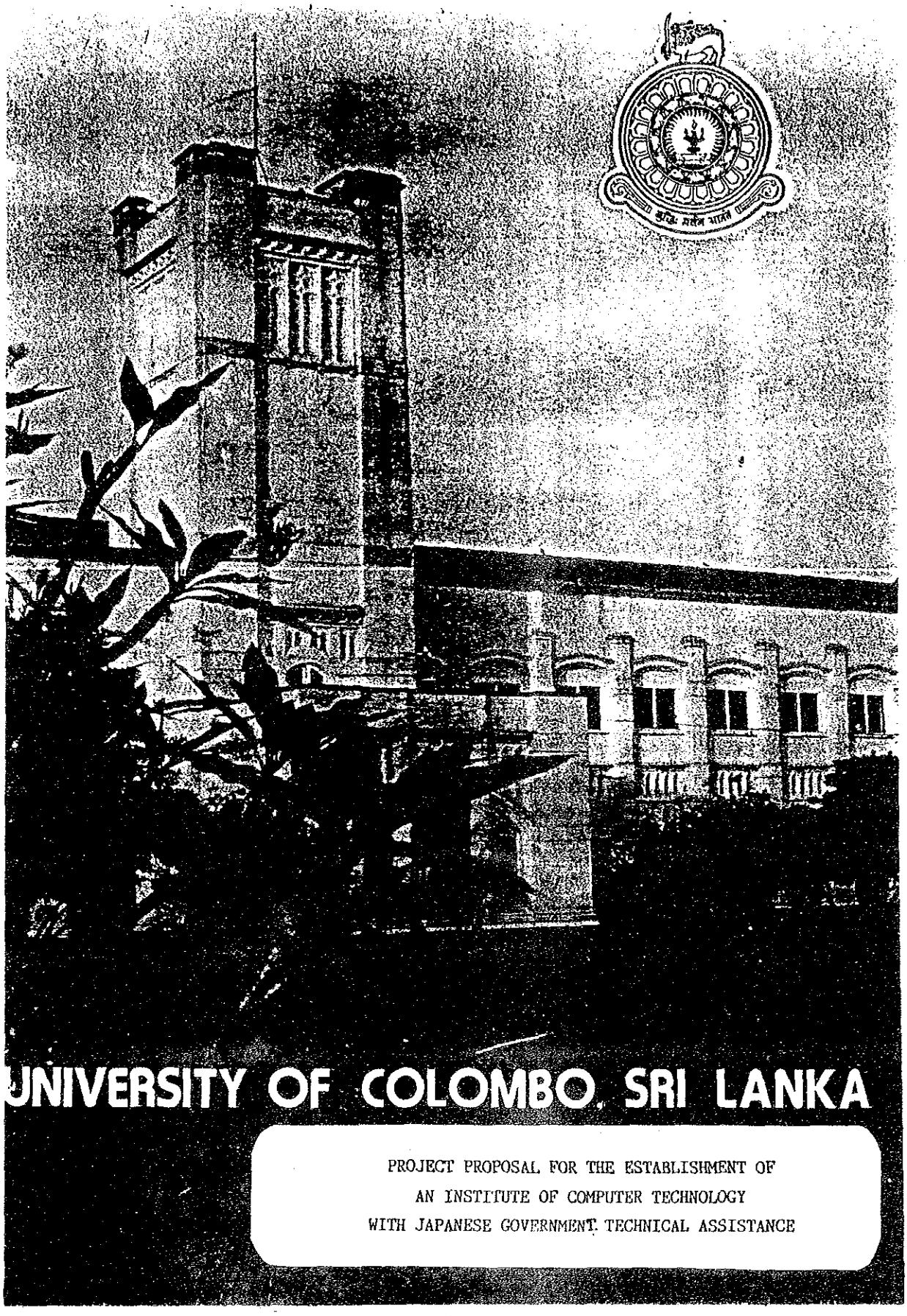
10. 添　付　資　料

10.1 PROJECT PROPOSAL FOR THE ESTABLISHMENT OF AN INSTITUTE OF COMPUTER TECHNOLOGY WITH JAPANESE GOVERNMENT TECHNICAL ASSISTANCE



UNIVERSITY OF COLOMBO, SRI LANKA

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AN INSTITUTE OF COMPUTER TECHNOLOGY
WITH JAPANESE GOVERNMENT TECHNICAL ASSISTANCE

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REVISED PROPOSAL PREPARED BY
THE DEPARTMENT OF STATISTICS AND COMPUTER SCIENCE

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I SUMMARY

The University Grants Commission under the Ministry of Higher Education as well as the Computer and Information Technology Council of Sri Lanka (CINTEC), both functioning under H. E. the President have decided that the Computer Facility at the University of Colombo should be developed further to be a Centre of Excellence in Computing, with emphasis towards software. The University has over the last few years developed its computing resources both material and human, and is in a position to expand. The UGC has established a Department of Statistics and Computer Science at the University of Colombo commencing 1. 1. 85.

A proposal to establish an Institute of Computer Technology was first submitted in September 1983 to the Japanese Government by the Sri Lanka authorities. This was followed by a detailed project proposal submitted to the Japanese mission that visited the country in March 1984. A special team including a computer expert visited Sri Lanka in April 1984 and Prof. V. K. Samaranayake visited Japan and Singapore in May 1984. Several discussions have taken place since then and the present project proposal is a redraft of the original proposals in the light of experience gained in the various discussions as well as the recent progress made by the University of Colombo in this field. The University of Colombo has

prepared a comprehensive Computer Policy Document and the proposed Institute of Computer Technology occupies a central role in its development program. The Government of Sri Lanka has also included this project in its publicaton " Public Investment - 1985 - 1989 " released in May 1985 by the National Planning Division of the Ministry of Finance and Planning.

The Project envisages a mainframe computer installation at Colombo with Japanese Government Technical Assistance. A team of Japanese experts are expected to help in initiating the programmes of the Institute. The duration of the project is five years after which Sri Lankan staff are expected to gain adequate competence to run the Institute on their own. The Institute would cater to the following major needs of the country.

1. Production of graduates with an adequate knowledge of computer technology and applications through courses made available to the students of the Department of Statistics and Computer Science as well as others in the University.

2. Production of professional Analyst/Programmers through a special one year course launched by the Institute.

3. Provision of the computer power needed by the Colombo University to function as a Centre of Excellence in Computing.

It is expected that the mainframe computer installed under the project will be put to maximum utilisation through the implementation of all three aspects.

The Institute and the Department of Statistics and Computer Science both functioning as integral parts of the University would be housed in the same building and be of mutual benefit.

II INTRODUCTION

The proposal for the establishment of an Institute of Computer Technology at the University of Colombo was initiated by Professor Mohan Munasinghe, Senior Energy Advisor to H.E. the President and Chairman of the Computer and Information Technology Council of Sri Lanka (CINTEC) and by Dr. Stanley Kalpage, Chairman, University Grants Commission and Secretary, Ministry of Higher Education. The University of Colombo, which first introduced computer programming courses as far back as 1967, embarked on a policy of introducing computer studies in the late seventies and by 1982 had established computer facilities with a mini computer and several microcomputers and conducted several courses for its own undergraduates as well as for outsiders. As such the University of Colombo was in a position to undertake this project.

A committee chaired by Prof. Munasinghe and including Prof. V. K. Samaranayake of the University of Colombo prepared a National Computer Policy for Sri Lanka in early 1983 as an assignment for the Natural Resources, Energy and Science Authority of Sri Lanka (NARESA) at the request of H.E. the President. This report recommended the University of Colombo as one of the Centres of Excellence in Computing that should be developed further. This report resulted in the establishment of CINTEC under the chairmanship of Prof. Munasinghe. Prof. Samaranayake under whose leadership this Computer Centre will develop is a member of CINTEC Council and is also the Chairman of its Education Committee.

The Government of Sri Lanka is committed to the promotion of computer usage in Sri Lanka and the development of computer technology in the country. It is aware of the great potential of its educated youth who could be trained as software resources that is becoming expensive elsewhere in the world. With declining hardware costs, a software industry would thrive here as is evident from the few commercial establishments

already in the business of software development for export and local consumption. H.E. the President as well as several ministers have made public declarations of their committment to the development of computer technology and given encouragement for computer usage in this country. These intentions have been followed up by computerisation of many public and private sector institutions such as the Banks, key State Institutions such as the Port of Colombo, Department of Telecommunications, and the Electricity Board. The Ministry of Education has initiated its own Computer Education Programme for which once again the University of Colombo has given assistance. The UGC through its inter University Committee on Computing has established micro computer laboratories in all Universities. The recently held Senior Executive Seminar for the Public Sector attracted a very encouraging response from the senior government officials. Similarly the CINTEC workshop on Computer Applications in Agriculture resulted in the establishment of a working group on Computer Applications in Agriculture. Computerisation is taking place at a rapid pace and the climate is thus right for the establishment of the proposed Institute to provide professionally trained manpower as well as the technical support.

In early 1983, the University Grants Commission sought the help of Prof. Colin Reeves, Professor and Head of the Dept. of Computer Science of the University of Keele to submit a report on the introduction of Computer Studies in the higher Educational Institutes of Sri Lanka. His report submitted in March 1983 and accepted by the UGC as a guideline for computer development in the universities also recommends the University of Colombo as a Centre of Excellence.

The Reeves report states that

"Alone amongst the Sri Lankan Universities, the University of Colombo can claim to be equipped with modern computing facilities. These

have, I understand, been financed by commercial initiatives within the Applied Statistics Unit. Great credit belongs to the staff who have pushed these developments through."

The implementation of the Reeves report as well as British Funding received by the University of Colombo under the Statistics Link with the University of Reading, and other grants from the UGC and the Netherlands Universities Fund for International Cooperation (NUFFIC) had made it possible to build up the University of Colombo Computer Centre to its present state which could be called the best computing facility in any University.

It is worth noting that during the period of negotiations for the present project, the number of microcomputers at the centre has almost tripled. The full list of equipment available is given in Appendix II.

The project proposal was first formulated in 1983 and submitted to the Japanese Authorities through the University Grants Commission, the Ministy of Higher Education, the National Plannig Division and the External Resources Department of the Ministry of Finance and Planning with the continuing support of the Computer and Information Council of Sri Lanka (CINTEC). H. E. the President himself has endorsed this proposal. All relevant government departments have approved the project.

The recently published document " Public Investment 1985 - 1989 " in its section on Technical and Vocational education states :

" New academic disciplines likely to be of importance to Sri Lanka in the future such as Computer Science, will also be encouraged in all universities and the centres of excellence in the discipline will be at the Universities of Colombo, Peradeniya and Moratuwa."

III THE UNIVERSITY OF COLOMBO

The University of Colombo which is the location of the proposed Institute was first established in 1921 as the Ceylon University College, affiliated to the University of London. It became the University of Ceylon in 1942 when Sri Lanka (then Ceylon) established its first University. Although this University began shifting its faculties to a new site at Peradeniya from 1952, the Science Faculty did not shift as the authorities, feeling the need for more Universities established a second Science Faculty at Peradeniya leaving the Colombo Faculty intact. In 1967 the University split with the Colombo part becoming the University of Colombo.

The Computer Centre of the University of Colombo had its origin in the late sixtees when computer programming was taught at the University of Colombo. In 1976, a desktop computer was obtained on British aid to be followed in 1981 by the purchase of a Data General Eclipse S/140 scientific mini computer. Since then the Computer Centre has expanded and comprises of 13 terminals including a graphics terminal and micro computers with locally developed terminal emulators attached to the mini computer, a Radio Shack T 80-model 16 system (using the Motorola 68000 16 bit processor) with 3 terminals and the Xenix operating system, a Microcomputer laboratory with 30 BBC microcomputers networked together to share common facilities and 30 more microcomputers for research and development work. The full configuration is listed in Appendix II.

At the moment the Computer Centre provides training for a large number of undergraduates and also conducts weekend classes in programming to an interested clientale in both the public and private sectors. It also helps in research and provides a Data Processing Service to clients both within and outside the University. The main area of specialisation is Statistical applications and the Centre has third party software such as MINITAB and GLIM as well as staff trained in both Statistics and

Computing to cater to the specialised needs of most clients. The Centre is also developing a data base on crop and climatic data under a collaborative research project between the Statistical Unit of the University of Colombo and the Department of Applied Statistics of the University of Reading, U.K.

The Computer Centre as well as the Dept. of Statistics and Computer Science is headed by Prof. V.K. Samaranayake, who is a Professor of Mathematics and a Senior Associate of the International Centre for Theoretical Physics, Trieste, Italy. He has considerable experience in administration having been Head of Department, Dean of Faculty, President of a Campus and acting Vice Chancellor. He has travelled widely and has worked at several international research centres and has a good knowledge of the working of computer centres elsewhere, such as for example CERN in Geneva. His first experience with computers was over 20 years ago as a research student at the University of London, using a computer for his work on High Energy Physics. Since his return to Sri Lanka in 1967, he has pioneered the programme of training of computer personnel and most of the Computer Programmers/Systems Analysts in employment today in Sri Lanka are graduates of Science who have passed out from his University of Colombo. He has been responsible for the rapid build up of the Computer Centre to its present state in a short period of 4 years since the purchase of the mini computer and has a devoted group of staff under him, many of whom are receiving further training or are due for training in the U.K. A list of existing staff is given in Appendix I.

In June 1984, the University of Colombo organised the first ever Asian Regional College on Microprocessors - Technology and Applications sponsored by the International Centre for Theoretical Physics, Trieste, Italy with the help of an international faculty including many from CERN, the European Nuclear Research Centre. Prof. Samaranayake was a Co-Director of the College. Financial support for the College came from IAEA, UNESCO, UN University, The Asia Foundation, CIDA, NORAD and the Commonwealth Secretariat together with Local sponsors CINTEC and the UGC.

In September 1984, the University of Colombo cosponsored with the British Council and the Sri Lanka Foundation a two week residential course for school teachers on computer literacy.

In December 1984, a six week International Course on Statistics in Agriculture was conducted by the University of Colombo in collaboration with the University of Reading, U.K. making extensive use microcomputers. A Statistics package (INSTAT) specially developed for the BBC microcomputer by Reading and Colombo was used throughout the course with excellent results.

The Staff at the University of Colombo Computer Centre has been involved in several projects among which are the conversion of the BBC microcomputer into a terminal for the Data General Mini Computer and the development of a sinhala character set for display, presently used by the National TV. The development of the Statistical package INSTAT jointly by Colombo and Reading is another example. Our efforts to recruit and train staff have progressed well with several presently undergoing training in the U.K. and six more due to leave for training in the U.K. soon.

The proposed Institute would function under the University of Colombo and work in close collaboration with the Department of Statistics and Computer Science set up in 1985. The new building proposed for the Department will also house the Institute as shown in Appendix III.

