LFCS Now and Then

Gordon Plotkin

LFCS@30
Edinburgh, April, 2016

Logic programming

Hope Park Square

Hope Park Square

Metamathematics Unit

The James Clerk Maxwell Building

Some early people

[7]The Metamathematics Unit of the University of Edinburgh was renamed into "Dept. of Computational Logic" in late 1971, and was absorbed into the new "Dept. of Artificial Intelligence" in Oct. 1974. It was founded and headed by Bernard Meltzer. In the early 1970s, the University of Edinburgh hosted most remarkable scientists, of which the following are relevant in our context:

	Univ. Edinburgh (time, Dept.)	PhD (year, advisor)	life time (birth–death)
Donald Michie	(1965–1984, MI)	(1953, unknown)	(1923–2007)
Bernard Meltzer	(1965–1978, CL)	(1953, Fürth)	(1916?–2008)
Robin J. Popplestone	(1965–1984, MI)	(no PhD)	(1938–2004)
Rod M. Burstall	(1965–2000, MI & Dept. AI)	(1966, Dudley)	(*1934)
Robert A. Kowalski	(1967–1974, CL)	(1970, Meltzer)	(*1941)
Pat Hayes	(1967–1973, CL)	(1973, Meltzer)	(*1944)
Gordon Plotkin	(1968–today, CL & LFCS)	(1972, Burstall)	(*1946)
J Strother Moore	(1970–1973, CL)	(1973, Burstall)	(*1947)
Mike J. C. Gordon	(1970–1978, MI)	(1973, Burstall)	(*1948)
Robert S. Boyer	(1971–1973, CL)	(1971, Bledsoe)	(*1946)
Alan Bundy	(1971–today, CL)	(1971, Goodstein)	(*1947)
Robin Milner	(1973–1979, LFCS)	(no PhD)	(1934–2010)

CL = Metamathematics Unit (founded and headed by Bernard Meltzer)
(new name from late 1971 to Oct. 1974: Dept. of Computational Logic)
(new name from Oct. 1974: Dept. of Artificial Intelligence)

MI = Experimental Programming Unit (founded and headed by Donald Michie)
(new name from 1966 to Oct. 1974: Dept. for Machine Intelligence and Perception)
(new name from Oct. 1974: Machine Intelligence Unit)

LFCS = Laboratory for Foundations of Computer Science

Bob Boyer and J Moore

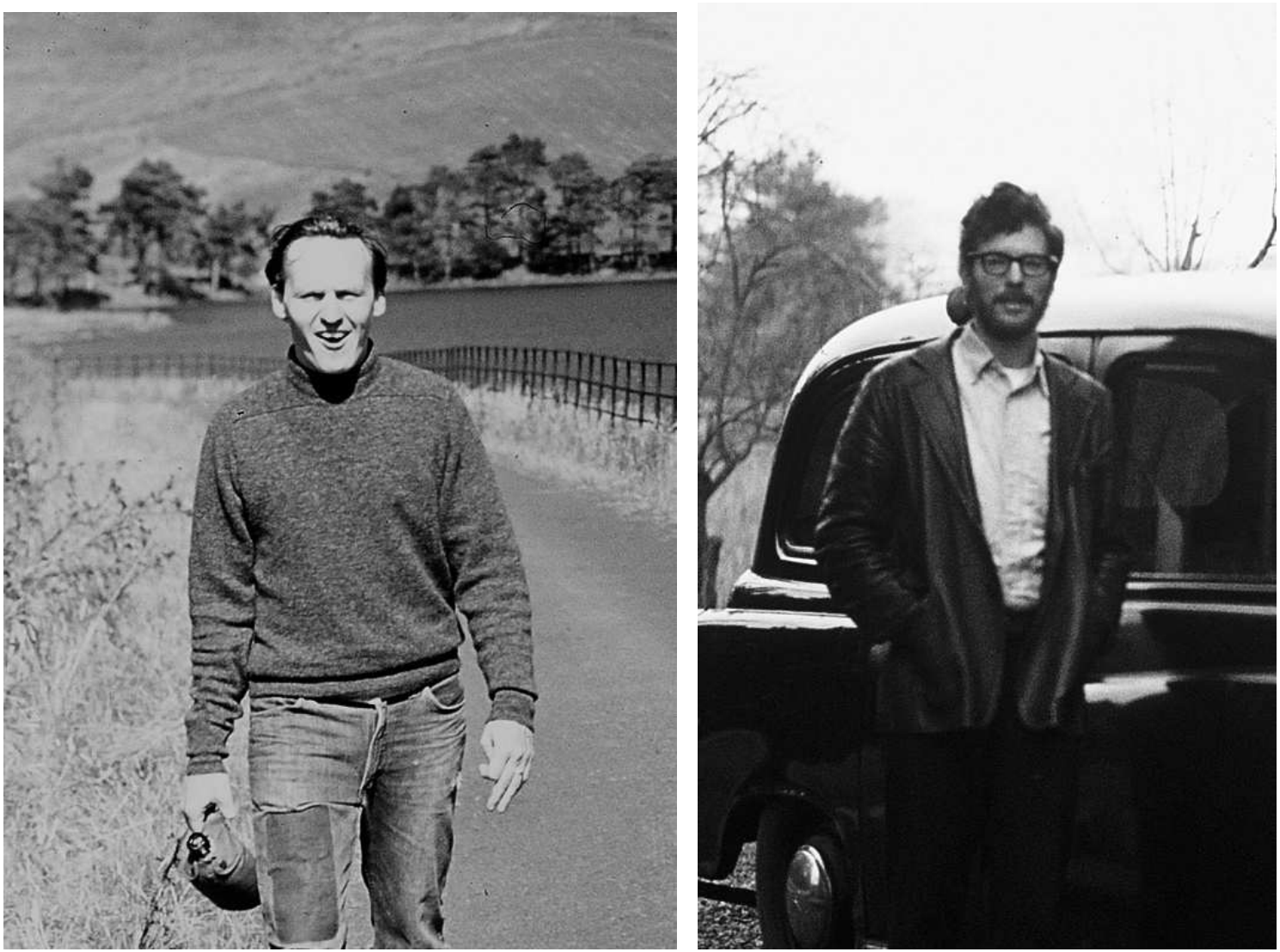


Figure 2: Robert S. Boyer (1971) (l.) and J Strother Moore (1972?) (r.)

