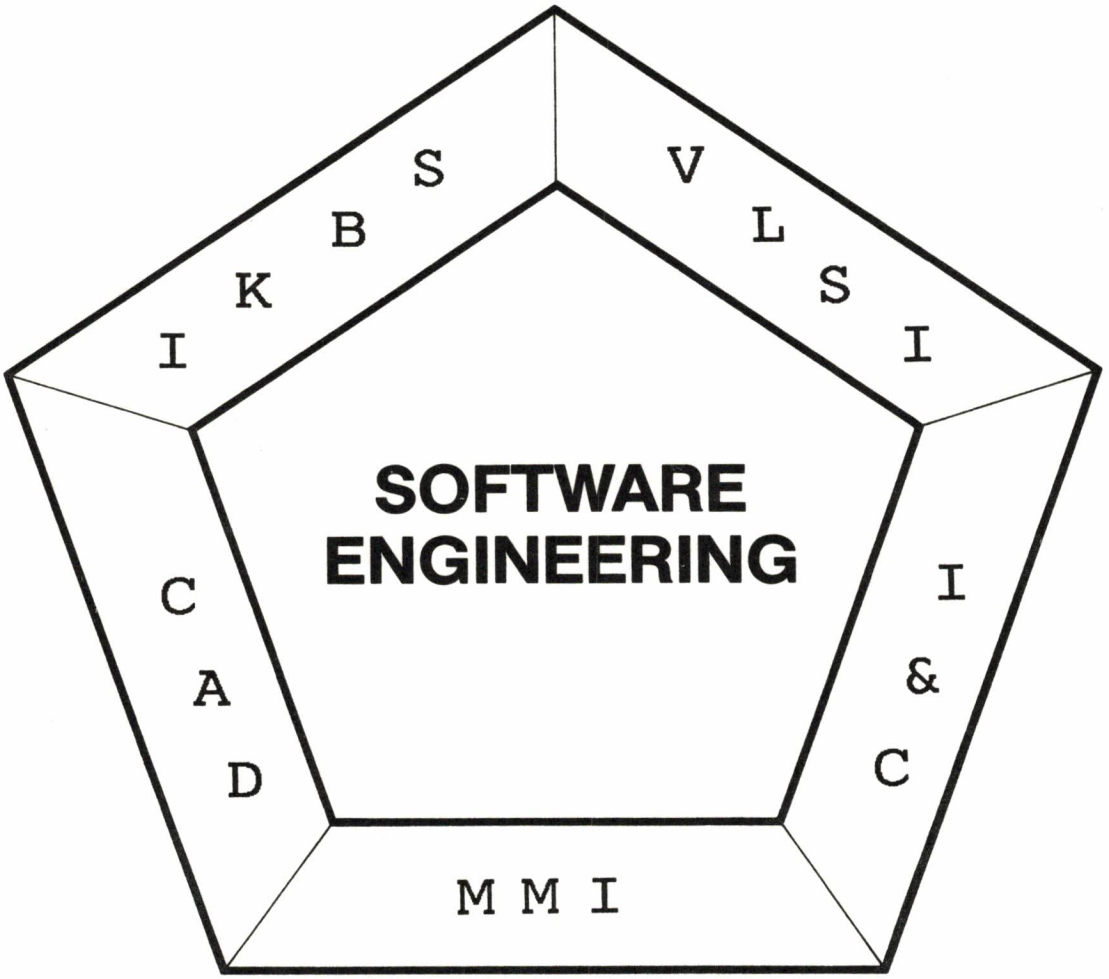
No.SE4/20

ALVEY NEWS SUPPLEMENT



ABSTRACTS OF COMPLETED DELIVERABLES FOR THE ALVEY SOFTWARE ENGINEERING DIVISION

FOR FURTHER INFORMATION ON THESE DELIVERABLES PLEASE REFER TO CONTACT DETAILS

TITLE
System Structure Language Definition
REF: SE4/20/051
PROJECT: PRJ/SE/014/24
CLASSIFICATION
Innovation and Understanding
Methods and Processes
Environment
IPSE 1
CONTACT DETAILS
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ABSTRACT
This document describes a System Structure Language called SySL. SySL is a notation to describe the structure of systems which can be represented in the ECLIPSE database system.