The location of the University of Colombo in the commercial capital of the country in close proximity to the majority of computer installations and with less infrastructure problems with regard to electricity, telecommunications etc. makes it an ideal location capable of serving a large clientale.

IV THE PROPOSED INSTITUTE OF COMPUTER TECHNOLOGY

OBJECTIVES:

(a) To train Analyst Programmers to meet the needs of the country. Training will not be restricted to any particular area but will cover scientific, business and other application areas presently needed in Sri Lanka. There is a rapid growth in the number of computer installations in Sri Lanka and a marked increase in the number used for management, research and development. There is already an immediate need for Analyst Programmers capable of diverse applications.

(b) To improve the quality of training given to the undergraduate students of the University of Colombo in Computer Science and Applications. On graduation, these students would take up responsible positions in research institutes and in government and private sector organisations involved in research and development work. They would also go into management and administrative positions in both the public and the private sector. It is expected to expose all students of the university to the computer while allowing those who need computer applications and computer science courses all facilities required. With the establishment of a Department of Statistics and Computer Science at the University of Colombo from 1985, this need has become extremely important, particularly to the students in the department who are expected to follow courses in Computer Science with a bias towards software. The training of trainers for the large number of higher educational institutes including technical colleges and polytechnics which would include some element of computing in their curricula is also envisaged.

(c) To provide a thorough Systems Analysis/Programming course for programmers already in service but with little or no formal training in Systems Analysis in order to enable them to perform their tasks more efficiently.

(d) To provide computing facilities for the staff of the University for their research and development work which in turn would become valuable material for teaching applications to the students.

COURSES PLANNED:

The following courses are planned to achieve the above objectives:

(a) A one year full time course leading to a Diploma in Computer Applications producing Analyst/Programmers. It is anticipated that high quality students would join this course.

(b) Provide course units in certain specified areas such as Data Base Management, Systems Analysis, Software Engineering to the undergraduatesin the department of Statistics and Computer Science.

(c) Provide a Postgraduate Diploma in Computer Technology for programmers in service with a minimum of two years experience, to update their knowledge. Lectures, practicals and project work will be included and the project will have relevance to the work place of the candidate. This course will be held after hours, as it is designed for those employed as Analyst Programmers.

OTHER ACTIVITIES ENVISAGED:

It is expected that computing facilities of the Institute will be available to the Deptartment of Statistics and Computer Science for its own teaching programs and for extension courses.

STAFF:

The Institute will be headed by a Director who will be the counterpart to the Japanese team leader. All local staff will be employed by the University. It is envisaged that new staff will be recruited to the Institute to supplement those presently attached to the Deparment of Statistics and Computer Science. It is expected that a total of 12 local staff and 6 Japanese staff would be needed. The Japanese staff would be expected to be available for the duration of the project.

Instead of employing a large number of staff both local and foreign, the Institute will manage with the above numbers, supplemented by staff of the Department of Statistics and Computer Science and visiting staff from local installations, thus bringing in real life experience. Local staff recruited to the Institute are expected to be trained in Japan before the commencement of courses and continue their training at the Institute, with assistance from the Japanese experts.

The University staff in Computer Science and some of the other disciplines such as Statistics, Physics and Mathematics would be attached to the Institute on a part time basis and would play a role in the teaching of computer applications and in giving the students experience in a wide range of computers and computer applications. As this is a University based project, it is expected that staff with high calibre would be available.

MAINTENANCE :

In view of the absence of local agents for any Japanese mainframe computer in Sri Lanka, it is suggested that maintenance personnel be trained from the staff of the Institute before installation in Japan and also during and after installation in Colombo. The Institute will recruit adequate personnel for this purpose. It is expected that a maintenance engineer from the manufacturer would be stationed at the Institute during installation and for a sufficient period thereafter.

V ASSISTANCE REQUIRED FROM THE JAPANESE GOVERNMENT

5.1 EXPERTS:

The project envisages the need for employment of Japanese experts for the initial teaching as well as the training of counterpart staff who would also undertake teaching as the project progresses. Experts will be needed in the following areas:

1. Systems Analysis and Design
2. Higher Level Languages and Scientific Applications
3. Business Applications
4. Data Base Management Systems and Management of Information Systems
5. Operating Systems and Systems Engineering
6. Hardware Maintanence

5.2 HARDWARE:

The establishment of the Institute Computer of Technology requires the installation of sufficient computer hardware for training purposes of the Institute. In view of the objectives listed earlier, it is expected that the minimum configuration required would be:

2 sets	CPU with a processing speed of at least 2.0 MIPS, Floating point hardware and at least 4MB of internal memory each with Cache memory of at least 32KB.
2000 MB	Hard Disk and disk controllers
2 sets	Console Terminals
2 sets	Line Printers
60 sets	VDU Terminals
10 sets	Intelligent Terminals
10 sets	Data Entry Stations (Off Line)
2 sets	1600/6250 bpi Magnetic Tape Drives and Controllers
10 sets	Dot Matrix Printers
2 sets	Letter Quality Printers
1 set	Laser Printer
20 sets	Personal Computers with peripherals and with the possibility of interfacing to the main computer as a terminal emulator and file server.
2 sets	Graphic Terminals
2 sets	Plotters
1 set	Diagnostic Equipment

As the project is for a five year duration, it is important that the hardware is not outdated and is upgradable. Also important is the possibility for the terminals to be used with reasonable response. Considering these aspects, the following technical requirements are listed as important aspects to be considered.

PERFORMANCE:

High MIPS rate, concurrent use of 128 peripherals with reasonable response together with 24 background tasks, virtual space of 2Mb per process, 64 bit data paths for main memory, pipeline architecture.

UPGRADABILITY:

Main memory upto 16Mb, Hard disk upto 20Gb, Number of Terminals upto 100.

INSTALLATION:

It is suggested that cable layout should be optimised using a wide band Local Area Network.

5.3 SOFTWARE:

Software to include an efficient operating system allowing interactive time sharing and other modern facilities while allowing batch processing as well, ASSEMBLER, compilers for high level languages, Data Base Management Package, Mathematical Library, Statistical Analysis Packages, Business Application Packages etc. High level languages should include FORTRAN 77, PASCAL, BASIC ,PL/1 and COBOL. The ability to have UNIX operating system and fourth generation application generator would also be desirable.

5.4 OTHER EQUIPMENT:

Other related equipment needed would be:

Modems
Voltage Stabilisers
Uninteruptable Power Supply Unit
Dehumidifiers
Standby Generator
Internal Telephone System
Personal Computers Interfaced to Typewriters for Word Processing

Audio visual equipment required are:

10 sets Overhead Projectors and Screens.
2 sets Slide Projectors and Screens
2 sets Large Screen Computer Projection Equipment
2 sets Video Cassette Recorders
5 sets Large Colour Monitors
2 sets Public Address Systems
1 set Photocopiers
1 set Offset Printer
1 set Duplicating Machine

The Institute would also require books and journals. It is proposed that a common library to serve the Institute as well as the Department of Statistics and Computer Science be established using the existing stock and future purchases to the department from other sources. Space for a library cum reading room is provided in the building plan. A small collection of books is already available to form the nucleus of the library.

5.5 TRAINING:

The project envisages the training of counterpart staff in Japan so as to enable them to undertake teaching at the Institute. It is expected that there will be at least two such counterparts to each expert. Maintanence staff are also expected to be trained in Japan before installation so that they may take part in the installation and subsequent maintanence with the assistance of the expert recruited for maintanence.

VI FACILITIES PROVIDED BY THE UNIVERSITY OF COLOMBO

The University of Colombo will provide the space, services and counterpart staff for the project. A building consisting of 40,000 square feet on four floors will be built soon to house the Department of Statistics and Computer Science, the present Computer Centre and the Institute. Plans are shown in Appendix III.

Services such as power, water and furniture will be provided by the University. However, Japanese Government assistance for the provision of audio visual and office equipment would be expected.

Counterpart staff for the Institute will be provided on the basis of two per each Japanese expert. In addition the staff of the Department of Statistics and Computer Science and the Computer Centre will be made available for work at the Institute.

Provision of administrative and support staff as well as recurrent expenditure will also be the responsibility of the University of Colombo.

Although the undergraduate courses are free of charge, a nominal fee will be charged for the analyst/programmer course to cover part of the running costs. The use of the computer installation during week ends for the certificate course now conducted using the existing equipment will enable the Institute to be self supporting to some extent. The week end courses requires the use of the computer facilities for 8 hours each on Saturdays and Sundays and could in return provide funds for the operating costs of the Institute, thus ensuring that the Institute would be independant of state funding while providing the major courses free of charge.

VII CONCLUDING REMARKS

The project proposal presented in this document replaces the earlier proposals and should be used as a working document for the Preleminary Mission. Discussions at this stage between the Mission, the University of Colombo and the Sri Lanka Government we expect will help to modify and strengthen the project proposal.

It should be noted that we have now steered away from the more general proposal initially proposed, to a more specfic proposal.Considerable development of computing at Colombo has taken place since 1983, when the very first proposal was submitted. It will be mutually beneficial to the proposed Institute and the new Department of Statistics and Computer Science to work in cooperation with each other and sharing the resources.

We have also looked at the funding required to successfully implement the project. The University of Colombo has requested Rs. 10 million for a building to house the Department of Computer Science and the proposed Institute. Additional capital costs have also been requested. As for recurrent costs, continuation of the present week- end certificate courses at the Institute on a fee levying basis would allow the Institute to be less dependent on the State for running costs and and also help to run the week day courses free of charge.

Computer technology is changing fast. During the last two years, when the project was being developed, we have seen changes in hardware and software available. At the same time the computer facilities and teaching programs at the University of Colombo has expanded. Thus it is important that hardware and software provided under the Technical Assistance scheme does not become obsolete soon after the project is launched.

APPENDIX I

PRESENT STAFF OF THE DEPARTMENT OF STATISTIICS AND COMPUTER SCIENCE

01. Professor V. K. SAMARANAYAKE
B.Sc. (Cey.), Dip. Stat. (Vidyodaya), D.I.C., Ph.D. (Lond.)
Coordinator, Statistical Consultancy and Data Processing Service.
Professor of Mathematics &
Head, Dept. of Statistics & Computer Science and Computer Centre.

02. Dr. (Miss) S. ABEYASEKERA.
B.Sc. (Cey.), M.Sc. (Cey.), M.Sc.(Reading), Ph.D. (Cey.)
Senior Lecturer and Head, Statistical Unit.

03. Mrs. A. KARUNARATNE
B.Sc. (Cey.), Dip. O.R. (Rome)
Lecturer

04. Dr. (Mrs.) L. H. LIYANAGE
B.Sc. (Cey.), M.Sc., Ph.D. (Wollongong)
Lecturer

05. Mr. KEVIN SENEVIRATNE
B.Sc. (Cey.), M.Sc. (Cey.)
Ph.D. student in Statistics & Computer Applications.
Presently at University of Reading, U.K. due end of June with Ph.D.
Assistant Lecturer

06. Mr. S. SIVAGANESHAN
B.Sc. (Cey.), M.Sc. (Birmingham)
Ph.D. student in Statistics in the U.S.A.
Assistant Lecturer

07. Miss D. S. JAYAWARDENA
B.Sc. (Cey.), M.Sc. (Cey.)
Assistant Lecturer,

08. Mr. N. D. KODIKARA
B.Sc. (Cey.), Dip. Stat. (Cey.), M.Sc.(Computation - Manchester)
Due to proceed to U.K. for Ph.D. in Computer Science
Assistant Lecturer.

09. Mr. D. P. LIYANAGE
B.Sc. (Cey.)
Presently at University of Nottingham following M.Sc in Computer Science. Due back in 1987 with Ph.D.
Assistant Lecturer.

10. Mr. M. J. N. PEIRIS.
B.Sc. (Cey.)
Trained at CICC, Tokyo for six months. Due to leave for U.K. for M.Sc. in Computer Science.
Systems Analyst/Programmer.

11. Mr. S. T. NANDASARA
    B. Dev. (Cey.)
    Presently at Essex reading for M.Sc. in Computer Science. Due back in late 1985.
    Statistical Officer.

12. Mrs. W. M. LIYANAGE
    B.Sc. (Vidyalankara), Dip. Stat. (Vidyodaya)
    Presently at University of Reading, U.K. reading for M.Sc. in Applied Statistics
    Statistical Officer

13. Mr. M. R. P. SILVA.
    B.Sc. (Col.)
    Trained at CICC, Tokyo for six months. Due to leave for U.K. for M.Sc. in Computer Science.
    Systems Analyst/Programmer.

14. Mr. D. R. WEERASEKERA,
    B. Sc. (Cey.), Dip. Stat. (Col.)
    M.Sc student in Applied Statistics.
    Due to leave for U.K. for training in Medical Statistics
    Statistical Officer

15. Mr. G. K. A. DIAS
    B.Sc. (Col.)
    Presently at University of Reading, U.K. Will be reading for a M.Sc. in Computer Science from October 85.
    Systems Analyst/Programmer.

16. Mr. R. L. PEARS
    B.Sc. (Cey.)
    Due to leave for the U.K. for M.Sc. in Computer Science.
    Systems Analyst/Programmer

17. Mr. V. MANUKULASURIYA
    B.Sc. (Col.)
    Systems Analyst/Programmer

18. Mr. M. G. N. A. S. FERNANDO
    B.Sc. (Col.)
    Research Assistant

19. Mr. A.P.S.R. SOMASIRI
    B.Sc. (Col.)
    Research Assistant

20. Mr. P.N.P. FERNANDO
    B.Sc. (Col.)
    Research Assistant

21. Mr. K. GOONETILLAKE
    B.Sc. (Col.)
    Trainee Programmer

22. Mr. K.M.F.P. FERNANDO
    B.Sc. (Col.)
    Trainee Programmer

23. Mr. J.R. LANKAPURA
    B.Sc. (Col.)
    Trainee Programmer

24. Mr. G.P. SENEVIRATNE
    B.Sc. (Col.)
    Trainee Programmer

25. Mr. L.P. JAYASINGHE
    B.Sc. (Col.)
    Trainee Programmer

26. Miss. S. ADIKARI
    B.Sc. (Col.)
    Trainee Programmer

27. Mr. G.N. WIKRAMANAYAKE
    B.Sc. (Col.)
    Trainee Programmer

28. Miss. I.U. GOONETILLAKE
    B.Sc. (Col.)
    Trainee Programmer

29. Mr. P.B. PERERA
    B.Sc. (Col.)
    Trainee Programmer

30. Miss L.S. SAMARASINGHE
    B.Sc. (Col.)
    Trainee Programmer

31. Mr. K. L. GUNAWARDANA
    Technical Assistant

32. Mrs. M. K. SENEVIRATNE
    Institute of Statistician Preliminary, N.D.T. (Com.Sc.)
    Statistical Clerk

33. Mrs. S. RAJAPAKSE
    Data Entry Operator

34. Mr. M. D. SUMANASENA
    Data Entry Operator

35. Miss. A. RAJAPAKSE
    Clerk

36. Miss R.K. P. WICKREMASINGHE
    Stenographer

APPENDIX II

COMPUTER EQUIPMENT PRESENTLY AVAILABLE AT THE DEPARTMENT OF STATISTICS AND COMPUTER SCIENCE, UNIVERSITY OF COLOMBO.