The BBMS

- Bob Boyer suggested we meet for research discussions in the evening.
- Bob left about 1973; Robin arrived about then.
- Rod suggested we form the BBMS.
- The BBMS was hosted by Rod and Sissi, and Robin and Lucy.
- The meetings were (in my memory!) always packed, with people sometimes having to sit on the floor.
- We discussed programming languages and their semantics and theorem proving and concurrency and anything else that interested us.
- We even had an outside speaker - Adrian Bird told us about genetics at Rod's house.
- The BBMS met until sometime around 1985 (?), maybe 10 years in all,
- A motivation and scientific and social basis to found LFCS.

Lucy Milner

Sissi Burstall

Logic Programming and the Fifth Generation Project: 1982 – 1992

- A massive government/industry research by Japan's MITI, to
  1. create a massively parallel "epoch-making computer" with supercomputer-like performance. Prototype machine performance between 100M and 1000 LIPS
  2. and so provide a platform for future artificial intelligence applications using concurrent logic programming (Ehud Shapiro: Concurrent Prolog).
- A number of languages were developed, all with their own limitations; in particular, the committed choice feature of concurrent constraint logic programming interfered with the logical semantics of the languages
- Did not meet with commercial success (cf Lisp machines) as eventually surpassed in speed by less specialized hardware.
- At the end of the ten-year period, the project had spent about $400 million at 1992 exchange rates and was terminated.

Reaction to the Fifth generation project

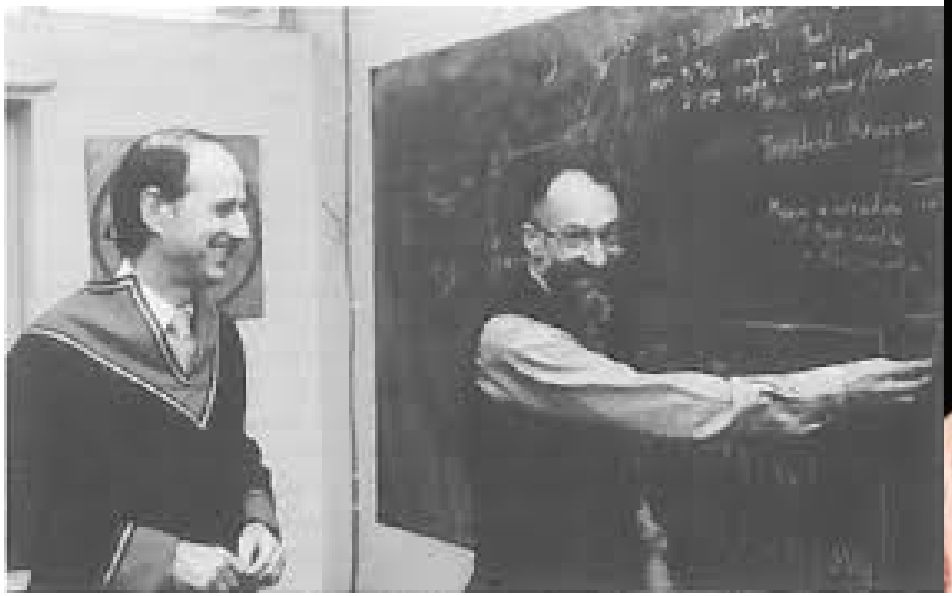
- The Japanese in the 1980's had a reputation for invincibility.
- Parallel projects were set up:
  1. US: the Strategic Computing Initiative; and MCC, the Microelectronics and Computer Technology Corporation.
  2. UK: Alvey
  3. Europe: ESPRIT, the European Strategic Program on Research in Information Technology; and the ICL-Bull-Siemens ECRC (European Computer Research Centre).

The Alvey Programme

The Alvey Programme ran from 1983 to 1987. Focus areas for the Alvey Programme included:

- VLSI (very large scale integration) technology for microelectronics
- Intelligent Knowledge Based Systems (IKBS) or Artificial Intelligence (AI)
- Software Engineering
- Man-Machine Interface (included Natural Language Processing)
- Systems Architecture (for parallel processing)