Throughout the software life-cycle many thousands of entities will be generated which will be represented in terms of complex structures and relationships in the database. Normally a user will only be interested in a subset of the database, making up some system, and it is very difficult for him or her to form an overall understanding of the system structure. SySL provides the user with a high-level language in which that structure may be expressed and examined.

Different types of users will require more or less information depending on their needs, SySL provides constructs which allow users to describe structures at varying levels of detail, depending on needs. It also allows a user to refine this description to greater detail. Some of the facilities of the database schema definition language are mirrored in SySL but in a form which is more amenable to an end-user rather than a DB administrator.

SySL has several areas of application which include software design documentation, system building and database checking; its group of target users include system administrators and software engineers.

TITLE
Solving the Interface Equation
REF: SE4/20/052
PROJECT: PRJ/SE/079/T2
CLASSIFICATION
Innovation and Understanding
Methods and Processes
Formal specification
CONTACT DETAILS
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ABSTRACT
In this paper, we address the problem of solving a class of equations in Calculus Communicating Systems (CCS) of the form

$$(p|X)\backslash A \approx q$$

where p and q are suitably constrained. We characterise those equations which have solutions and sketch a coarse algorithm for obtaining them.

TITLE
Extending the Interface Equation
REF: SE4/20/053
PROJECT: PRJ/SE/079/T3
CLASSIFICATION
Innovation and Understanding
Methods and Processes
Formal Specification
CONTACT DETAILS
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ABSTRACT
In this paper, we continue work, reported in SE4/20/052, on implicit system specification in which we examine the CCS equation $(p|X)\backslash A \approx q$ subject to constraints on p,q and the class of agents admitted as solutions. We shall show that solutions may be found under less restrictive conditions including the constraint of weak determinacy on q. We shall also present some useful results about this property.

TITLE
ASPECT Man Machine Interface Options
REF: SE4/20/054
PROJECT: PRJ/SE/001/10
CLASSIFICATION
Innovation and Understanding
Methods and Processes
Environment
IPSE 1
CONTACT DETAILS
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ABSTRACT
This document is a summation of the design philosophy underlying ASPECT's human-computer interface primitives. It distinguishes between the 'user interface' and the 'programmer interface'—the second is the means of generating the first.

The document examines the particular interface needs of software engineering environments, and identifies a number of design goals. Since ASPECT will be distributed, possibly over a range of devices, device independence via a common device interface is considered essential. Three basic output types, and their associated functionality, are identified. Firstly, text must have a full repertory of primitives to determine its appearance and layout. Editing must be an intrinsic function of text, wherever it appears on the screen. Secondly, the graphical primitives must create screen objects which have an independent existence, and a hierarchical structure. Lastly, tables must combine the functionality of both text and graphics, and provide primitives to manipulate rows and columns.

The document also examines the options available for the input model. The major choice is between sample-driven, bound-in input routines on the one hand, and server-generated events on the other. The document supports the latter model, as a means of maintaining a consistent interaction model for a range of application processes.

TITLE
The *me too* method of Software Design
REF: SE4/20/055
PROJECT: PRJ/SE/029/4Mb
CLASSIFICATION
Implementation and Integration
Methods and Processes
Software Generation
CONTACT DETAILS
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ABSTRACT
The *me too* method addresses two concerns in the process of software design. The first is effective communications of a design specification amongst members of a design team. The second is early feedback on the correctness and adequacy of a design. The first concern is achieved by producing a formal specification of a design's requirements. The second is accomplished by transforming the specification into an executable design prototype to be tested.

This paper describes the *me too* method and illustrates its use in the design of two prototypes of a system for production rules.

TITLE
Report on experience with the *me too* method of software design for prototyping conventional applications
REF: SE4/20/056
PROJECT: PRJ/SE/029/1Eb
CLASSIFICATION
Implementation and Integration
Methods and Processes
Software Generation
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ABSTRACT
As part of the Alvey project "Use of functional programming as a design and prototyping methodology for Intelligent Business Systems", we have investigated the applicability of functional programming for a number of conventional applications on a moderately large scale. The *me too* method of software design, based on functional programming, has developed as part of this investigation. This interim report records some of our observations as a consequence of these investigations.