A. MINI COMPUTER SYSTEM:

DATA GENERAL ECLIPSE S/140 MINI COMPUTER with
512KB Main Memory and Floating Point Hardware
2 x 25 Mb Winchester Hard Disk
1 x 800/1600 bpi Magnetic Tape Drive
1 x G300 Graphics Terminal
3 X G200 VDU Terminals
5 x G100 VDU Terminals
5 x BBC Microcomputers interfaced as Terminals
1 x Printer

AOS Operating System, FORTRAN IV, FORTRAN V, BUSINESS BASIC
Statistical Packages MINITAB and GLIM. (SPSS on order)

B. RADIO SHACK - TANDY - TRS 80 - 16 MICROCOMPUTER SYSTEM

TRS 80 - 16 Microcomputer (16 bit Motorola 68000 and Z80)
512Kb Main Memory
3 x user Terminals
1 x 10Mb Winchester Hard Disk
2 x 1.28 Mb 8" Floppy Disk Drives
1 x Dot Matrix Printer

DOS OS, XENIX (UNIX equivalent), PASCAL, FORTRAN, BASIC, C
PROFILE 16, MULTIPLAN, VISICALC

C. BBC MICROCOMPUTER LABORATORY (NETWORKED)

13 x BBC Microcomputers with Econet and Disk interface
17 x BBC Microcomputers with Econet
08 x Dual Disk Drives (800K)
08 x Single Disk Drives (400K)
01 X Single Disk Drives (100K)
12 x 6502 Second Processors
05 X Z80 Second Processors
02 x EPSON FX80 Dot Matrix Printers
09 x Colour Monitors
01 X Cassette Recorder
01 X Electron Microcomputer
21 x Monochrome Monitors
01 x SONY 26" Television (colour)

BBC BASIC, ISO-PASCAL, VIEW WORD PROCESSOR, LOGO, FORTH, LISP, BCPL

D. Stand alone BBC Microcomputers

01 x BBC Microcomputer
10 X BBC Microcomputers with Disk interface
04 x 6502 Second Processors
01 x Z80 Second Processors
01 x EPSON FX80 Dot Matrix Printers
01 x EPSON MX80 Dot Matrix Printers
02 x Single Disk Drives (400k)
06 x Dual Disk Drives (800 k)
01 X Parfit Plotter/Digitiser
02 x Numeric Key Pads
02 x Brother CE60 Typewriters interfaced to the BBC's
03 x Monochrome Monitors
01 x Televison set (14" colour)

BBC BASIC, ISO-PASCAL, TURBO PASCAL, VIEW WORD PROCESSOR, FORTRAN, LOGO, FORTH, LISP, BCPL

MINITAB, INSTAT

E. Other Microcomputers

(1) IBM PC XT with 256 Kb memory, 10 Mb Hard Disk and 1.28Kb Floppy Disk Drive

(2) WANG PC with 256 Kb memory, 10MB Hard Disk, 1.28Mb Floppy Disk Drive, Printer and IBM PC emulator

(3) KAYPRO-2 with built in Modem and Dual Floppy Disk drives

F. On order:

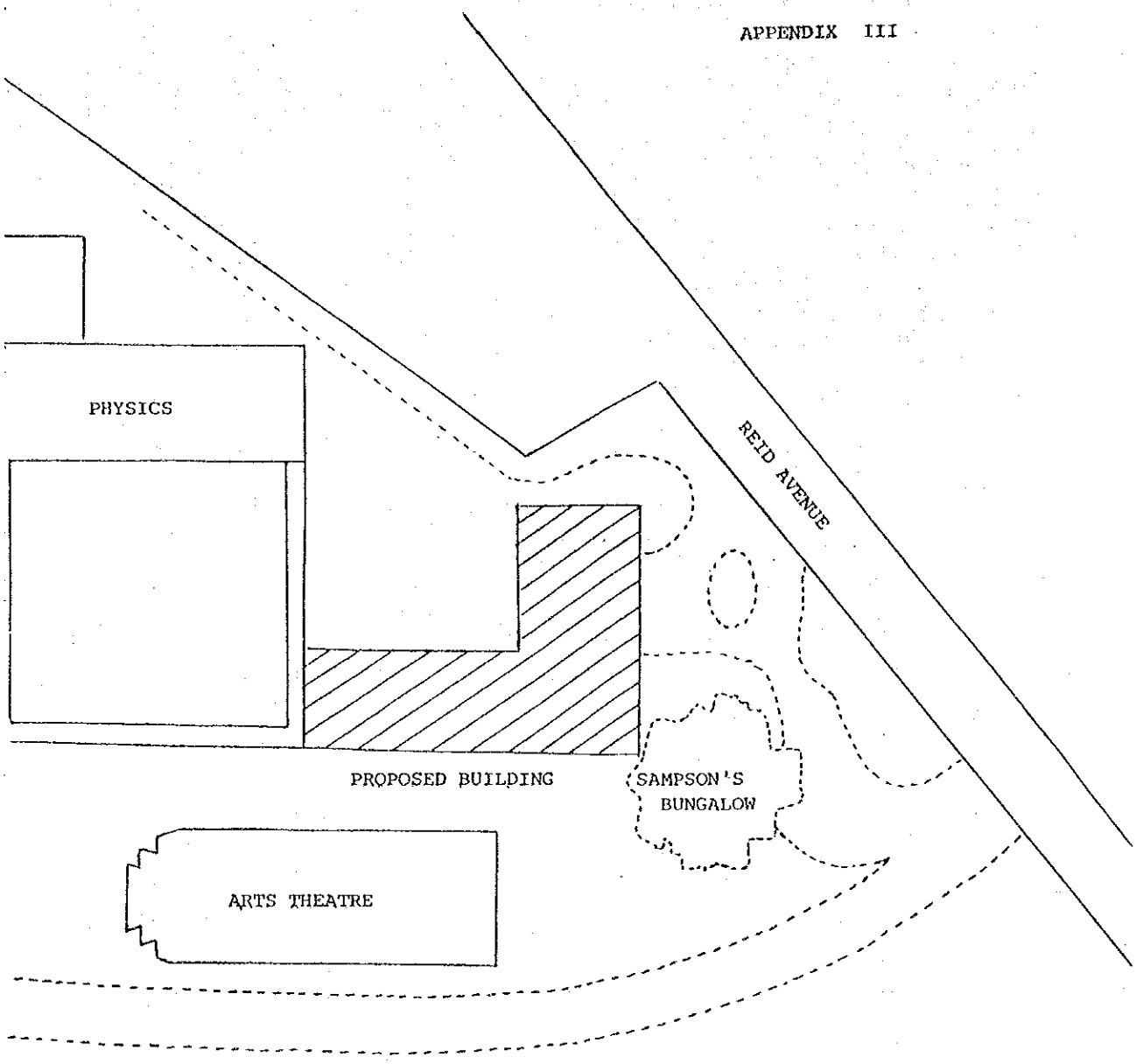
4 x BBC Microcomputers with Disk Interface
4 x BBC B PLUS Microcomputers
1 x 30 Mb Hard Disk for BBC Microcomputer network

The above computer systems have been obtained from funds made available by

1. The University Grants Commission,
2. The Overseas Development Administration, U.K.
3. The Netherlands Universities Fund for International Cooperation

and from funds generated by the Statistical Consultancy and Data Processing Service of the University.

APPENDIX III



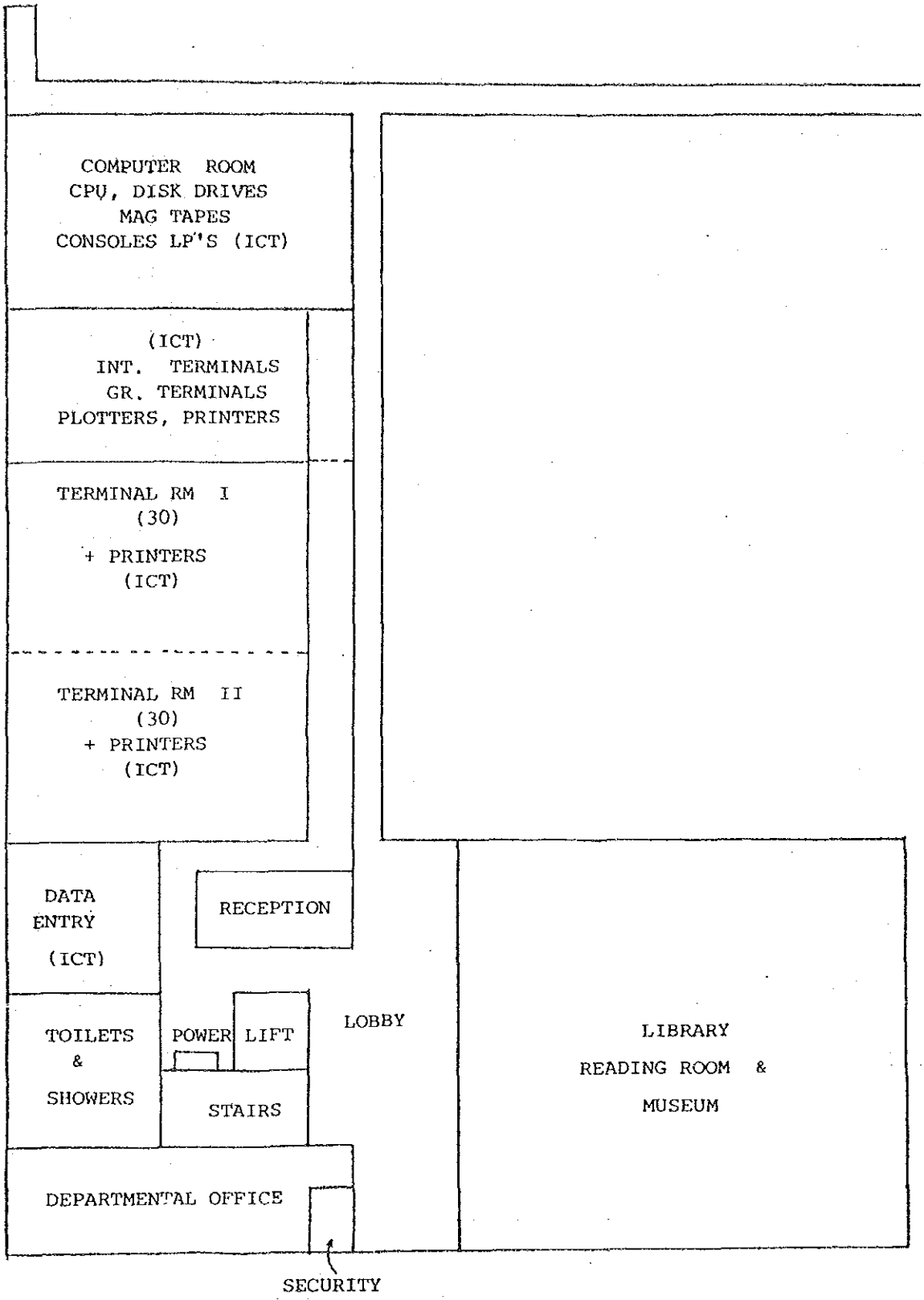
PROPOSED BUILDING FOR

THE DEPT. OF STATISTICS & COMPUTER SCIENCE,

THE UNIVERSITY COMPUTER CENTRE &

THE INSTITUTE OF COMPUTER TECHNOLOGY

UNIVERSITY OF COLOMBO



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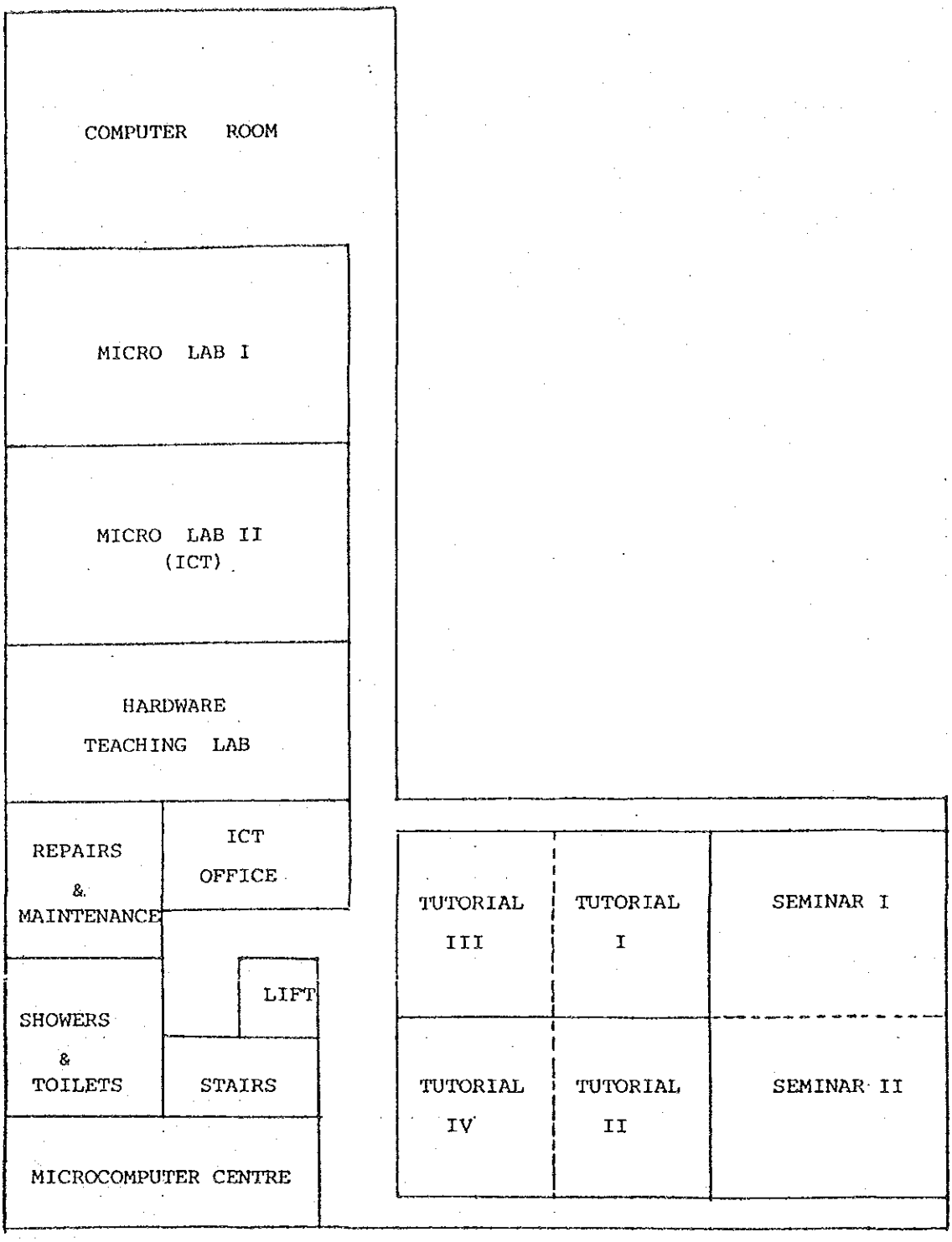
(FULLY AIR CONDITIONED)