The protagonists



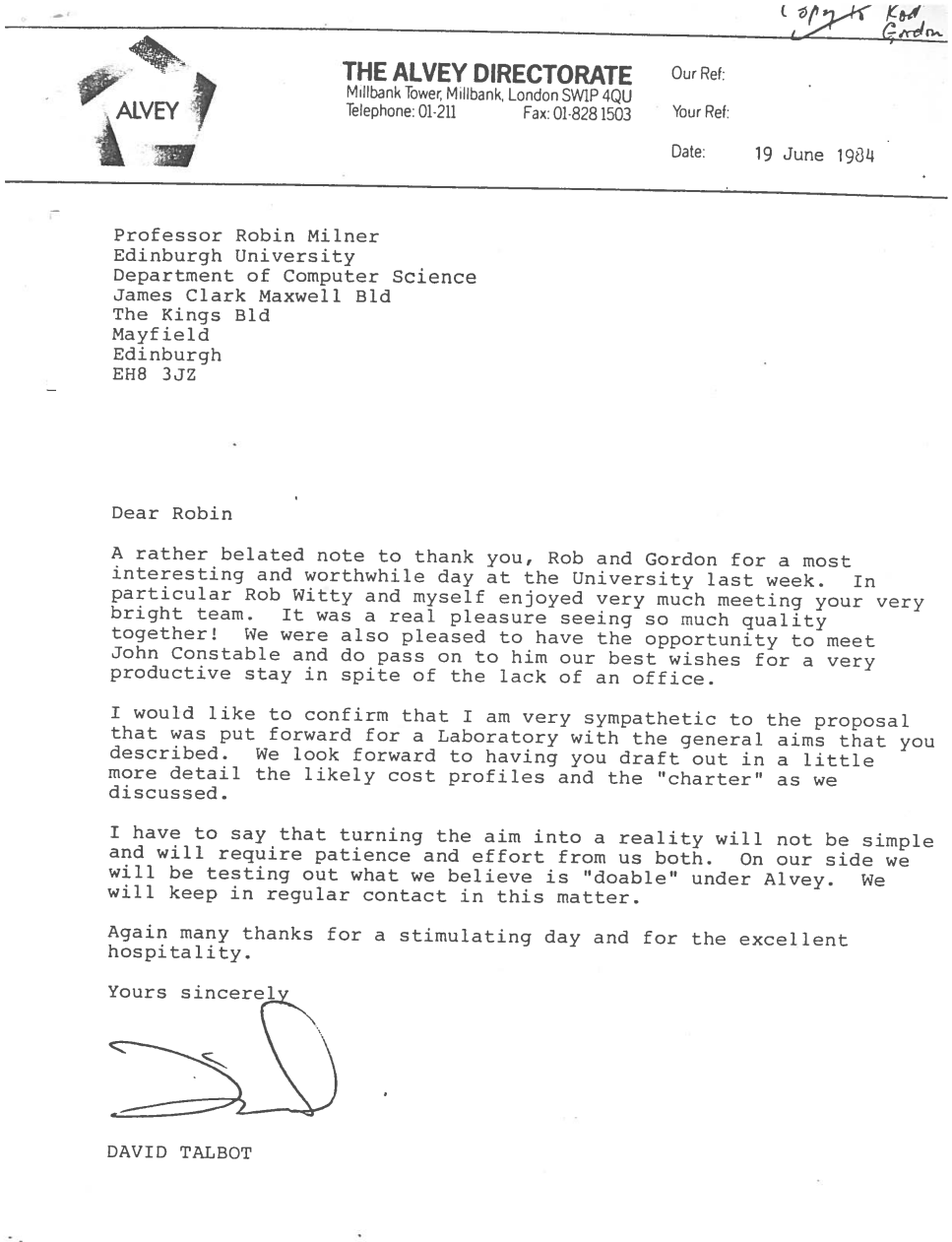
From letter to Alvey: June 2, 1984

ARGUMENT FOR THE LABORATORY

Alvey proposes the increased awareness, exploitation and development of formal methods in Computer Systems engineering, both hardware and software. The UK is well placed to achieve these ends, as the groundwork for such an advance has been laid by theoretical researchers in UK perhaps more than anywhere else in the world (and certainly so in proportion to the size of its research community).

In parallel with this advance, it is essential that UK maintain its leading position in theoretical research. For this purpose, we wish to argue that a centre is needed whose primary aim is to advance computation theory, now that the theory is beginning to find application and to influence design to an extent which few would have predicted even five years ago. Such a centre will certainly flourish and bear fruit in the very positive climate which now exists, provided by interplay between the intrinsic challenge of computer science as an academic subject on the one hand, and on the other hand by the demands of industry for application.

Response from Alvey: June 19 1984



copy to Rod Gordon

ALVEY

THE ALVEY DIRECTORATE
Millbank Tower, Millbank, London SW1P 4QU
Telephone: 01-211 Fax: 01-828 1503

Our Ref:
Your Ref:
Date: 19 June 1984

Professor Robin Milner
Edinburgh University
Department of Computer Science
James Clark Maxwell Bld
The Kings Bld
Mayfield
Edinburgh
EH8 3JZ

Dear Robin

A rather belated note to thank you, Rob and Gordon for a most interesting and worthwhile day at the University last week. In particular Rob Witty and myself enjoyed very much meeting your very bright team. It was a real pleasure seeing so much quality together! We were also pleased to have the opportunity to meet John Constable and do pass on to him our best wishes for a very productive stay in spite of the lack of an office.

I would like to confirm that I am very sympathetic to the proposal that was put forward for a Laboratory with the general aims that you described. We look forward to having you draft out in a little more detail the likely cost profiles and the "charter" as we discussed.

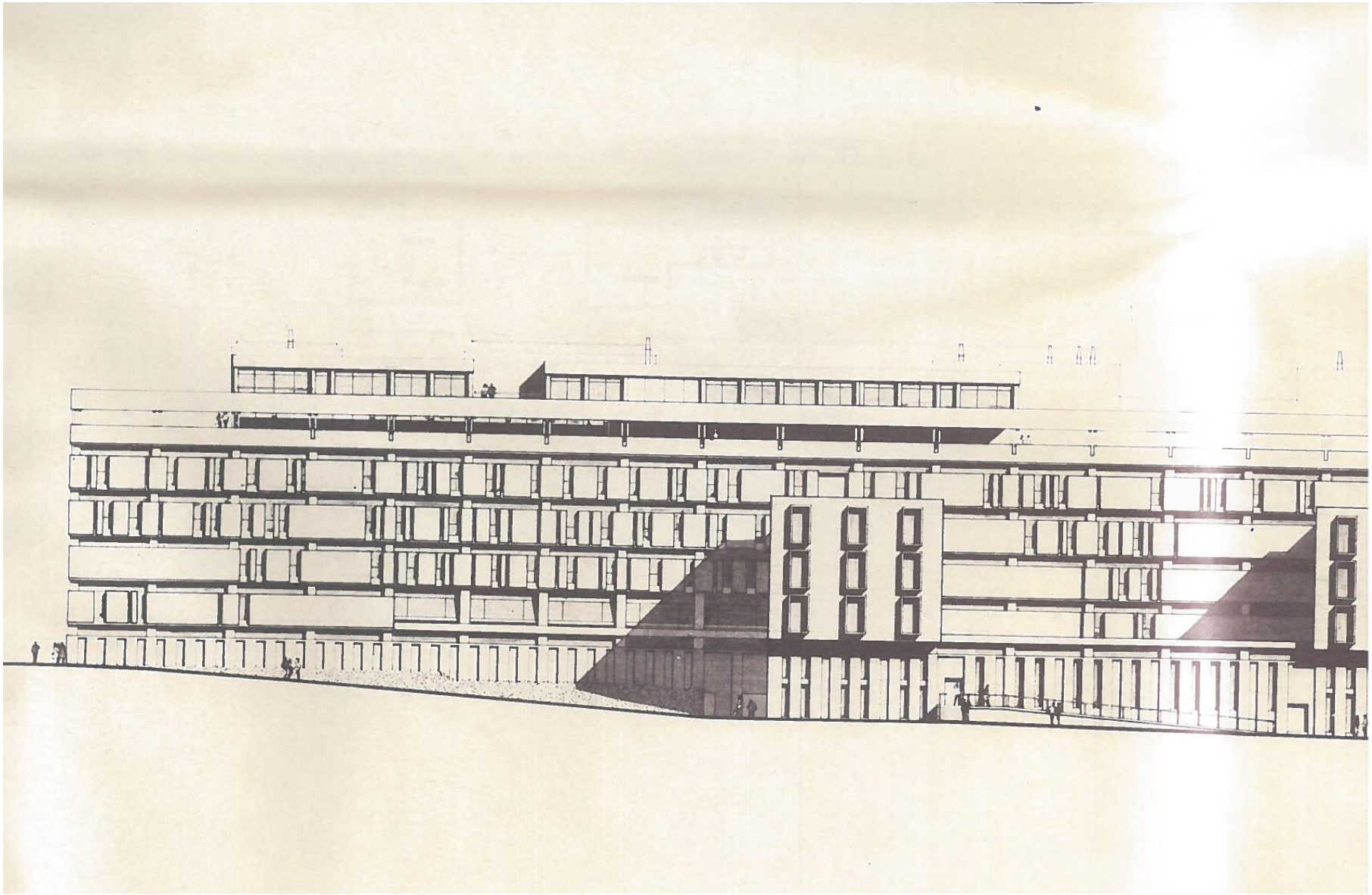
I have to say that turning the aim into a reality will not be simple and will require patience and effort from us both. On our side we will be testing out what we believe is "doable" under Alvey. We will keep in regular contact in this matter.