TITLE
Functional Programming, Formal Specification and Rapid Prototyping
REF: SE4/20/057
PROJECT: PRJ/SE/029/4Mc
CLASSIFICATION
Implementation and Integration
Methods and Processes
Software Generation
CONTACT DETAILS
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ABSTRACT
Functional programming has enormous potential for reducing the high cost of software development. Because of the simple mathematical basis of functional programming it is easier to design correct programs in a purely functional style than in a traditional imperative style. We argue here that functional programs combine the clarity required for the formal specification of software designs with the ability to validate the design by execution. As such they are ideal for rapidly prototyping design as it is developed. We give an example which is larger than those traditionally used to explain functional programming. We use this example to illustrate a method of software design which efficiently and reliably turns an informal description of requirements into an executable formal specification.

TITLE
A Formal Specification of a Personal Planner
REF: SE4/20/058
PROJECT: PRJ/SE/029/1Da
CLASSIFICATION
Implementation and Integration
Methods and Processes
Software Generation
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ABSTRACT
A personal planner and time management system was designed and prototyped using the *me too* methodology. This report documents the requirements of such a system, a description of the database chosen, the specification of the system, and ideas on further refinements.

TITLE
A PS-algol Implementation of the Personal Planner from its *me too* Specification
REF: SE4/20/059
PROJECT: PRJ/SE/029/5Pa
CLASSIFICATION
Implementation and Integration
Methods and Processes
Software Generation
CONTACT DETAILS
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ABSTRACT
This report describes the methods used to implement a personal planning system in PS-algol, the persistent data typed language developed by the Universities of St Andrews and Glasgow. The Personal Planner was designed and prototyped using the *me too* methodology and the implementation is directly based on the *me too* specification of the prototype. The implementation of the Personal Planner was made easy by the precise form of the specification.

TITLE
Towards Reusable Software—a consideration of some components and some applications
REF: SE4/20/060
PROJECT: PRJ/SE/029/3IJ
CLASSIFICATION
Implementation and Integration
Methods and Processes
Software Generation
CONTACT DETAILS
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ABSTRACT

The third Demonstrator produced under the Alvey project entitled "Use of Functional Programming as a Design and Prototyping Methodology for Intelligent Business Systems" was to investigate the use of the *me too* method of Software Design in producing a library of component specifications which could be reused in the construction of larger application specifications.

In carrying out the investigation we set ourselves the task of designing three components which we considered to be 'reusable'. We then attempted to design three applications, where each application was built from two of the three components, and each component was contained in more than one application.

This report describes the three components and the three applications specified during the investigation. It also describes the supporting specifications that were written for each application. Some of the decisions taken to make the components 'reusable' are documented, as well as some of the decisions made in using the components in the supporting specifications. The complete specifications of all three components and the supporting specifications are in the appendices of the report. The observations we made about modularisation and reusable components as a result of the investigation are discussed in the comments section.

TITLE
A Formal Specification of the Project History Data Base System
REF: SE4/20/061
PROJECT: PRJ/SE/048/2
CLASSIFICATION
Exploitation and Understanding
Methods and Processes
Formal Specification
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Tel: 0625 29241

ABSTRACT

This report describes three attempts at specifying a small, but non trivial, data processing system. The system comprises a computer which is used for information storage and retrieval, and some clerical functions which collect its data and interpret its output. At first we tried to ignore this division because it was a design decision. The main problem was that the interpretation function involved a lot of subjective judgement which could not be defined in terms of our data. We then tried to model the entire problem domain. A major difficulty here was in showing how or why incorrect data is recorded in the database and hence there does not appear to be any reason for the correction operations which are obviously necessary in real life. We also did a lot of work which did not contribute to the production of a system to solve our problem. All of this work was done in parallel in OBJ and VDM.

Finally we tried to use ML as a specification language. We accepted the customer's initial ideas about the role that the computer would play and tried to specify this role—thereby avoiding the poorly defined areas mentioned above. We wrote an axiomatic specification in extended ML and systematically refined it into a prototype in standard ML. This also served as a basis for an Ada implementation. Our experiences indicate that this is a feasible means of developing reliable software.