COMPUTER ROOM
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MICRO LAB II
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MAINTENANCE
ICT
OFFICE
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SHOWERS
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TOILETS
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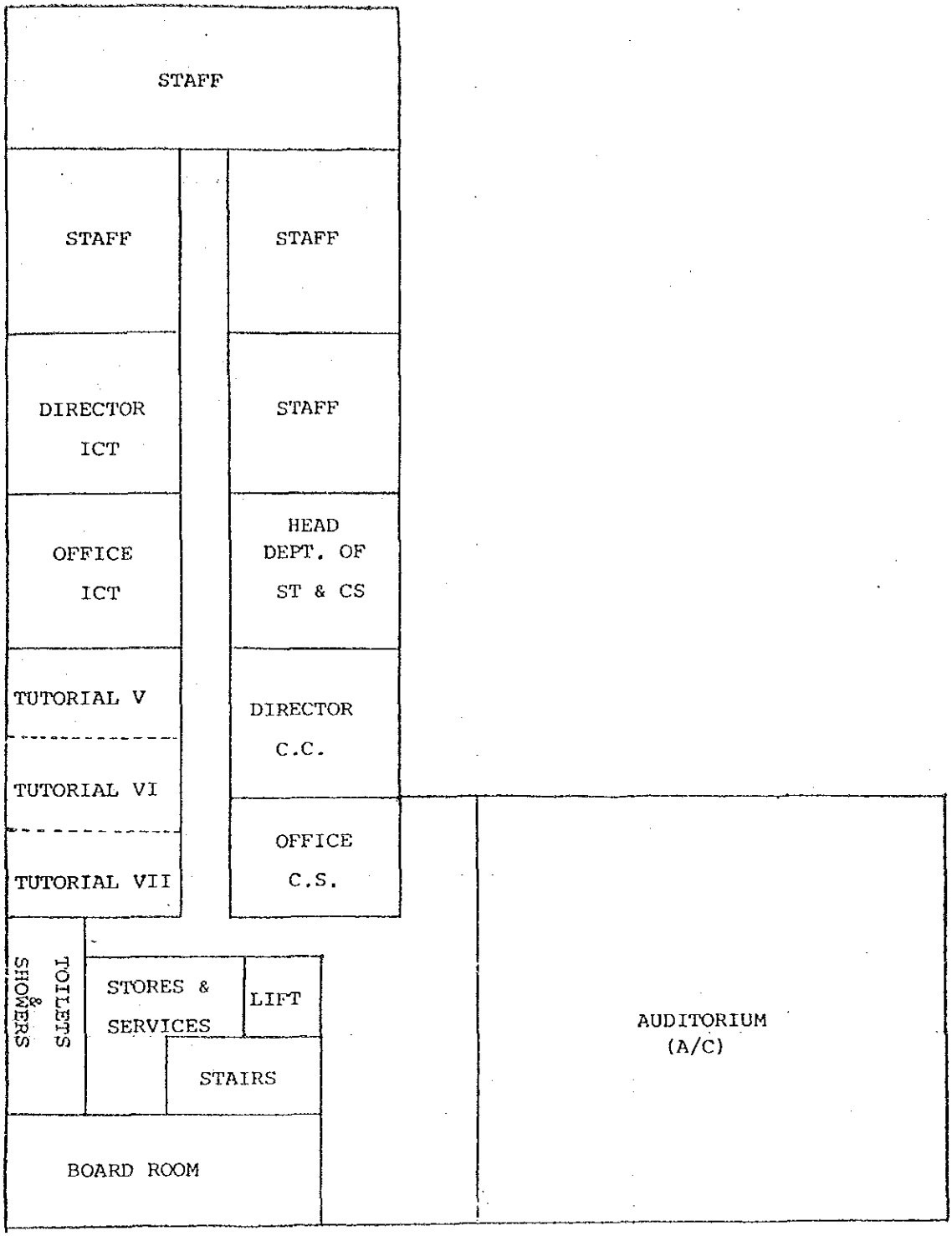
SEMINAR II

FIRST FLOOR



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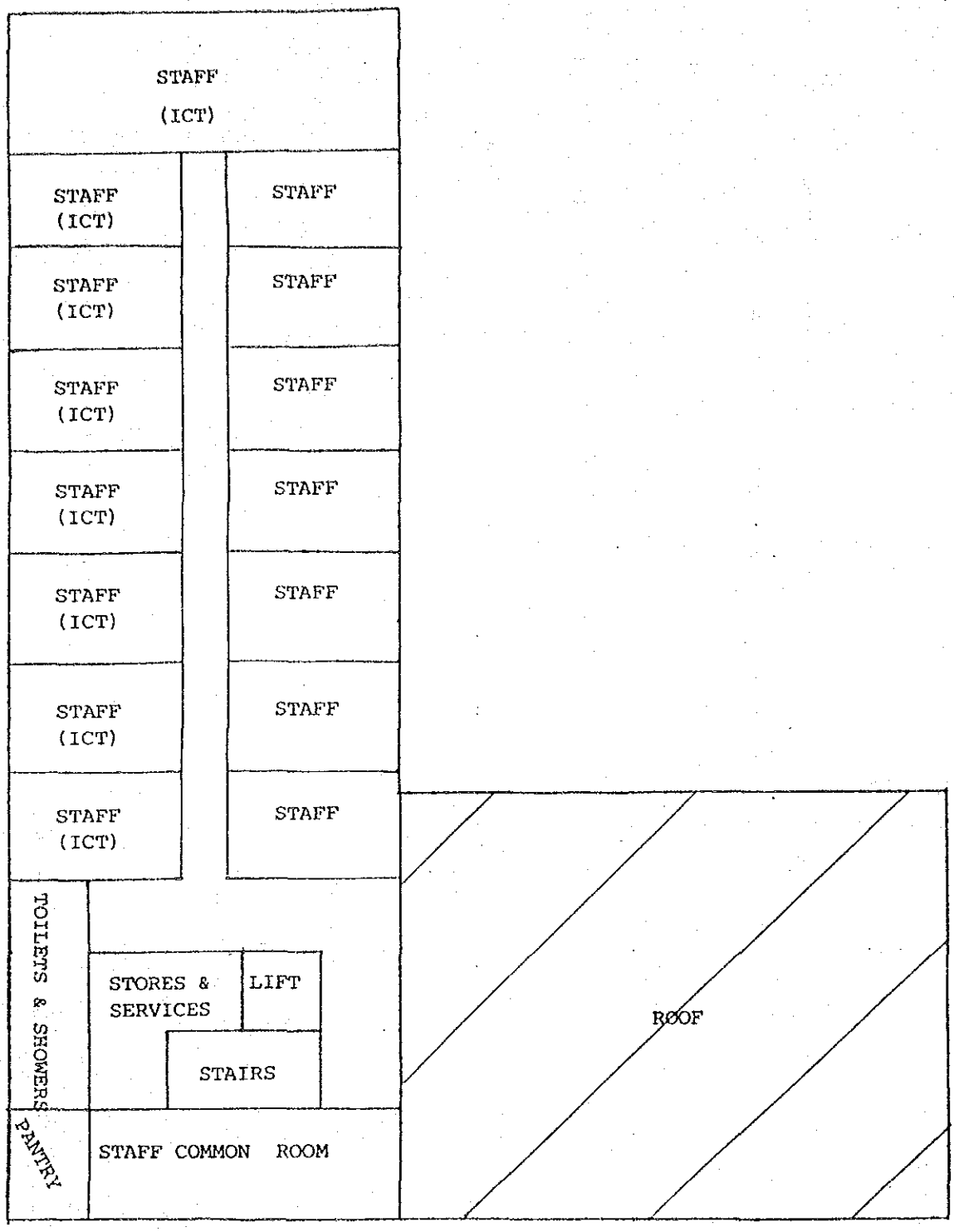
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STORES &
SERVICES
LIFT
STAIRS
PANTRY
STAFF COMMON ROOM
ROOF

THIRD FLOOR

APPENDIX IV

COMPUTER POLICY OF THE UNIVERSITY OF COLOMBO

(This does not outline future policy only but includes past and current activities of the University Computer Centre)

1. To establish a Centre of Excellence in Computer Science with emphasis on software development to serve the training, research, and developmental needs of the country in the area of Computer Technology bearing in mind the importance of applications of Computer Technology in all disciplines, as has been recommended in the National Computer Policy.

2. To set up a central computing facility to serve all departments of the University, ideally with a network. To help establish departmental computer units where necessary, although pooling of resources to develop a central facility would take priority.

3. To achieve the goal of providing computer literacy to all staff and students of the University and providing programming skills to all those who would need to use computers in their own disciplines.

4. To work in close collaboration with other university departments in providing an integrated curriculum in computer related disciplines and in computer applications. To promote the use of Computer Assisted Teaching.

5. To establish degree courses in Computer Science and Computer Applications with the emphasis on software. To provide training and research facilities in Computer Science and Computer Application

6. To introduce courses of a fundamental nature that are needed to produce Computer Scientists.

7. To help the University Administration, the Library, Sports Council and certain other University bodies to benefit from the Computer Centre by the computerisation of their activities.

8. To act as a training centre for software personnel needed by the various computer installations in the country as well as for export. To cater to the growing needs of the industry for professionals who could use modern computing facilities. To provide a Consultancy Service on purchase, systems design and use.

9. To act as a Central Data Processing Unit and Data Base for scientists of the country engaged in applied research. To build a data base and provide access to such a Data Base from remote research institutes field stations as well as research centres overseas. This is an important aspect in meeting national development needs. To provide a consultancy service in data processing activities at all levels, particularly for scientific research and development.

10. To exploit the location of the University of Colombo in the Commercial Capital of Sri Lanka with good communications facilities to interact with the private and public sectors in mutually beneficial collaborations and also provide training facilities that are beneficial to the employees of these sectors. This would also include collaboration with professional organisations catering to the interests of their members.

11. To actively engage in the promotion of computer applications at all levels through computer literacy and appreciation programmes. To act in close collaboration with the Faculty of Education and the Ministry of Education in supporting the Micro Electronics Programme of the Ministry and the promotion of Computer Education and Computer Assisted Education in the schools.

12. To help the Computer and Information Technology Council of Sri Lanka (CINTEC) in whatever ways possible by providing facilities and manpower to achieve the objectives of the National Computer Policy.

10.2 A NATIONAL COMPUTER POLICY FOR SRI LANKA

A NATIONAL COMPUTER POLICY FOR SRI LANKA

Report of the Special Working Committee
of the Natural Resources, Energy and
Science Authority, Colombo, Sri Lanka

to

His Excellency J.R. Jayewardene,
President of Sri Lanka

April, 1983

TABLE OF CONTENTS

A NATIONAL COMPUTER POLICY FOR SRI LANKA

EXECUTIVE SUMMARY

Chapter I describes the composition and the terms of reference of the committee to formulate National Computer Policy guidelines, set up at the request of H.E. The President, by the Natural Resources, Energy & Science Authority. The task of the committee was to analyse the material already available, and to synthesise an initial set of policy measures consonant with government economic and social objectives.

The challenges and opportunities created for Sri Lanka by rapid world wide developments in computers are identified. In general these developments are favourable to Sri Lanka, given its geographic position, natural abilities of the population, and the current economic and political climate; although there may be some negative effects, such as the erosion of the comparative advantage of low-cost labour due to advances in robotics.

In Chapter II, the 5 main objectives of a National Computer Policy are set out and discussed in further detail. The committee felt that before formulating policy guidelines, it was important to explicitly identify the objectives of a national computer policy.

Chapter III describes the general philosophy underlying the National Computer Policy guidelines, which is to foster initiative and creativity in both public and private sectors, and to co-ordinate, encourage and guide these efforts rather than to control and regulate them. Policy guidelines are set out, regarding acquisition, utilisation and access, computer education, public sector applications, computer literacy and appreciation, self reliance and export of computer services, computer related infrastructure, legal environment, and other areas related to computers.

In Chapter IV the principal recommendations regarding the organisational framework and action programme for policy implementation are discussed. The five main recommendations of the committee are :

(a) The creation of a National Computer Policy Advisory Council (COMPAC) functioning directly under H.E. The President;

(b) The creation of a Central Computer Secretariat to service COMPAC;

(c) The creation of Permanent Committees under COMPAC, on : Computer Education, Computer Applications in the Public Sector, and Telecommunication and Data Transmission;

(d) The identification of and support for Centres of Excellence;

(e) The establishment of channels of communication with the Computer Society of Sri Lanka and other groups interested or involved in the computer industry.

The organisation of the Council, the Secretariat, the committee, and other groups, as well as their role and interactions, are defined. There is also an outline of the role of the Central Computer Secretariat, and the services it is expected to perform.

REPORT OF THE NARESA SPECIAL COMMITTEE ON A NATIONAL COMPUTER POLICY FOR SRI LANKA

CHAPTER I - INTRODUCTION

1.1 Background

At the request of H.E. the President, the Natural Resources, Energy and Science Authority (NARESA) set up a special working Committee in November 1982,to formulate National Computer Policy guidelines and recommend a practical framework and action programme for implementing such policies. The Committee was directed to produce its report by April 1983 and consisted of the following members :-

Dr. Mohan Munasinghe,(Chairman)	NARESA
Mr. R.B. Ekanayake	Bank of Ceylon
Dr. N.W.N. Jayasiri	National Institute of Business Management
Mr. Ajit Kanagasundram	Central Bank
Prof. S. Karunaratne	University of Moratuwa
Prof. V.K. Samaranayake	University of Colombo
Mr. N.U. Yapa, (Secretary)	NARESA

The Committee met eight times between 1982.11.29 and 1983.04.28 at NARESA.

The Committee reviewed existing information on the subject of a National Computer Policy, in particular the recent Sri Lanka Computer study by a UNDP - ILO team, the legal framework of and background information on the National Computer Board of Singapore, and information on computer policy in other countries such as India and the U.K. Relevant persons were also interviewed during its deliberations. However, given the limited time available to produce its report, and the significant amount of relevant material already available, the committee was not expected to research afresh the problems and constraints faced in the development of computing in Sri Lanka or produce a detailed plan with quantitative targets to be achieved. Therefore, the committee concentrated on synthesising and developing an initial set of policy measures and solutions from existing information sources, formulating policy guidelines consistent with the broad economic, social and political development programmes of the government,and recommending a practical institutional framework and action programme for implementing policy.