Again many thanks for a stimulating day and for the excellent hospitality.

Yours sincerely

DAVID TALBOT

The LFCS building



A letter from the Principal: November 5th 1984

SB Matthew

Principal and Vice-Chancellor
J H BURNETT
MA DPhil LLD DSc FRSE

Telephone 031–667 1011

University of Edinburgh

OLD COLLEGE
SOUTH BRIDGE
EDINBURGH
EH8 9YL

5 November 1984

Professor A J R G Milner
Department of Computer Science
James Clerk Maxwell Building
Mayfield Road

Dear Professor Milner,

I had a most useful discussion with Mr Oakley on Friday as a consequence of which I am prepared to permit your proposal to establish a Laboratory for Foundations of Computer Science to be forwarded to the Alvey Directorate. In so doing I have to say that we cannot, at this stage, have high expectations of funding the capital aspects of the project, and it may well be that a number of the recurrent items will need to be met in part by the University. I have in mind particular items 17, 18, 19, 23, and 24, as well as the maintenance costs of the proposed building, i.e. items 7-10. These are all areas which I am continuing to explore on behalf of all our Alvey projects with Oakley, the UGC, and possibly Ministers. Nevertheless, the Directorate would like to see your ideas without, of course, any commitment at this stage on either side to funding.

Yours sincerely,

J H Burnett

Another letter from the Principal: November 5th 1984

14 May 1985

Professor A J R G Milner
Department of Computer Science
James Clerk Maxwell Building
The King's Buildings
Mayfield Road

Dear Milner,

Thank you for your further letter of 10 May. I think that I need rather firmer evidence about what additional accommodation will be made availabe to Computer Science before I can authorise action on the post of Assistant Director. I have, accordingly, written to the Dean on this matter and enclose a copy of my letter.

Yours sincerely,

JHB

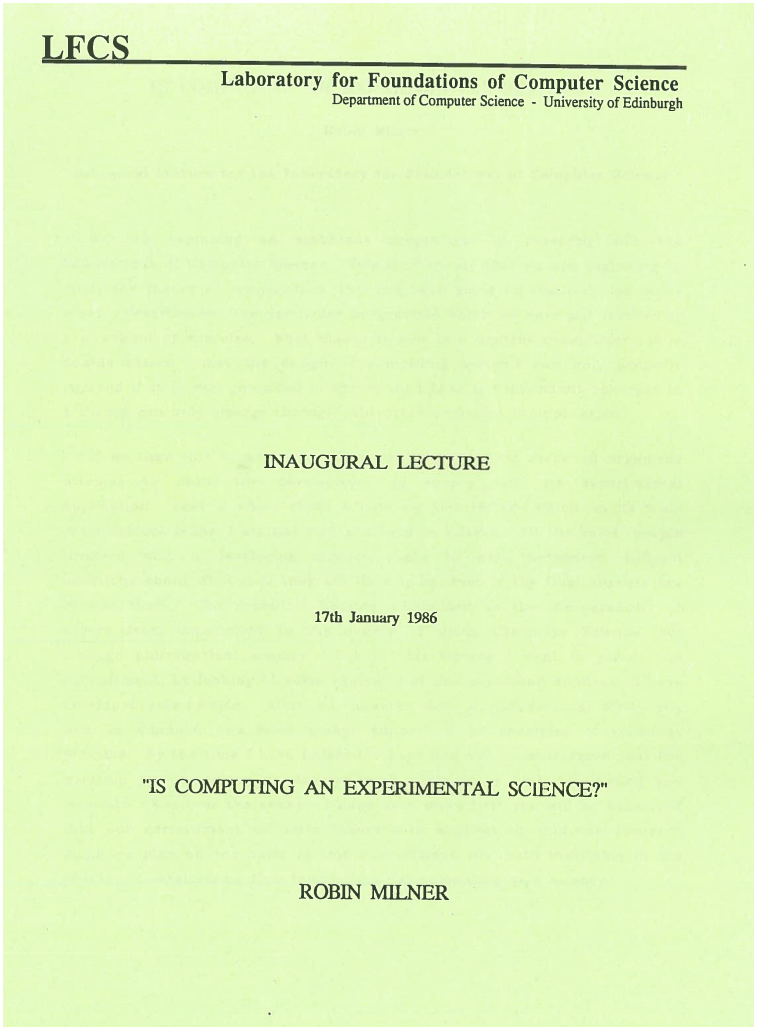
George Cleland

Programme of work for the Assistant Director

YEAR ONE :

- Formally found the Laboratory.
- Become acquainted with all current details of Laboratory planning, with the University administrative staff, and with Alvey Directorate.
- Coordinate recruiting and accommodation of Research staff.
- Coordinate recruiting and accommodation of Support staff.
- Form financial plan for Laboratory development.
- Launch fund-raising exercise for permanent Laboratory building.
- Initiate Industrial Membership scheme.
- Tour Industry and elsewhere to explain and publicize the Laboratory.
- Arrange visiting Industrial Scientist programme.
- Plan programme of short courses for Industry.
- Establish regular communication with Industry, particularly Member Companies
- Explore with SERC the continued funding of the Laboratory after Alvey.

