics; on the whole thay do not arise from longer-established sciences.

The experimental aspect is present at different levels: experimental hardware designs are tested either in prototypic products or by implementing computer languages; experimental languages – descriptive and prescriptive – are tested by expressing or specifying new systems in them; this experience confirms or refutes the adequacy of the underlying concepts.

At the outermost level, information flows in organisations composed of humans aided by machines; the study at this level is deeply concerned with how people process information, both in isolation (patterns of inference) and in joint activities such as dialogue. A large challenge is to harmonise these human-oriented concepts with those which inform lower levels.

The Application of Informatics

Outside these four levels is the enormously broad spectrum of application. The proper understanding of a large real-world informatics system will typically involve all four levels. As an example, one can cite a communications system installed in a critical environment. Not only

are rigorous notions such as "correctness" and "validation" of strong technical import, but they must also by understood in broad terms by management; further, the system design must take cognitive and social aspects into account if the communication is to be effective.

The broad spectrum of applications is not only found in the external world; it also exists within academic institutions – e.g. databases for studies in the humanities, robotics engineering, large-scale parallel computations in physics.

Strategy for Informatics at Edinburgh

The spectrum of research and teaching at Edinburgh spans the four levels we have identified. Computer Science has been mostly concerned with the engineering principles and the rigorous mathematisation of concepts which lie behind methods and languages for hardware and software design; Artificial Intelligence has contributed at this level, and at the higher levels where machines assist (or replace) humans in sensing, understanding and manipulating their environment; Cognitive Science and the HCRC are concerned with how humans interact with computers, and with the principles of human thought and behaviour which pertain to this interaction.

This breadth of excellence at Edinburgh, much of it at the frontier, is almost unique among Universities worldwide; already leading in many separate topics, Edinburgh can also become a world leader in making informatics an integral science in the broad sense discussed above. Without this integrity, there is real danger that applications develop with no coherent concepts; to take a particular example, it may remain unclear what constitutes validation of a computational system. and this can lead to disastrous consequences.

It is quite possible that by (say) 2010 the activity will be broad enough to justify creation of a Faculty of Informatics. Without necessarily accepting this prediction, the IPU recognised the imperative need to draw together now the many strands which contribute to the science of informatics

- at least geographically
- preferably through an integrated teaching programme
- possibly in a single organisation
- but keeping (at least the research level) the identity of currently separate departments or groupings.

As a first step, the IPU has devised a plan to integrate its teaching programmes. But this is not enough; without a greater degree of colocation of departments the vital interchange of ideas at the research level, which will increase and then preserve the integrity of the discipline, cannot properly be achieved.

In an integrated approach to informatics, it is appropriate to seek a common link with Industry. This common link, operating at all the levels of research which we have identified, will help to bring about an important cultural development. Our present culture not only uses electrical and mechanical technologies; it also possesses a general understanding –developed over centuries– of the physical principles which underlie them. Via a strong link with Industry, we should try to promote a similar understanding of the principles of informatics.