In carrying out its mandate, the committee has at all times been fully cognisant of the importance given to computing, robotics and communications in the next phase of national development, as reflected in the following extract from a speech by H.E. the President at the opening of Parliament on 9th February, 1983.

"We must look to the future. The foundations for spiritual and material progress according to contemporary world conditions have been laid. Where does the future lead us to?"

The Government has considered that too. We hope to lead our youth into the technological age, complete with robots and computers. Already plans are being prepared for the establishment of centres of education and for the assembly and manufacture of the necessary equipment."

The information revolution, which has been compared in terms of its likely impact on contemporary society to the industrial revolution of the last century, has been underway for the past quarter century in the industrialised countries. This process has gathered momentum in the past few years, largely due to the dramatic fall in the cost of computer equipment as a result of advances in solid state technology and the mass production of micro-electronic devices. A few statistics illustrates this trend. Computer hardware that would have filled a room 35 years ago would now fit into a silicon chip the size of a pea, while power requirements have also declined correspondingly. Reliability of operation and ease of maintenance have improved substantially while nominal costs have declined by a factor of more than 100 over this same period. The cost decreases are even more dramatic if the normal effects of inflation over the last 35 years were netted out. Comparable reductions in cost and improvements in both hardware and software capability are anticipated in the coming decades. It is not surprising, therefore, that in Japan alone nearly half a million computer systems are being installed each year, while world wide sales of personal computers now approach US $ 5 billion per annum. Governments of developed countries such as Japan and France, and newly industrialising countries like Singapore have recognised the potential of computers and set up special organisations and programmes to promote their development and use.

1.2 Relevance for Sri Lanka

In the context of rapid world wide developments, in the computer field, this committee has identified some of the challenges faced by and opportunities created for Sri Lanka in the next phase of its development :

(a) The information processing revolution and developments in robotics will cause fundamental changes in the way goods are both produced and traded in the world economy. These changes will have a significant impact on Sri Lanka, especially in light of the relatively small size of our economy, and the "liberalised" or "open" economy concept to which the government is committed.

(b) The use of computers in the analysis of scientific data and technological applications is now a routine and integral part of scientific method. It is essential that the scientific community in Sri Lanka be given ready access to computer technology, if they are to achieve the full extent of their potential contribution to the development of the country. There are specific areas of application such as the maximum utilization of readily obtainable satellite data on Sri Lanka, where an immediate impact can be made in fields like agriculture, forestry and coastal conservation.

(c) By keeping abreast of the latest innovations in computer technology, telecommunications, and robotics, Sri Lanka could hurdle a whole stage of the economic development process. We can concentrate on industries that are knowledge-intensive and efficient in the use of scarce resources such as capital, skilled manpower, land, and energy. It will also be possible to avoid investments in industries where future developments world wide, especially in robotics, are likely to erode the advantages of our low-cost labour.

(d) Computer technology is a means, if properly used, by which the public sector can be made more efficient and responsive. The size of the public sector in Sri Lanka relative to the economy as a whole, and the vast investment programme of the government, has made the performance of the public sector a critical factor in the success of the national economic effort. At present the sub-optimal performance of at least some parts of the public sector has been identified as a major constraint to the successful implementation of government policy and continued rapid growth of the economy. Computers can be used both to improve the quality of decision making at the highest levels, and to enhance the working level operational efficiency in public sector organisations, as recognised recently by the Parliamentary Committee on Public Enterprises (COPE).

(e) The type of institutions that are developed to meet the needs of administration, finance, production, and exchange of goods and services can be decentralised. The use of computers will significantly improve the flexibility of citizens to make use of their skills and talents. This will provide an additional impetus for entrepreneurial activities more in keeping with national character and temperament.

(f) By investing in the necessary physical infrastructure (especially overseas communications and education), Sri Lanka can exploit fully its comparative advantage, to become a South Asian regional centre for finance and trade, in much the same way as Singapore has assumed this role in the South-East Asian region Our assets include an open economic policy which is both attractive to foreign investors and conducive to the growth of local entrepreneurial activity in the field of computers, political acceptability among all countries in the region, and a convenient geographic location.

(g) The development of computing can help the export drive both directly and indirectly. Directly, by the export of software and (to a lesser extent) computer hardware and other goods and services embodying computer related inputs. Indirectly, by cutting down the costs and time taken for documentation and information exchange between exporters in Sri Lanka and their trading partners.

(h) Presently one of the major sources of foreign exchange earnings is the remittances of Sri Lankan expatriate workers. By a proper education and training programme, it would be possible to augment this by exporting higher level skills in the form of programmers and systems analysts, who would find employment abroad.

In drawing up an institutional framework and action programme to implement national computer policy guidelines, the committee has sought to adopt an approach emphasising promotional and co-ordinating functions, while avoiding controls and over-regulation. However, a body with certain minimum powers to advise the government in formulating and implementing policy, especially with regard to the development of human resources, is necessary. This body would provide a guiding framework within which Sri Lankan public and private sector institutions in the computer field can develop and interact fruitfully, without unnecessary duplication, wastage of scarce resources and policy conflicts.

The use of computers in Sri Lanka is in its infancy - both in terms of the number of systems installed and the level of sophistication of use. However, this committee is convinced that given the encouragement and support of the government, and a committment of resources which will be modest in terms of the national investment programme, the resulting development in computers, telecommunications, and robotics will bring about fundamental changes in the attitude of Sri Lankans and contribute significantly not only towards material progress but also the sociopolitical development and cohesiveness of the country.

CHAPTER II

OBJECTIVES OF A NATIONAL COMPUTER POLICY FOR SRI LANKA

2.1 National Computer Policy Objectives

In the process of fulfilling its mandate, this committee felt that the objectives of a national computer policy should be identified before relevant policy guidelines and an implementation programme could be defined. Accordingly, the broad objectives of a national computer policy for Sri Lanka are set out below :

(a) Harness computer technology in all its aspects, for the benefit of the people of Sri Lanka, and to further the socio-economic development of the nation.

(b) Promote and guide the development of computer-related resources and their application, to anticipate and meet the future needs of the national economy.

(c) Enhance and supplement manpower resources and increase the efficiency and productivity of management and workers at all possible levels.

(d) Improve the quality of life of the people of Sri Lanka, including the job satisfaction and working conditions of employees.

(e) Increase the flexibility and dynamism of Sri Lankan society to enable it to successfully meet the challenges of the future, arising from the ever increasing pace of world-wide scientific and technological advances.

2.2 Discussion of National Computer Policy Objectives

The first objective is intended to clearly establish that computer technology in all its aspects should be treated like any other instrument of Government policy, to improve the well being of the people of Sri Lanka and contribute to the national socio-economic development effort.

The second objective is somewhat more specific. It seeks to encourage planning and systematic analysis of the national need for computers and computer-related resources. Once these requirements are established, it would be possible to meet them, so that economic growth and prosperity would not be hindered due to the lack of this vital element of modern infrastructure.

Objective three relates to sensitive issues of computerisation and automation in the context of a labour-surplus developing country such as Sri Lanka. This committee feels that it is important to recognise the role of the computer as an instrument which substitutes for and enhances man-power at the skilled level where it is most scarce, rather one that displaces surplus unskilled labour. A properly designed computer policy will create many new jobs, while enhancing the efficiency and productivity of management and workers at all levels.

The fourth objective is aimed at improving the quality of life of the people of Sri Lanka and eliminating drudgery both at home and in the work place. The advent of relatively inexpensive and versatile micro-computers will revolutionalize life styles and working habits over the next few decades, because of the greater flexibility provided by the new computer technology, e.g., the lives of Sri Lankans can be significantly improved by providing access to large amounts of information, and by improving communications.

The fifth objective is a general one. It is motivated by the recognition of the fact that for its long-run viability, any nation or society must be sufficiently resilient and dynamic to successfully meet the challenges of the future. This is particularly relevant to a small country like Sri Lanka, which has from historical times, prided itself on its ability to utilize and innovatively incorporate into its own cultural framework, the most valuable elements of ideas and technologies brought in from different parts of the world.

CHAPTER III

NATIONAL COMPUTER POLICY GUIDELINES

3.1 General Philosophy

The Committee is of the view that computer policy guidelines to achieve the above objectives should be both broad and flexible, given the wide and rapidly evolving nature of the computer field. Government policy should seek to guide, encourage and support the many public and private entities involved in the area of computers, rather than control and over-regulate, and thereby effectively stifle their activities. Furthermore, the policy guidelines indicated below are only a starting point. They should be monitored, interpreted and modified when necessary, on a continuous basis, to reflect future changes in both the national socioeconomic and political environment as well as technological trends.

3.2 Policy Guidelines

An initial set of national policy guidelines is given below, under specific headings :

(a) Acquisition

Potential users should be encouraged to treat the acquisition of a computer and/or related items as any other investment, including clearcut identification of computer needs and technical, economic and financial evaluation of the project. Government imposed regulations, rules, or financial disincentives that would restrict or delay purchasing of Computers and related items should be minimized wherever possible.

(b) Utilization and Access

Sharing of computer hardware, software and data resources should be promoted. Computer installation should be fully utilized by permitting access to users during as many hours of the day as possible. However, it would be undesirable and impracticable for the government to attempt to compel owners of computer facilities to share their resources. Interchange of information regarding computer hardware and software resources available among different users should be promoted.

(c) Computer Education, Public Sector Applications, Computer Literacy and Appreciation of the Potential of Computers

The Government should take immediate steps to improve computer-related skills and promote their application as widely as possible, especially in the following areas : scientific analysis, higher education, industry, business and financial management, and schools. The establishment of standards for computer education should also have high priority. Particular attention should be paid to identifying and encouraging the application of computers in the public sector. Efforts should be made, as soon as possible, to ensure adequate financial incentives and job satisfaction, in order to attract and retain the services of computer personnel in Sri Lanka. Computer literacy and appreciation of the potential of computers among the general public should be increased.

(d) Self-reliance, Export of Computer Services

Efforts should be made to make the country as self-reliant as possible in computer skills, establish a sound indigenous capability to evaluate and acquire foreign computer technology when necessary, and also export computer services (both software and hardware, especially assembled products).

(e) Computer-Related Infrastructure and Legal Environment

The Government should give high priority to improving infrastructural facilities that are essential for developing computer use in Sri Lanka, including : local and overseas telecommunications services, and electricity supply. An adequate legal environment should also be created which recognizes the role of computers as well as its impact on society.

(f) Other areas related to Computers

Developments in areas related to Computers such as satellite communications, other telecommunications, and robotics should be closely monitored and adapted for application in Sri Lanka whenever appropriate, by both the Government and other interested groups.

CHAPTER IV

ORGANIZATIONAL FRAMEWORK AND ACTION PROGRAMME FOR POLICY IMPLEMENTATION

4.1 Principal Recommendations

As indicated earlier, it is the creative activity and initiatives of individuals and specific organizations which will enable Sri Lanka to best realize the benefits of computer technology. However, some degree of policy guidance and coordination by Government is necessary to avoid unnecessary duplication, wastage of scarce resources and policy conflicts. The emphasis by the government in the computer area should be on promotion, encouragement and coordination, rather than control and regulation.

The committee's principal recommendations concerning an organizational framework and action programme for implementing national computer policy guidelines in Sri Lanka are first summarized (with respect to Figures 1 & 2), and then described at greater length below.

1. Create a National Computer Policy Advisory Council (COMPAC) functioning directly under H.E. the President.

2. Create a Central Computer Secretariat (CECSEC) to service the needs of COMPAC.

3. Create permanent committees of COMPAC on (a) Computer Education; (b) Computer Applications in the Public Sector; and (c) Telecommunications and Data Transmission; to advise on and promote activities in these areas.

4. Support the growth and development of several Centres of Excellence, identified in the first instance as, the Universities of Colombo, Moratuwa and Peradeniya, and the National Institute of Business Management.

5. Establish channels of communication with and draw on the contributions of the Computer Society of Sri Lanka, and other private special interest groups and companies.

4.2 National Computer Policy Advisory Council (COMPAC)

In the light of the importance of computers and related technologies for the future development of Sri Lanka, it is recommended that a body referred to hereafter as the National Computer Policy Advisory Council(or COMPAC)be set up. The principal purpose of COMPAC will be to provide a guiding framework and environment within which the many public and private sector organizations and individuals in the computer field can develop and make their contribution to the nation, without unnecessary duplication of efforts and wastage of scarce resources. This body should consist of not more than 10 members, including a Chairman. It is recommended that the members of COMPAC be senior persons drawn from among a variety of disciplines such as computers and related fields, economics, finance, education, engineering and science. They should have a broad viewpoint as well as a long-term, policy-oriented perspective.

The functions of COMPAC should be :-

(a) to encourage, facilitate and assist in the development and application of computers and related technologies in Sri Lanka, and also in the improvement of the infrastructural facilities necessary to promote computer development;

(b) to advise the government on national policies concerning computers and their applications, assist in the interpretation of these policies, and facilitate their implementation;

(c) to promote, coordinate and accelerate the application of computers in the public sector;

(d) to develop computer education in all its aspects and assist in advancing the skill and knowledge of persons engaged in the computer industry;

(e) to raise professional standards in computing by establishing standards in specific areas, including computer education and training, privacy of individuals and abuse of personal information, and integrity of data in computer installations.