Robin's inaugural lecture



LFCS

Laboratory for Foundations of Computer Science
Department of Computer Science - University of Edinburgh

INAUGURAL LECTURE

17th January 1986

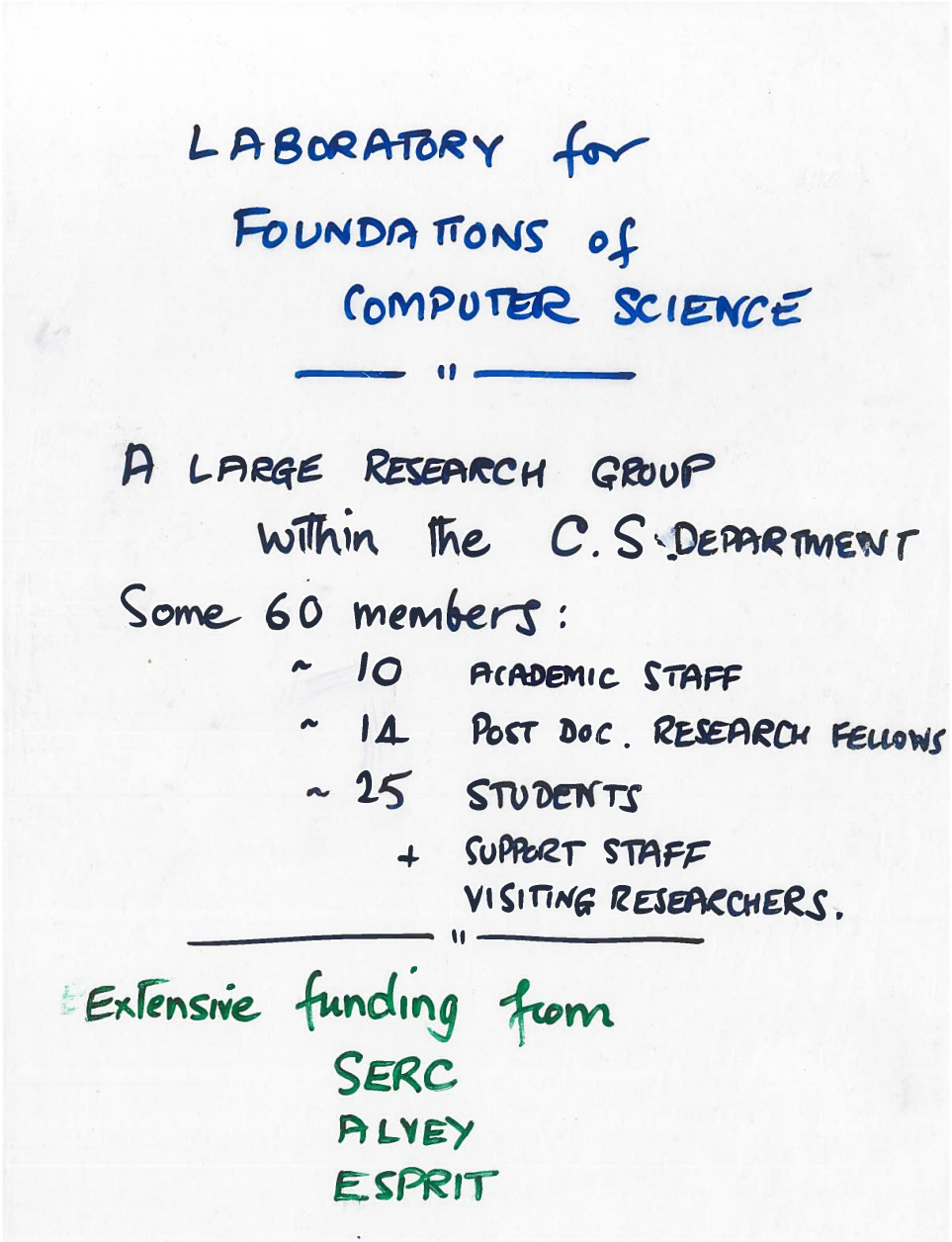
"IS COMPUTING AN EXPERIMENTAL SCIENCE?"