FIGURE 1. PROPOSED ORGANIZATION OF THE COMPUTER SECTOR IN SRI LANKA

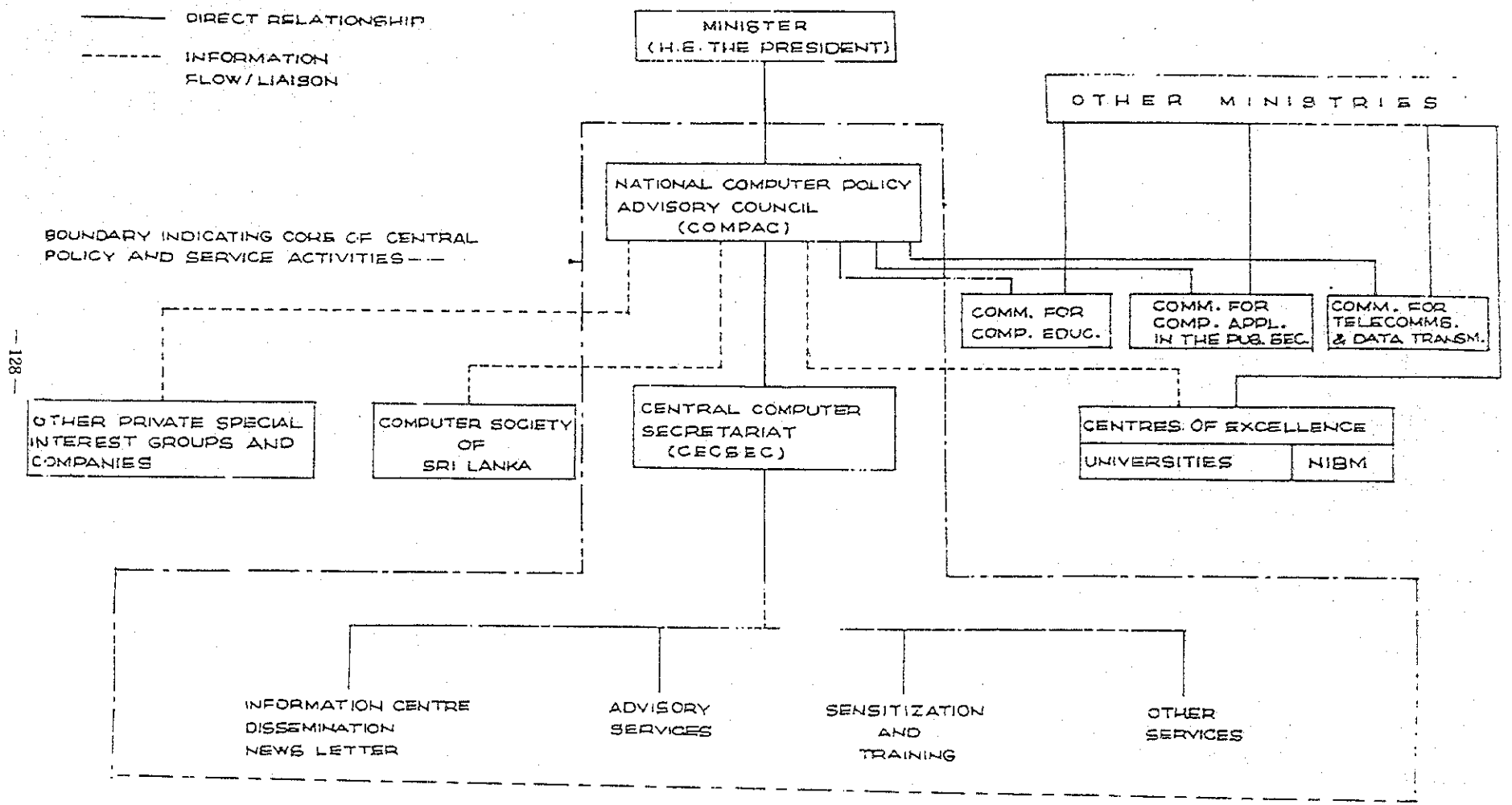
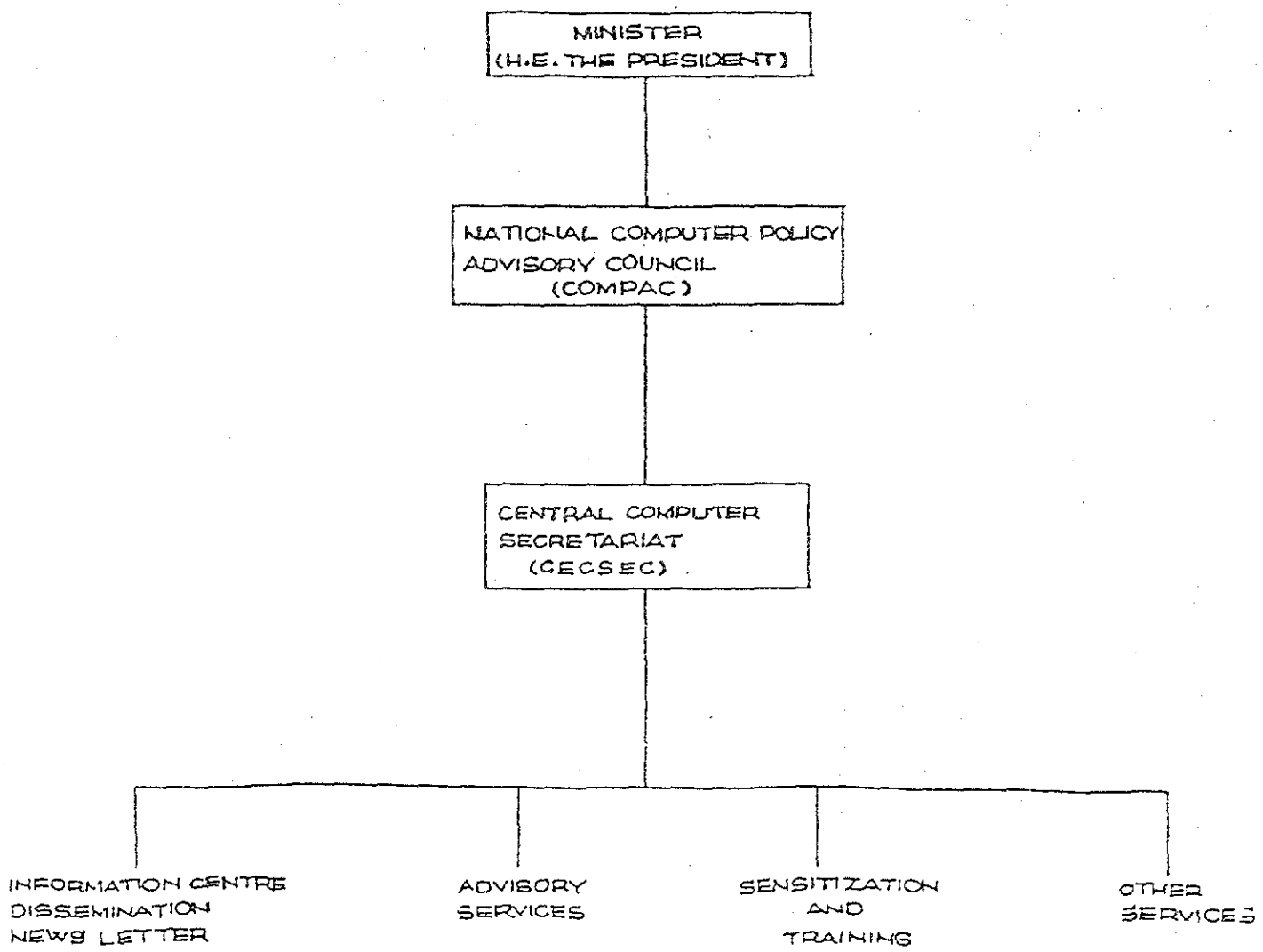


FIGURE 2. CORE OF CENTRAL POLICY AND SERVICE ACTIVITIES



(f) to promote research in the areas of computers and related technologies, and assist in monitoring and adapting developments in these areas for use in Sri Lanka.

(g) to contribute to the improvement of the quality of life of the people of Sri Lanka, especially through improvements in the job satisfaction and working conditions of employees.

(h) to make the nation as self-reliant as possible in computer skills, establish a sound indigenous capability to evaluate and acquire the necessary foreign computer technology, and promote the export of computer services.

(i) to increase the flexibility and dynamism of Sri Lankan society to enable it to successfully meet the challenges of the future, arising from the ever-increasing pace of worldwide scientific and technological advances;

4.3 Central Computer Secretariat (CECSEC)

To carry out its advisory and service functions, COMPAC should have a central computer secretariat (CECSEC) consisting of full-time staff members. While COMPAC would be entirely policy-oriented, the principal function of CECSEC would be to act as a service arm of COMPAC. CECSEC should be headed by a full-time Manager. In view of the importance of separating the policy activities of COMPAC from the service functions of CECSEC, it is recommended that the Manager of CECSEC not be a Council Member of COMPAC. However, in order to facilitate communications and interaction between COMPAC and CECSEC, the Manager could also act as the Secretary to COMPAC.

The substantive work of CECSEC should be carried out by the Manager, assisted by 3 to 4 professionals and about 3 supporting secretarial and clerical staff, all recruited on a full-time basis. Initially, the service functions given below have been identified as high priority areas for CECSEC (see Figure 2). Other activities could be added on, according to future needs, at the discretion of COMPAC.

(a) Computer Information Centre, Information Exchange, Newsletter

There should be a permanent computer information centre containing books, periodicals, and other current reports and documents on computers and related fields. Reading and photocopying facilities would be made available to interested persons. However, in order to provide the necessary service without an excessive organizational effort, it is recommended that no lending activities be undertaken (i.e., only reference facilities be provided), at least in the start-up period. The information centre would also function as focal point for the exchange and dissemination of information among COMPAC, Sri Lanka bodies such as the Centres of Excellence (described below) and the Sri Lanka Computer Society, as well as foreign sources. It is also recommended that CECSEC regularly circulate a newsletter to interested individuals and institutions in Sri Lanka, on recent developments in computers and related areas that have taken place locally and abroad.

(b) Advisory Services

CECSEC should provide advice on computer-related matters to COMPAC as well as other public and private sector institutions or individuals referred to CECSEC by COMPAC. Such services would be provided only on request, and should not be viewed as a mandatory requirement by potential users of this facility.

The chief objective would be to provide basic information and advice on acquisition and use of computers. Many of the simpler queries could be handled, directly by CECSEC staff. However, given that CECSEC would not have a large in-house staff, it is envisaged that more complex problems be referred by CECSEC to other competent individuals or institutions (such as the Centres of Excellence).

(c) Sensitization and Training

Areas of sensitization and training relating to computers, such as increasing computer literacy and appreciation among the general public or senior government and private sector decision makers, which may not have a high priority for other organizations, should be covered by CECSEC. Again, the emphasis would be on ensuring that this work is organized and carried out, preferably by outside organizations (on a contractual basis if necessary), rather than attempting to build up a large in-house capability within CECSEC.

(d) Other Services

It is anticipated that to assist in its deliberations, COMPAC itself will generate many requests for information which would have to be serviced by CECSEC. Some of this information would be readily available and of a general nature (e.g., finding out the import duties and tariffs applicable to computer products). At the same time, other specific areas such as developments in robotics and telecommunications, or safeguarding privacy and abuse of personal data, are likely to require more effort, including literature reviews and data analyses by research assistants and other trained staff.

4.4 Permanent Committees of COMPAC

COMPAC should initially set up permanent committees covering three priority areas in which the government has a legitimate right to play a more active role : (a) computer education; (b) computer applications in the public sector; and (c) telecommunications and data transmission. Further committees could be set up by COMPAC, as the need arises, to study issues in areas such as privacy safeguards and abuse of personal information, and exports of computer services.

(a) Committee on Computer Education

A committee consisting of not more than 8 persons is recommended. At least one member of the Committee should be also a member of COMPAC, while the others would be drawn from relevant Ministries including Higher Education and Education, as well as other departments and organizations.

The principal function of this committee would be to coordinate activities, and avoid policy conflicts and duplication of effort. In the first instance, the committee should give high priority to improving computer related skills and promoting their application in the following areas : scientific analysis, higher education, industry, business and financial management, and schools. Standards of computer education should also be established and applied (preferably in collaboration with the Computer Society of Sri Lanka - see below)

Manpower planning to meet future needs in the computer area, and providing adequate financial incentives and attractive working conditions in order to retain the services of computer personnel, are also topics that need to be studied early.

(b) Committee on Computer Applications in the Public Sector

This committee of COMPAC should also consist of not more than 8 persons, with at least one representative from COMPAC, and other members drawn from relevant Ministries and public sector agencies.

The committee should place greatest emphasis on its promotional role in encouraging the use of computers in the public sector. In particular, it should encourage the better use of existing computer facilities, identify and anticipate the future computing needs of government organizations, and advise and assist such organizations on matters concerning computer applications.

(c) Committee on Telecommunications and Data Transmission

The existing poor quality of telecommunications constitutes a serious handicap to the development of computers and their applications in Sri Lanka. Upgrading this vital element of infrastructure to facilitate future computer developments, including the use of portable terminals, local and wide-area networks, and links with overseas computer facilities, should be the priority task of this committee. As in the case of the other committees, a maximum of 8 persons is recommended with at least one COMPAC representative.

(d) Other Future Committees

Other committees could be established by COMPAC, to meet future requirements. Given the vast data handling capabilities of computers and the increasing potential for misuse of computerised data, the establishment of safeguards to protect the privacy of individuals and the integrity of data is an important issue to be studied. Similarly, promotion of the export of computer services should be pursued, in view of the relatively high levels of education in Sri Lanka, unemployment among graduates, entrepreneurial talents of Sri Lankans, and our ability to absorb high technology skills.

4.5 Centres of Excellence

The Government should identify and give priority to the development of several Centres of Excellence having potential in the computer area, initially including the Universities of Colombo, Moratuwa and Peradeniya, and the National Institute of Business Management (NIBM). While the 3 universities would concentrate their efforts on use of computers in scientific work and higher education, the NIBM would be better placed to develop the business application and data processing areas. New Centres of Excellence in the public and private sectors may be identified in the future, including those that are developing at the other universities.

COMPAC would help to support the growth and development of these Centres, by channelling extra resources or providing other incentives and encouragement to them,(e.g., in the case of the Universities, by supplementing the normal University funding mechanism). In particular, it is recommended that private computer firms and vendors as well as foreign governments and international organisations be approached to provide the latest hardware and software, maintain equipment and support the operation of the Centres,and train local staff. The Sri Lanka government would provide counterpart funds for local staff, buildings, and other facilities. Scholarship schemes for promising computer students could be set up under this framework. Avenues should also be found to retain and encourage the return from abroad of skilled computer scientists.

A certain degree of healthy competition among the Centres of Excellence would be important to bring out the best in them. At the same time COMPAC should seek to enhance the flow of information among them, to avoid excessive or wasteful duplication of efforts.

4.6 Computer Society of Sri Lanka, Private Special Interest Groups and Companies

The Computer Society of Sri Lanka (CSSL), and private special interest groups and companies can make a valuable contribution to the development of computers and their application in Sri Lanka.

The Computer Society is the principal vehicle by which COMPAC could maintain contact with individuals interested in computers. CSSL should also be encouraged to help establish and maintain standards of professional education and conduct in the computer field.

Dialogue between COMPAC and private special interest groups and companies should be maintained to determine their needs, and establish a national environment in which their contribution would be best harnessed both in the application of computers in Sri Lanka, as well as for the exports of computer services abroad.

FINAL OBSERVATIONS

This Committee has sought to fulfil its mandate by identifying the objectives of a national computer policy for Sri Lanka, setting out an initial set of policy guidelines to meet these objectives, and recommending an organizational framework and action programme for implementing policy.

A central theme we have sought to convey in our report in the need for preserving the delicate balance between the two extremes of control and over-regulation which could stifle the growth of computer technology in Sri Lanka on the one hand, and excessive freedom and anarchy leading to wasteful duplication and conflicts, on the other

Although Sri Lanka is in the early stages of computer development, this committee is confident that with appropriate policies that would encourage, promote and guide the computer community in Sri Lanka, the development and use of computer technology will make a very significant contribution to the well-being and quality of life of our citizens, over the coming decades and beyond.

ACKNOWLEDGEMENTS

The Committee wishes to express its gratitude to the Director-General and staff of NARESA for having provided all the infrastructural facilities and services required to complete its deliberations. Thanks are also extended to the Bank of Ceylon, Central Bank, National Institute of Business Management and the Universities of Colombo and Moratuwa, for the release of their staff officers to serve on the Committee.

10.3 COMPUTER AND INFORMATION TECHNOLOGY COUNCIL (CINTEC) ACTIVITIES FOR THE YEAR—1985

COMPUTER AND INFORMATION TECHNOLOGY COUNCIL (CINTEC)
ACTIVITIES FOR THE YEAR - 1985

1. INTRODUCTION :

CINTEC was established by Parliament Act No. 10 of 1984 in April 1984 and Prof. Mohan Munasinghe was appointed its first Chairman. Although CINTEC was involved in several activities during the year 1984, it became functional in November 1984 when office space was obtained at the BMICH and a modest budget of Rs. 250,000/= was allocated. Hence most of the preliminary work regarding the establishment of CINTEC as an operational organization took place in 1985.

Budget for 1985 2,500,000 Rp.
1986 4,500,000 Rp.

2. COUNCIL :

The Council consisting of 10 members (Annex 1) was appointed by H.E. the President in April 1985 and the first meeting of the Council was held on 23.04.1985. The Council meets once a month and has met on 8 occasions in 1985. Prof. Mohan Munasinghe resigned from the post of Chairman in July 1985, but continues as a member and Chairman Emeritus. Prof. V.K. Samaranayake was appointed Acting Chairman with effect from 23 July 1985.

3. WORKING COMMITTEES :

CINTEC has established the following statutory working committees (Annex II).

1. Committee on Computer Education (COCE)
2. Committee on Computer Applications in the Public Sector (CAPS)
3. Committee on Computer Telecommunication (CTEL)

The Committee on Computer Education and Committee for Computer Applications in the Public Sector had one meeting each. The Committee on Computer Education is looking into ways and means of improving the quality of courses in computer studies available in the country and also helping the Ministry of Education with their computer studies programme. Arrangements have been made to hold a one day seminar for senior educational administrators in 1986.

The Committee for Computer Applications in Public Sector have identified certain key public sector organizations for computer awareness and have also identified groups of public sector organizations which could pool their resources in moving towards computerization. It has also proposed using the media for providing computer literacy.

The following non-statutory committees were also appointed and are functioning :

1. Committee for recommending standards for the use of Sinhala and Tamil Script in Computer Technology
2. Committee on Law and Computers.

4. WORKING GROUPS :

Following the successful conclusion of the seminar on Microcomputers in Developing Countries held last year CINTEC formed three working groups on computer applications in agriculture, computer applications in energy and computer applications in health. The agriculture working group has held two meetings and the energy working group has held one meeting. Their membership is given in Annex III. It was felt that the health sector does not have a sufficient number of active research workers to form a working group immediately and steps are being taken to initially hold a seminar on computer applications in the health sector so as to facilitate the formation of a working group.

4.1 The Working Group on Computer Applications in Agriculture :
A Workshop on Computer Applications in Agriculture was held on 22nd May 1985 and was attended by 10 members. The Workshop produced several recommendations relating to computer use in agriculture and also formulated several project proposals.

CINTEC co-sponsored with the University of Colombo a 4 week course on statistical and computer applications in agriculture for researchers from Sri Lankan Institutes in November - December 1985. 30 participants drawn from a wide variety of organizations involved in agriculture research attended this very successful workshop where the participants were exposed to several microcomputers and statistical software. On 7th December, the participants joined the Working Group on Computer Applications in Agriculture to attend a one day Workshop.

4.2 The Working Group on Computer Applications in Energy :

The Workshop on Computer Applications in Energy was held on 19th June 1985 and was attended by 10 members and project proposals in this area are expected to be submitted.

5. Senior Executive Seminar on Computer Applications in the Public Sector (SESCAPS) :

A seminar for Senior Executives on Computer

Applications in the Public Sector was held on 26th April 1985 and was attended by about 150 senior executives including Secretaries of Ministries. This one day seminar helped in providing computer awareness to senior executives and it is expected that similar seminars would be conducted in specific areas relating to computer applications.

6. PUBLICATIONS :

The Proceedings of the First International Symposium on Computer Applications in Developing Countries held in November 1984 sponsored jointly by CINTEC and National Academy of Sciences, USA, was published during 1985 as "Microcomputers for Development - Issues and Policy". The editing and printing of this publication was done entirely in Sri Lanka and a publication of high quality was produced.

The proceedings of the Senior Executive Seminar on Computer Applications in the Public Sector is with the printer and would be released in early 1986, as a publication entitled "Computer Applications for Senior Managers".

7. CENTRES OF EXCELLENCE :

CINTEC has identified the Universities of Colombo, Moratuwa, Peradeniya, the Arthur Clarke Centre for Modern Technologies and the National Institute of Business Management as Centres of Excellence in Computing. It is taking every effort towards developing these institutes so that they may satisfy the need of the country in specialized computer studies and applications.

8. SPECIAL INTEREST GROUPS :

8.1 CINTEC has successfully formed an ad-hoc vendor group which will meet once a month. (Annex IV) This group while acting as a communication link between CINTEC and vendors also looks in to ways and means of promoting computer use in Sri Lanka.

8.2 CINTEC has taken steps to have close links with Computer Society of Sri Lanka and offered its assistance in holding the 1986 annual session of the Computer Society, by sponsoring guest lecturers of a high quality who could disseminate knowledge on the state-of-the-art in the fast changing discipline of computer science, as well as by extending the sessions from one day to three days (the sessions held in early 1986 was a tremendous success).

9. OTHER ACTIVITIES :

9.1 CINTEC has continued to support the project proposal submitted to the Japanese Government for the establishment of an Institute of Computer Technology at the University of Colombo. This project is expected to be implemented in the near future.

9.2 CINTEC has appointed a committee to formulate guidelines for acquisition of computers including an initial feasibility study, preparation of specifications and finally evaluation. CINTEC also maintains a roster of experts who could be called upon to evaluate tenders relating to purchase of computers and providing advice on a consultancy basis.

9.3 CINTEC has launched on a study of the computer situation in Sri Lanka and has embarked on establishing a data bank on information relating to computers and computer use.

9.4 CINTEC has taken steps to establish a central library on computers with its own funding as well as foreign assistance. A positive response has already been received from the British Council.

9.5 CINTEC would also be awarding research grants for research activities relating to computer science or for the computational aspects of research relating to other areas through the facilities available at NARESA.

9.6 CINTEC would also be providing computing facilities at its secretariat for research workers who do not have access to microcomputers.

9.7 CINTEC has taken steps to disseminate information relating to computers through a news letter to be published with the assistance of the vendor group.

10. CINTEC has established a secretariat which is functioning smoothly with a staff of 7 and its gradually building up its resources. CINTEC is working on the philosophy that it would make use of other organizations such as NARESA in its activities instead of duplication of resources, while playing the role of being the apex organization for computer related activities in the country. It is also negotiating with NARESA to obtain part of its new building to house the CINTEC Secretariat.

ANNEX I

COMPUTER AND INFORMATION TECHNOLOGY COUNCIL OF SRI LANKA

Members of the Council

1.	Prof. V.K. Samaranayake	- Acting Chairman CINTEC and Head/Dept. of Statistics and Computer Science, University of Colombo
2.	Mr. C. Gunasingham	- Additional Secretary to H.E. the President
3.	Dr. R.P. Jayewardene	- Director-General, Natural Resources, Energy and Science Authority of Sri Lanka
4.	Mr. G. Cumaranatunga	- Deputy Secretary to the Treasury
5.	Mr. Akiel Mohamed	- Director, External Resources Department
6.	Mr. K.K. Gunawardene	- Director, Department of Telecommunications
7.	Mr. R.B. Ekanayake	- President, Computer Society of Sri Lanka and Director, Information Technology, Bank of Ceylon
8.	Dr. N.W.N. Jayasiri	- Director, Management Information Systems, National Institute of Business Management.
9.	Dr. A.S. Induruwa	- Head, Department of Computer Science, University of Moratuwa
10.	Prof. Mohan Munasinghe	- Emeritus Chairman, presently at World Bank, Washington

ANNEX II

STATUTORY WORKING COMMITTEES OF CINTEC

A. Committee on Computer Education (COCD)

1. Prof. V.K. Samaranayake, (Chairman), CINTEC Member,Head/Department of Statistics and Computer Science,University of Colombo
2. Dr. A.S. Induruwa, CINTEC Member, Head/Computer Section, University of Moratuwa
3. Dr. N.U.N. Jayasiri, CINTEC Member, NIBM
4. Mr. L.S.A. Fernando, Merchant Bank of Sri Lanka

B. Committee on Computer Applications in the Public Sector (CAPS)

1. Mr. R.B. Ekanayake (Chairman), CINTEC Member, Head of Computer Division, Bank of Ceylon
2. Mr. C. Gunasingham, CINTEC Member, Additional Secretary, Presidential Secretariat
3. Mr. B. Ranasinghe, Data Processing Manager, Ceylon Petroleum Corporation
4. Mr. P. Amarasinghe, Director, Data Processing Department, Central Bank of Ceylon

C. Committee on Telecommunications and Data Transfer

1. Mr. K.K. Gunawardene (Chairman),CINTEC Member, Director, Telecommunications
2. Mr. Manicavasagar, Deputy Director/Telecommunications

(Additional Members to be coopted)

D. Committee on Recommending Standards for the use of Sinhara and Tamil Script in Computor Technology

1. Prof. V.K. Samaranayake (Chairman), CINTEC Acting Chairman, Head/Dept. of Statistics and Computer Science, University of Colombo

2. Mr. N. Nanayakkara, Government Printer

3. Prof. G. Wijewardena, Professor of Sinhala, University of Colombo

4. Prof. J.D. Dissanayake, Professor of Sinhala, University of Colombo

5. Dr. A. Kandiah, Open University

6. Mr. S.G. Samarasinghe, Ministry of Post and Telecommunication

E. Committee on Law and Computers

1. Prof. V.K. Samaranayake, Chairman, Acting Chairman,CINTEC, Head/Dept. of Statistics and Computer Science, University of Colombo

2. Mr. Sunil de Silva, Additional Solicitor-General, Attorney-General's Department

3. Mr. Upawansa Yapa, Deputy Solicitor-General, Attorney-General's Department

4. Mr. M.D. Somaweera, Assistant Registrar of Patents

5. Dr. Rohan Samarajeewa

Annex III

LIST OF MEMBERS OF THE WORKING GROUP ON AGRICULTURE

Prof. V.K. Samaranayake,	University of Colombo, Chairman
Mr. P. Maddugoda,	Forest Department
Mr. W.R.M.S. Wickremasinghe	- do -
Mr. A.P. Mallawatantri	Ministry of Plan Implementation
Dr. W.D. Joshua	Irrigation Department
Mr. A.R. Dassanayake	- do -
Mr. S.A.P.K. Samaranayake	- do -
Mr. Sarath Peiris	Coconut Research Board
Mr. K.S. Palipana	- do -
Mr. E.R.N. Gunawardena	University of Peradeniya
Miss E.J. Solomon	Royal Botanic Gardens
Dr. A.P. Gurusinghe	Dept. of Minor Export Crops
Mr. A.L. Gunasekara	Central Agriculture Research Institute
Dr. A. de S. Liyanage	Rubber Research Institute
Dr. Miss S. Abeysekera	University of Colombo
Dr. Kevin Seneviratne	- do -
Mr. T. Thevadasan	Tea Research Institute
Mr. G.A.C. de Silva	Dept. of Agriculture
Mr. A.T. Suraweera	Rubber Control Department
Mr. S.T.F. Silva	Sri Lanka Tea Board
Dr. S. Sivasubramanium	Batticaloa University College
Mr. P.Umaharan	- do -
Mr. P.M. Jayathillaka Banda	Dept. of Meteorology
Mr. R. Vithana	Dept. of Census and Statistics
Mr. S.T. Herath	Surveyor General's Dept.
Mr. H.S.De S. Jayathilake	- do -
Miss T. Sanmugam	Agrarian Research & Training Institute
Prof. K.K. Pathirana	University of Ruhuna
Mr. P.S. Atukorala	Rubber Control Dept.
Mr. K.A.G.B. Amaratunga	Rubber Research Institute
Mr. K.H. Dharmasena	Faculty of Agriculture
Mr. D. Dharmadasa	Dept. of Biochemistry
Mr. D.M.A.P.Dissanayake	Rubber Research Institute
Mr. A.M.U. Dissanayake	Dept. of Census & Statistics
Miss W.M.U. Fernando	Cococnut Research Institute
Mr. W.V. Jayasena	University of Peradeniya
Miss. D. Jayasinghe	Rubber Research Institute
Miss G. Jayasinghe	FAO Project
Mr. K.B.A. Karunasekera	Rubber Research Institute
Kr. A.D. Kodituwakku	Dept of Animal Production and Health
Mr. P.M. Muthukuda	CISIR
Mr. R. Mathavan	Dept of Minor Export Crops
Mr. D.T. Mathes	Coconut Research Institute
Dr. R.B. Mapa	University of Peradeniya
Mr. K.E.A. Perera	Rubber Control Dept

Mr. S.G. Peiris	Coconut Research Institute
Mr. K.A.D.W. Senaratne	University of Ruhuna
Mr. T.B. Samarakoon	Land & Water Use Division
Dr. S. Somasiri	- do -
Mr. P. Sarukkali	Paddy Marketing Board
Mr. S. De Silva	Rubber Research Institute
Mr. H. Talgaswattha	- do -
Mrs. P. Uluwita	M.R.I.
Dr. M.R.T. Wickramaratne	Coconut Research Institute
Mr. A.S.D. De Zoysa	Dept of Agriculture
Mr. G. Wadasinghe	TRI, Ratnapura

List of Institutions involved in the Working Group on Agriculture

1. Forest Dept
2. National Fertilizer Secretariat, Ministry of Plan Implementation
3. Irrigation Dept
4. Coconut Research Board
5. Paddy Marketing Board
6. Faculty of Agriculture, University of Peradeniya
7. FAO Fertilizer Project, Royal Botanic Gardens
8. Dept of Minor Export Crops
9. Central Agricultural Research Institute
10. Rubber Research Institute
11. Dept of Statistics & Computer Science, University of Colombo
12. Tea Research Institute
13. Dept of Agriculture
14. Rubber Control Dept
15. Sri Lanka Tea Board
16. Faculty of Agriculture, Batticaloa University College
17. Dept of Meteorology
18. Dept of Census and Statistics
19. Surveyor General's Office
20. Agrarian Research & Training Institute