ROBIN MILNER

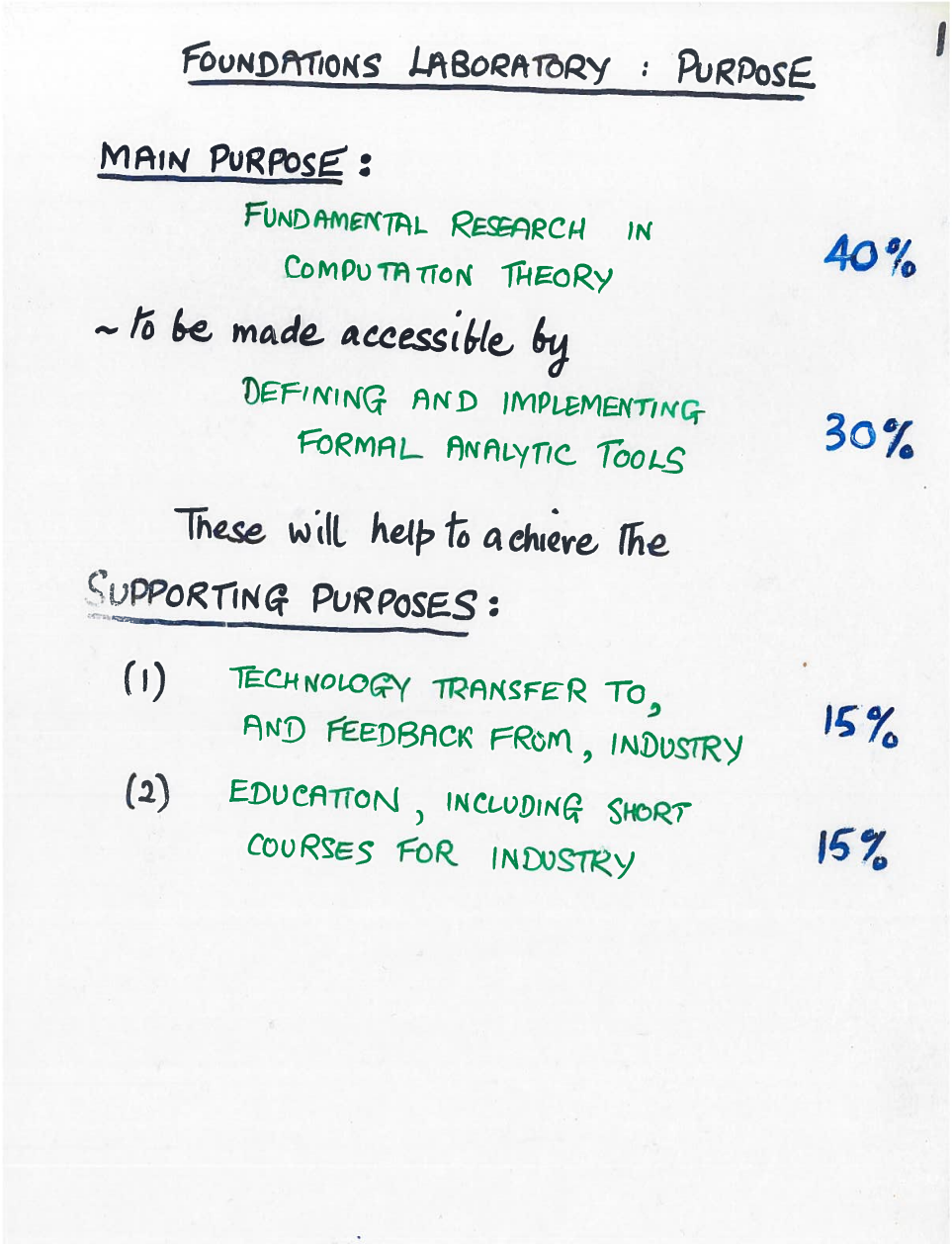
Robin's inaugural lecture

We are beginning an ambitious programme of research into the Foundations of Computer Science. This isn't to say that we are beginning to study the theory of computation; this has been going on fruitfully for many years. Nevertheless, the particular programme which we have put forward is a new kind of exercise. What makes it new is a central commitment to a double thesis: that the design of computing systems can only properly succeed if it is well grounded in theory, and that the important concepts in a theory can only emerge through protracted exposure to application.

An LFCS Presentation by Robin



An LFCS Presentation by Robin



FOUNDATIONS LABORATORY : PURPOSE

1

MAIN PURPOSE :

FUNDAMENTAL RESEARCH IN COMPUTATION THEORY — 40%

~ to be made accessible by

DEFINING AND IMPLEMENTING FORMAL ANALYTIC TOOLS — 30%

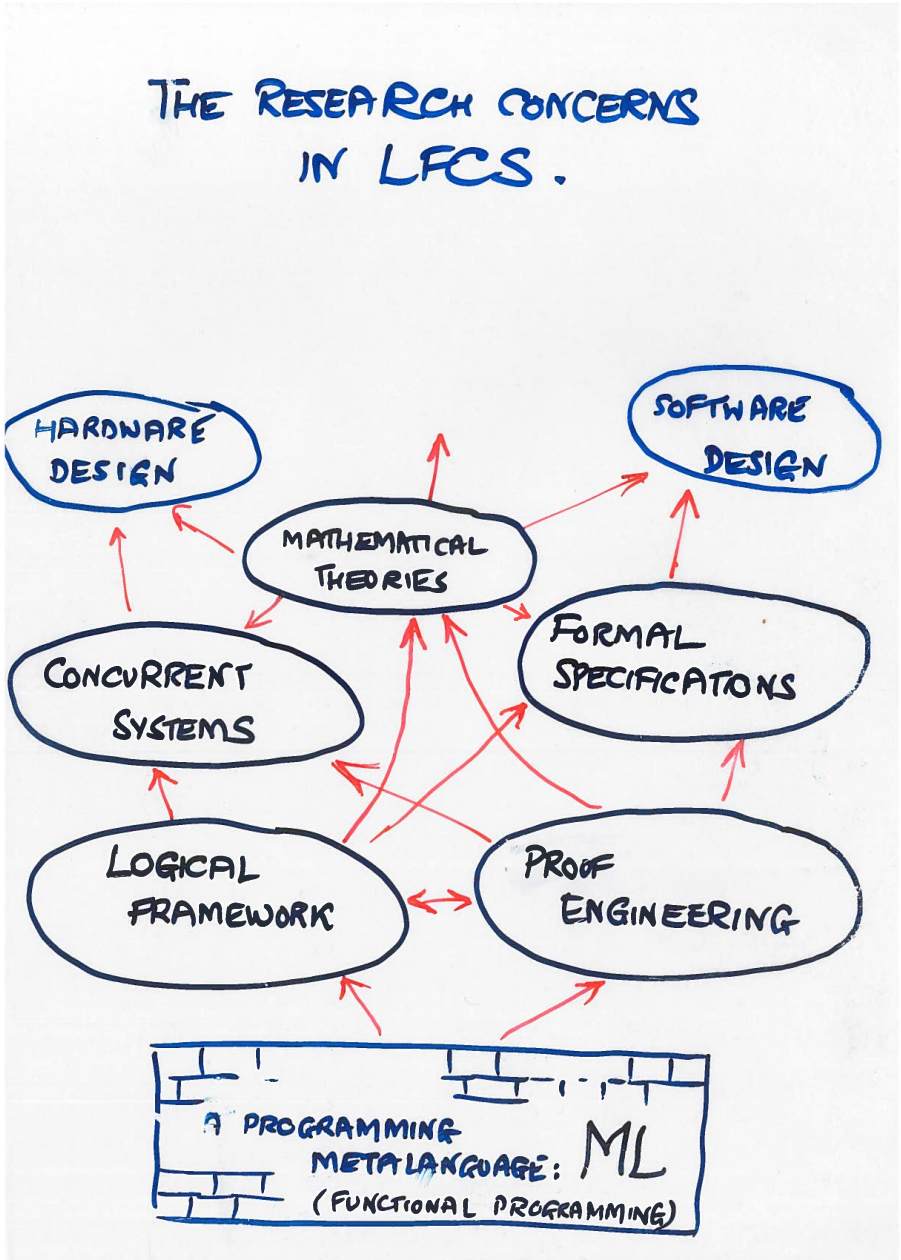
These will help to achieve the

SUPPORTING PURPOSES :