List of Members of the Working Group on Energy

1. Mr. Bandu Ranasinghe	-	Ceylon Petroleum Corporation
2. Mr. M.C.A. Alles	-	University of Peradeniya
3. Mr. D.S. Wijesundara	-	- do -
4. Mr. K.B.N. Ratnayake	-	- do -
5. Dr. Nimal Vijaindu	-	Ceylon Electricity Board
6. Mr. T.M. Herat	-	- do -
7. Mr. K.V.N. Kithsiri	-	- do -
8. Mr. Shavindranath Fernando	-	- do -
9. Mr. M.N.S. Perera	-	- do -
10. Mr. C. Ratnayake	-	- do -
11. Dr. A.S. Induruwa	-	University of Moratuwa
12. Dr. P. Dias	-	- do -
13. Mr. A. Abeywardene	-	CINTEC

Annex IV

LIST OF THE AD HOC VENDOR GROUP

01. INTERNATIONAL COMPUTERS (CEYLON) LTD
20, Sir C. A. Gardinar Mawatha
(P.O. Box 305)
Colombo 2 アタリー Tel. 34161

02. DATATECH LTD. Consulting F
50, Ward Place,
Colombo 7 Tel. 597798

03. METROPOLITAN AGENCIES LTD.
209/9, Union Place, スバリー
Colombo 2 Tel. 597266

04. BC COMPUTERS LTD. バローズ
26, Flower Road,
Colombo 7 Tel. 575303, 575302, 574590

05. IBM WORLD TRADE CORPORATION
House of Technology
Navam Mawatha
Colombo 2

06. COMPUTERLINK LTD. EPSON
294, Union Place APRLES
Colombo 2 D E Tel. 28641/2 ,546055,546876

07. NCR (LANKA) LTD.
7, York Arcade Road
Colombo 1 Tel. 21623

08. BARTLEET ELECTRONICS LTD.
11/1, Greenpath TRS
Colombo 3 Tel. 575699, 575700

09. THE HI-FI CENTRE
85, Rosmead Place
Colombo 7 Tel. 595047, 598866

10. INFORMATICS (PRIVATE) LTD.
65, Walukarama Road ドルフ
Colombo 3 Tel. 575545, 575549

11. OFFICE EQUIPMENT LTD.
55, Iceland Building オリベッティ
Colombo 3 Tel. 27659, 26301

12. CEYLON BUSINESS APPLIANCES LTD.
First Floor,Iceland Building
Colombo 3 IBM Tel. 26547,34947

13. FENTONS COMPUTERS (PVT) LTD.
350, Union Place
Colombo 2 NEC Tel. 25101, 32611,548517

14. DATASERVE LTD. DG
377, Darley Road NEC
Colombo 10 Tel. 93673, 595395

15. DATALINK LTD.
37, Queen's Street
Colombo 1

16. OMS ELECTRONICS LTD. WANG
106, Kynsey Road コモドール
Colombo 8 SORD Tel. 597855, 597854

17. AMARAN COMPUTERS LTD.
498, R.A. de Mel Mawatha
Colombo 3 A1 (IBMコンパチ) Tel. 500639

18. JAGATH ROBOTICS (PVT) LTD
236/5, Havelock Road
Colombo 5 Tel. 583470

19. シンクレラ

20. ホンコン製

10.4 FACULTY OF ENGINEERING— UNIVERSITY OF PERADENIYA

Computer Processes and Data Structures –

Fourth Yeas

FACULTY OF ENGINEERING - UNIVERSITY OF PERADENIYA

Computer Processes and Data Structures - Fourth Year
Syllabus Effective from 1984/85

1 Algorithms: Simple algorithms; flow charts; flow diagrams.

2 Structured programming: The Pascal language.

3 Computer Organisation: Computer architecture; micro-computers; assembly language programming of micro-computers; peripheral hardware; interrupts.

4 Systems Software: Monitor systems; operating systems; file manipulation.

5 Data structures: Arrays and sets; records and files; the stack; recursion; queues and lists; trees; graphs.

6 Searching and Sorting: Searching; exchange sorts; selection sorts and tree sorts; insertion sorts; external sorts.

Details of Course Contents:

1 Algorithms

1.1 Simple algorithms: Searching; sorting; solutions of algebraic equations, Polish notation.

1.2 Flow charts: Process; decision; loop.

1.3 Flow diagrams: Nassi-Shneiderman diagrams; IF ... THEN, IF ... THEN ... ELSE, FOR ... DO, WHILE ... DO, REPEAT ... UNTIL constructs.

2 Structured Programming

2.1 The Pascal language: Data types; statements; simple programs and procedures; value parameters; variable parameters; nested procedures; scope.

3 Computer Organisation

3.1 Computer architecture: Central Processing Unit, types of registers, instruction formats, data formats; memory; input and output.

3.2 Micro-computers: Architecture of common microprocessors and micro-computers.

3.3 Assembly language programming of micro-computers.

3.4 Peripheral hardware: Video display units; disk drives; tape

drives; printers; transfer of data; buffered input and output.

3.5 Interrupts: Processing of interrupts; direct memory access.

4 Systems Software

4.1 Monitor systems: Interpreters; compilers; linkers and loaders; storage allocation; management of input and output; batch processing; interactive systems.

4.2 Operating systems: Multi-programming; process management; storage management; real and virtual memory; processor management.

4.3 File manipulation: File organisation; file processing; editors; data base systems.

5 Data structures

5.1 Arrays and sets: One-dimensional arrays; character strings as packed arrays; two dimensional and multi-dimensional arrays; sets.

5.2 Records and files.

5.3 The stack: Primitive operations; implementation; evaluation of algebraic expressions; procedure entry and exit.

5.4 Recursion: Definition; recursive processes; recursive functions; Fibonacci series; binary search; recursive procedures.

5.5 Queues and Lists: Sequential representation of queues; linked list; linked implementation of stacks; linked implementation of queues; list operations; circular lists; doubly linked lists; implementation with dynamic storage allocation.

5.6 Trees: Binary trees; applications; representation of trees in Pascal; tree traversal; game playing by computer.

5.7 Graphs: Representations; traversals; connected components; spanning trees; shortest paths; activity networks; critical paths.

6 Searching and Sorting

6.1 Searching: Sequential search; indexed sequential search; binary search; tree search.

6.2 Exchange sorts: Bubble sort, Quicksort.

6.3 Selection sorts and tree sorts: Straight selection sort, binary tree sort, heap sort.

6.4 Insertion sorts: Simple insertion sort, shell sort; merge sorts.

6.5 External sorts: Tape sort; disk sort; 2-way merge; k-way merge; buffered input and output.

10.5 PRESENT STAFF OF DEPARTMENT OF STATISTICS AND COMPUTER SCIENCE

PRESENT STAFF OF DEPARTMENT OF STATISTICS AND COMPUTER SCIENCE

01. Professor V. K. SAMARANAYAKE
B.Sc. (Cey); Dip. Stat. (Vidyodaya); D.I.C.: Ph.D. (London)
Coordinator/Statistical Consultancy and Data Processing Service.
Professor of Mathematics &
Head/Dept. of Statistics & Computer Science.

02. Mrs. A. KARUNARATNE
B.Sc. (Cey); Dip. O.R. (Rome)
Lecturer

03. Dr. KEVIN SENEVIRATNE
B.Sc. (Cey); M.Sc.(Cey)
Ph.D. (Col.)
Lecturer

04. Miss. D. S. JAYAWARDANE
B.Sc. (Cey); M.Sc. (Cey)
Ph.D. student in Statistics, University of Reading, U.K.
Assistant Lecturer

05. Mr. N. D. KODIKARA
B.Sc.(Cey); Dip. Stat. (Cey); M.Sc.(Manchester)
Ph.D. student in Computer Science, Manchester, U.K.
Assistant Lecturer.

06. Mr. D. P. LIYANAGE
B.Sc. (Cey)
Presently at University of Reading working on Ph.D. in computer Science.
Assistant Lecture.

07. Mr. NALIN RANASINGHE
B.Sc. Eng., M.Sc. (London)
Nominated for Ph. D training in U.K.
Assistant Lecturer.

08. Mrs. N.WEERASOORIYA
B.Sc.(Cey), M.Sc.(Cey)
Nominated for Ph. D. training in U.K.
Assistant Lecturer

09. Mr. G. R. KARUNARATNE
B.Sc. Eng., (cey)
Assistant Lecturer.

10. Mr. G.N. WICKREMANAYAKE
B.Sc.(Col)
Temporary Assitant Lecturer.

11. Mr. M. J. N. PEIRIS.
B.Sc. (Cey)
Trained at CICC, Tokyo for six months. Presently at North stratford Polytechnic, following M.Sc. in Computer Science.
Systems Analyst/Programmer.

12. Mr. S. T. NANDASARA.
B.Dev.(Cey)
Returned from University of Essex with taining in Computer Science.
Statistical Officer.

13. Miss. H. A. W. MARGRET
B.Sc.(Cey); Dip. Stat. (Vidyodaya); M.Sc. (Reading)
Presently at University of reading ,U.K. Will return in January 1987.
Statistical Officer.

14. Mr. M. R. P. SILVA.
B.Sc. (Col)
Trained at CICC, Tokyo for six months.
Following M.Sc. in Computer Science at University of Cardiff.
Systems Analyst/Programmer.

15. Mr. D. R. WEERASEKERA,.
B. Sc.(Cey), Dip. Stat.(Col), M.Sc.(Col)
Trained at University of Reading. Registered for Split M. Phil in Medical Statistics.
Statistical Officer.

16. Mr. G. K. A. DIAS
B.Sc.(Col)
Diploma in Computer Science, University of Essex.
Systems Analyst/Programmer.

17. Mr. R. L. PEARS
B.Sc.(Cey)
M.Sc. (Cardiff) in Computer Science.
Systems Analyst/Programmer

18. Mr. V. MANUKULASURIYA
B. Sc. (Col) Due to leave for U.K. for Ph.D. in Computer Science.
Systems Analyst/Programmer

19. Mr. M. G. N. A. S. FERNANDO
B. Sc (Col.)
Research Assistnat

20. Mr. A.P.S.R. SOMASIRI
B.Sc. (Col.)
Trained in Computer Hardware at University of Reading
Trainee Technician

21. Mr. K. GOONETILLAKE
B.Sc. (Col.)
Trained in Computer Hardware at University of Reading
Trainee Technician

22. Mr. P.N.P. FERNANDO
B.Sc. (Col.)
Research Assistant

23. Mr. G.P. SENEVIRATNE
B.Sc. (Col)
Research Technician.

24. Miss. I.U. GOONETILLAKE
B.Sc. (Special) (Col)
Research Technician.

25. Mr. K. L. GUNAWARDANA
Technical Assistant

26. Mrs. M. K. SENEVIRATNE
Institute of Statistician Preliminary; N.D.T.(Com.Sc.)
Statistical Clerk

27. Mrs. S. RAJAPAKSE
Data Entry Operator.

28. Mr. M. D. SUMANASENA
Data Entry Operator.

29. Miss A. RAJAPAKSE
Clerk

30. Miss FATEEMA EVANS
Stenographer

31. Miss P.VIDYAKANTHI
Stenographer

Temporary Trainee Programmers

01. Mr. I.L.P. Amarasekara
B.Sc.(Col)

02. Miss I.A. Mallika
B.Sc.(Col)

03. Mr. P. Migara Ransiri Fernando
B.Sc.(Col)

04. Mr. T.R.U. Fernando
B.Sc.(Col)

05. Mr. N. Munasinghe
B.Sc.(Col)

06. Mr. M.E.G.N. Samaraweera
B.Sc.(Col)

07. Mr. P.N.D. Sunil
B.Sc.(col)

08. Miss H.N.A. Jayatilaka
B.Sc.(Col)

09. Miss S.D.C. Pushpa Kumari
B.Sc.(Col)

10. Mr. H.J. Dias
B.Sc.(Col)

11. Mr. S.A.U. Gunasekara
B.Sc.(Col)

12. Mr. L.D.P. Premaratna
B.Sc.(Col)

13. Miss K.R. Kularatne
    B.Sc.(Col)

14. Mr. J.P.C. Jayalath
    B.Sc.(Col)

15. Mr. A.N. Ranasinghe
    B.Sc.(Col)

16. Mr. M.A.S. Perera
    B.Sc.(Col)

10.6 QUESTIONNAIRE (To the Companies)

To the Companies

QUESTIONNAIRE

1. Outline of the company
   (1) Main activities
   (2) Sales, Employees, etc.

2. Outline of computer systems
   (1) Configuration of computer systems
       (Host, Peripherals, Terminals, etc.)
   (2) Extension plan in the future

3. Outline of EDP activities
   (1) Position of EDP department in your company
   (2) Main activities of EDP department
   (3) Languages used in development

4. Manpower of EDP department
   (1) Staffs for development
   (2) Staffs for system maintenance
   (3) Staffs for operation
   (4) Shortage of staffs
   (5) Demand for staffs in the future
   (6) Personal history of the staffs engaged in development
   (7) Salary of the staffs engaged in development

5. How are the staffs trained?
   (1) Training courses arranged by your company
       (Instructors, Carriculum, Facilities, etc.)
   (2) Availability of training courses outside

6. Maintenance of computer systems
   (1) Agreement of maintenance with the agent or the maker
   (2) Maintenance cost

7. Expectations to establishment of the Institute of Computer Centre

10.7 QUESTIONNAIRE (To the Educational Organizations)

To the Educational Organizations

QUESTIONNAIRE

1. Instructors
   (1) Numbers by classification
   (2) Mean class hours (per day and per week)
   (3) Qualifications of the instructors (Carrier, Age, etc.)
   (4) Treatment of instructors (Salary, Vacation,etc.)
   (5) Total hours of class per a instructor
   (6) Personal history of the instructors

2. Facilities related to computer education
   (1) Configuration of educational computer system
       (Host, Peripherals, Terminals, etc.)
   (2) Classroom equiped with terminals
   (3) Services requested from outside

3. Maintenance of computer systems
   (1) Agreement of maintenance with the agent or the maker
   (2) Maintenance cost

4. Teaching materials related to the training
   (1) Standard textbook
   (2) Supplementary reader
   (3) Lesson plan
   (4) Audio-visual materials

5. Carriculum related to the training
   (1) Programming language
   (2) Carriculum and syllabus
   (3) Application field
   (4) Training hours

6. Students
   (1) Number of students
   (2) Course structure
   (3) Candidates and selection method
   (4) Employment opportunity and salary for graduates
   (5) Diploma or qualifications

7. Future plan to expand the course structure