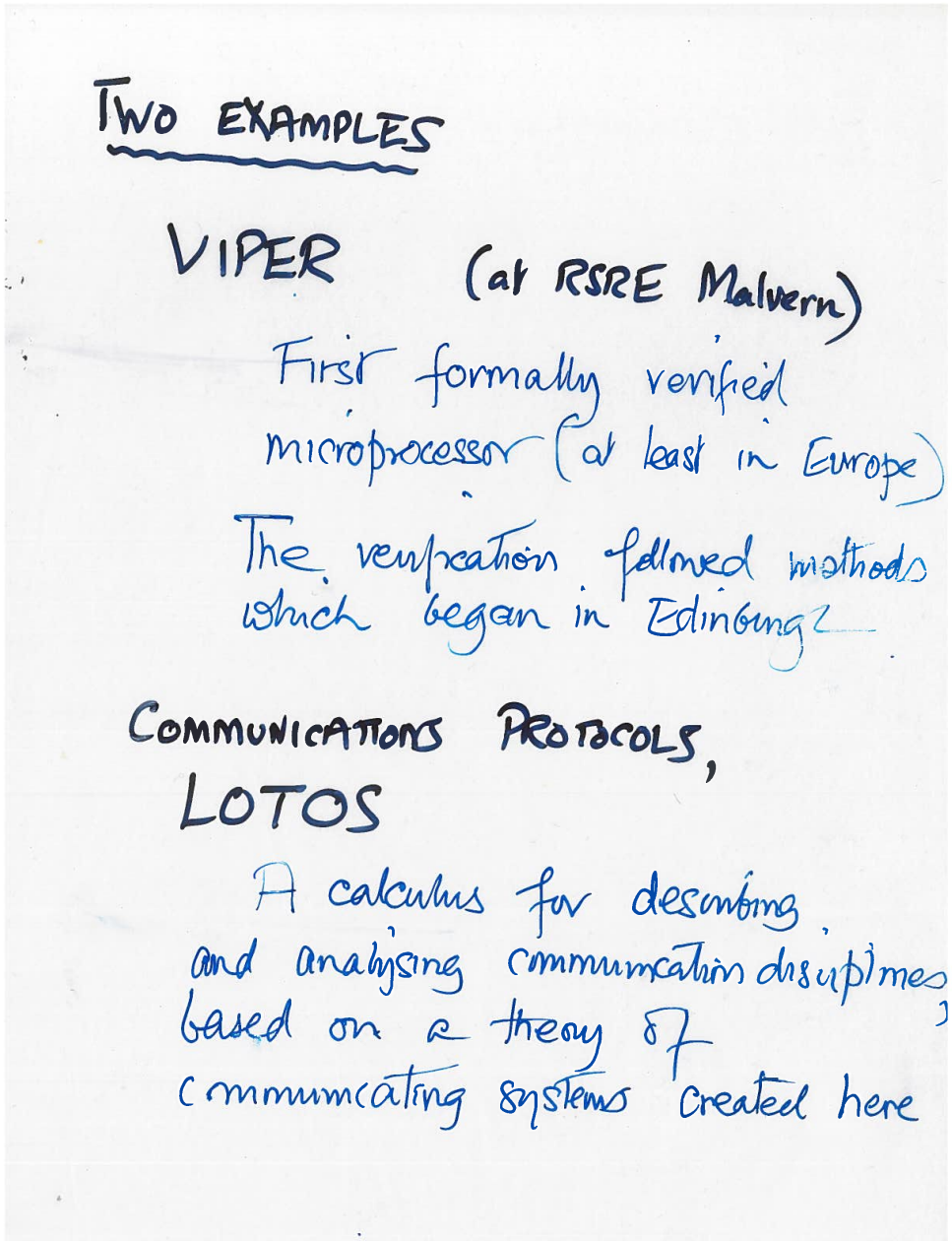
(1) TECHNOLOGY TRANSFER TO, AND FEEDBACK FROM, INDUSTRY — 15%

(2) EDUCATION, INCLUDING SHORT COURSES FOR INDUSTRY — 15%

An LFCS Presentation by Robin



An LFCS Presentation by Robin



The Lab lunch

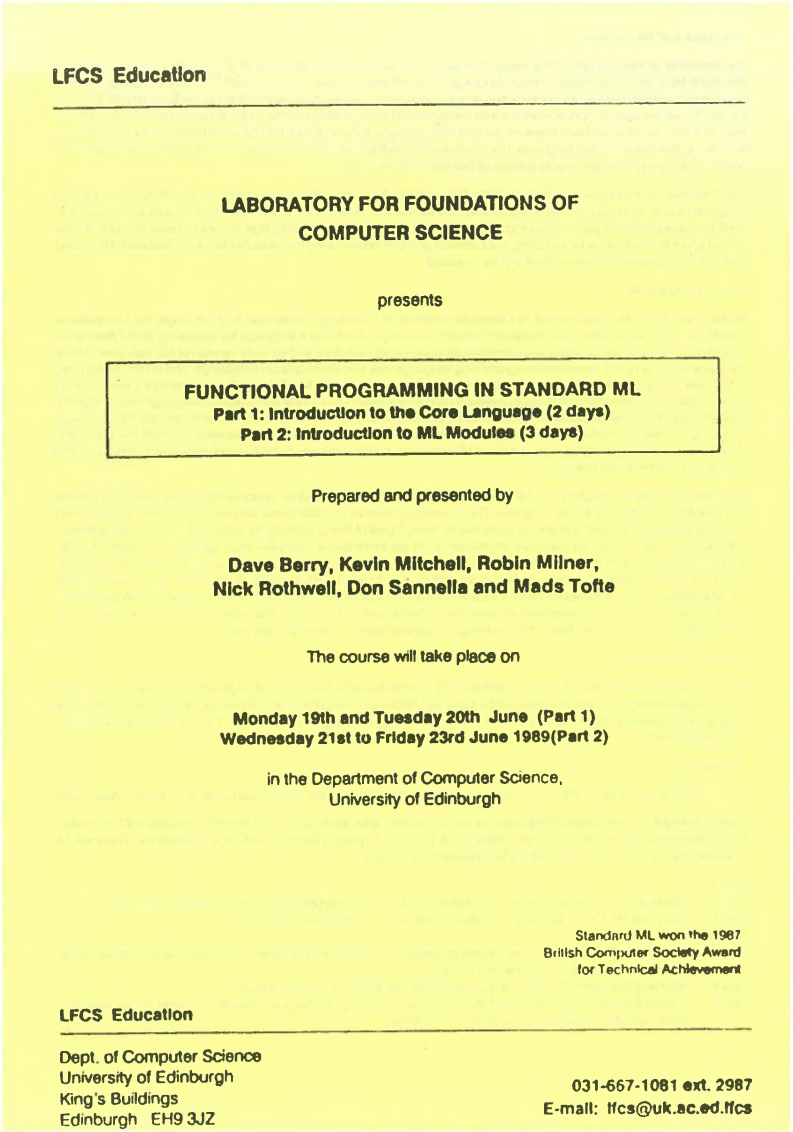
The PARC Computer Science Laboratory (CSL)

Lab Director Bob Taylor held periodic informal meetings in the“beanbag" conference room where CSL staff presented new ideas. Members received frank and sometimes brutal feedback from their colleagues

LFCS social-intellectual life

- Lab lunch
- Seminars
- Clubs: Concurrency; Semantics; ML...
- Away days
- Directors' meetings

LFCS Education:ML



LFCS Education

LABORATORY FOR FOUNDATIONS OF
COMPUTER SCIENCE

presents

FUNCTIONAL PROGRAMMING IN STANDARD ML
Part 1: Introduction to the Core Language (2 days)
Part 2: Introduction to ML Modules (3 days)

Prepared and presented by

Dave Berry, Kevin Mitchell, Robin Milner,
Nick Rothwell, Don Sannella and Mads Tofte

The course will take place on

Monday 19th and Tuesday 20th June (Part 1)
Wednesday 21st to Friday 23rd June 1989(Part 2)

in the Department of Computer Science,
University of Edinburgh

Standard ML won the 1987
British Computer Society Award
for Technical Achievement

LFCS Education

Dept. of Computer Science
University of Edinburgh
King's Buildings
Edinburgh EH9 3JZ

031-667-1081 ext. 2987
E-mail: lfcs@uk.ac.ed.lfcs

LFCS Education:ML

LFCS Education

Laboratory for Foundations
of
Computer Science

presents

Algebraic Specifications in Theory and Practice

A three-day course prepared and given by

Don Sannella and Andrzej Tarlecki

The course will take place from

Monday 11th to Thursday 14th September1989

in the James Clerk Maxwell Building
on the King's Building's Campus of the
University of Edinburgh

LFCS Education
Dept. of Computer Science
University of Edinburgh
King's Buildings
Edinburgh EH9 3JZ

031-667-1081 ext. 2
E-mail: lfcs@uk.ac.ed.lfcs

The LFCS postgraduate course

LFCS

Laboratory for Foundations of Computer Science
Department of Computer Science - University of Edinburgh

POSTGRADUATE EXAMINATION QUESTIONS

EDINBURGH UNIVERSITY

POSTGRADUATE EXAMINATION QUESTIONS

IN

COMPUTATION THEORY

1978 - 1988

LFCS Report Series

ECS-LFCS-88-64
(also published as CSR-276-88)

SEPTEMBER 1988

LFCS
Department of Computer Science
University of Edinburgh
The King's Buildings
Edinburgh EH9 3JZ

The LFCS postgraduate course

Edinburgh University Postgraduate Exam Questions in Computation Theory

- For more than 10 years, an informal course of lectures and seminars in Computation Theory has been offered to first-year PG students. This course is designed to give a suitable grounding for research in this area as well as a survey of current research topics. It is divided into three broad sections: Complexity, Programming Methodology and Semantics.
- Every year in May there is an informal three-day open-book examination on the material taught in the course. This report contains all of the questions which have appeared on these examinations since the course began.

LFCS Directors

Robin Milner	1986 – 1989
Gordon Plotkin	1989 – 1992
Rod Burstall	1992 – 1996
Don Sannella	1996 – 1999
Samson Abramsky	1999 – 2001
Colin Stirling	2001 – 2004
Julian Bradfield	2004 – 2008
Phil Wadler	2008 – 2011
Jane Hillston	2011 – 2015
Stephen Gilmore + Don Sannella	2015 – present

LFCS Faculty: the 32

Stuart Anderson
Myrto Arapinis
David Aspinall
Luca Bortolussi
Julian Bradfield
Peter Buneman
James Cheney
Mary Cryan
Vincent Danos
Kousha Etessami
Wenfei Fan
Michael Fourman
Stephen Gilmore
Andrew Gordon
Chris Heunen
Jane Hillston
Paul Jackson
Kyriakos Kalorkoti
Elham Kashefi
Aggelos Kiayias
Leonid Libkin
John Longley
Richard Mayr
Gordon Plotkin
Ajitha Rajan
Don Sannella
Ian Stark
Perdita Stevens
Colin Stirling
Stratis Viglas
Philip Wadler
Petros Walden

LFCS social-intellectual life

- Lab lunch
- LFCS Seminars
- Groups/seminars: PEPA club; Security seminars; PL Thursday group; category theory (with math);....
- Away days (Jane Hillston)
- Friday afternoon cake.

LFCS Evolution

- From a lab to an institute, among other institutes.
- From a tight focus to a many-splendoured thing.
- Continuation of old topics, often with new twists, and changes of emphasis, e.g., mobile computing, web programming, performance and spatial modelling.
- Wonderful gain of many others: e.g., software engineering, algorithms and complexity, automata theory, games, automated verification, databases, systems and synthetic biology, quantum computing, networks, security and cryptography.
- Loss of some things: educational outreach to industry, integrated approach to our PhD students.
- From a small group to almost a department (cf Cornell).
- From a CS context to a hugely-varied Informatics one.
- with rich opportunities for interaction and growth: e.g., machine learning, big data, theorem proving, systems.
- From a CS context to a University one: e.g., biology (modelling and learning), mathematics (optimisation), economics (games), sociology (security).

A Question

What is LFCS to you?