TITLE
Application of Formal Methods in an Industrial Environment (Final Project Report)
REF: SE4/20/062
PROJECT: PRJ/SE/048/5
CLASSIFICATION
Exploitation and Evaluation
Methods and Processes
Formal Specification
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Tel: 0625 29241

ABSTRACT

We have applied three formal specification languages (VDM, OBJ and ML) to defining the functional requirements for a number of small programs and one medium sized information processing system. We have produced guidelines for developing Ada programs from our specifications.

We have been particularly interested in investigating how ML should be used to express specifications. We found that an axiomatic approach produced a good specification which was amenable to being developed (using a VDM-like refinement process) into a sound design incorporating a realistic hierarchical decomposition. Eventually we arrive at a prototype system in standard ML which can be tested. If the design appears satisfactory, it can be used as a blueprint for an imperative language such as Ada. This approach worked better than that of attempting to execute the initial specification directly (as we did in OBJ) because this was often impracticably slow. We feel that the initial specification should be justified by argument and deduction.

It is important to set realistic targets for the scope of a formal specification. We found that it was not cost effective to use formal methods before the stage of expressing the functional interface to the system and authors should not be concerned if their scripts look like a high level design document. However, where possible, it is sound practice to start by producing a set of axioms that the functional interface should satisfy.

Generally we found formal methods practicable and not unduly expensive. However more assistance with methods for producing initial specifications would be beneficial.

TITLE
Report on SE-71's recent research on structural metrics: A Unifying Approach
REF: SE4/20/063
PROJECT: PRJ/SE/069/1a
CLASSIFICATION
Innovation and Understanding
Methods and Processes
Metrics
CONTACT DETAILS
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ABSTRACT

This report describes the most recent research conducted in Project SE-71 on structural complexity metrics. In particular it describes a theory for software control structure which leads to provably unique hierarchical decomposition in terms of a tree of prime structures. It is shown that this decomposition tree can be used to generate all well-known structural complexity metrics in an elegantly simple manner. Thus an abundance of research in this area is placed within a unified framework, which minimises the amount of subjectivity needed to define, assess and evaluate metrics of this type. It is also indicated how a similar approach might be used for metrics of design and ultimately specification, so that the paper attempts to establish common theoretical ground between the 'reliability and metrics' community on one hand and the 'formal specification' community on the other.

TITLE
Source Code to Control-flow Graph—an S3 Application
REF: SE4/20/064
PROJECT: PRJ/SE/069/1b
CLASSIFICATION
Innovation and Understanding
Methods and Processes
Metrics
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ABSTRACT

The aim of this document is to record the method used by STL/ICL to convert S3 source code in its control-flow graphs. These graphs will form the basis of the data STL/ICL is providing to the structure-based software Metrication project. The document gives the current position on standard representations of the various control-statements in S3. Some examples are provided to show how the control-structures are combined to form the S3 holons. The graph theoretic metrics which will be derived from the control-flow graphs will be of no benefit unless their usefulness can be demonstrated to project managers therefore a short section is given briefly describing a potential use of the metrics.

TITLE
The use of Z to specify the structural decomposition of control-flow in programs
REF: SE4/20/065
PROJECT: PRJ/SE/069/1c
CLASSIFICATION
Innovation and Understanding
Methods and Processes
Metrics
CONTACT DETAILS
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ABSTRACT

This report describes how programs may be represented as flowgraphs, how flowgraphs may be represented in set notation and how flowgraphs may be composed from and decomposed into prime components. Next the specification language "Z" is described. Z is used to give formal specifications for graphs and multigraphs, digraphs and multidigraphs, flowgraphs, CGK-graphs and various operations and relations on them. Some node and arc-labelled multidigraphs and flowgraphs are also specified. Methods for obtaining sets corresponding to the flowgraph of a program are considered. The Z specification method is still under active development but nevertheless it has proved more than adequate to specify the graphs, operations and relations mentioned above.

TITLE
A Review of Structure-Based Software Metric Validation
REF: SE4/20/066
PROJECT: PRJ/SE/069/1d
CLASSIFICATION
Innovation and Understanding
Methods and Processes
Metrics
CONTACT DETAILS
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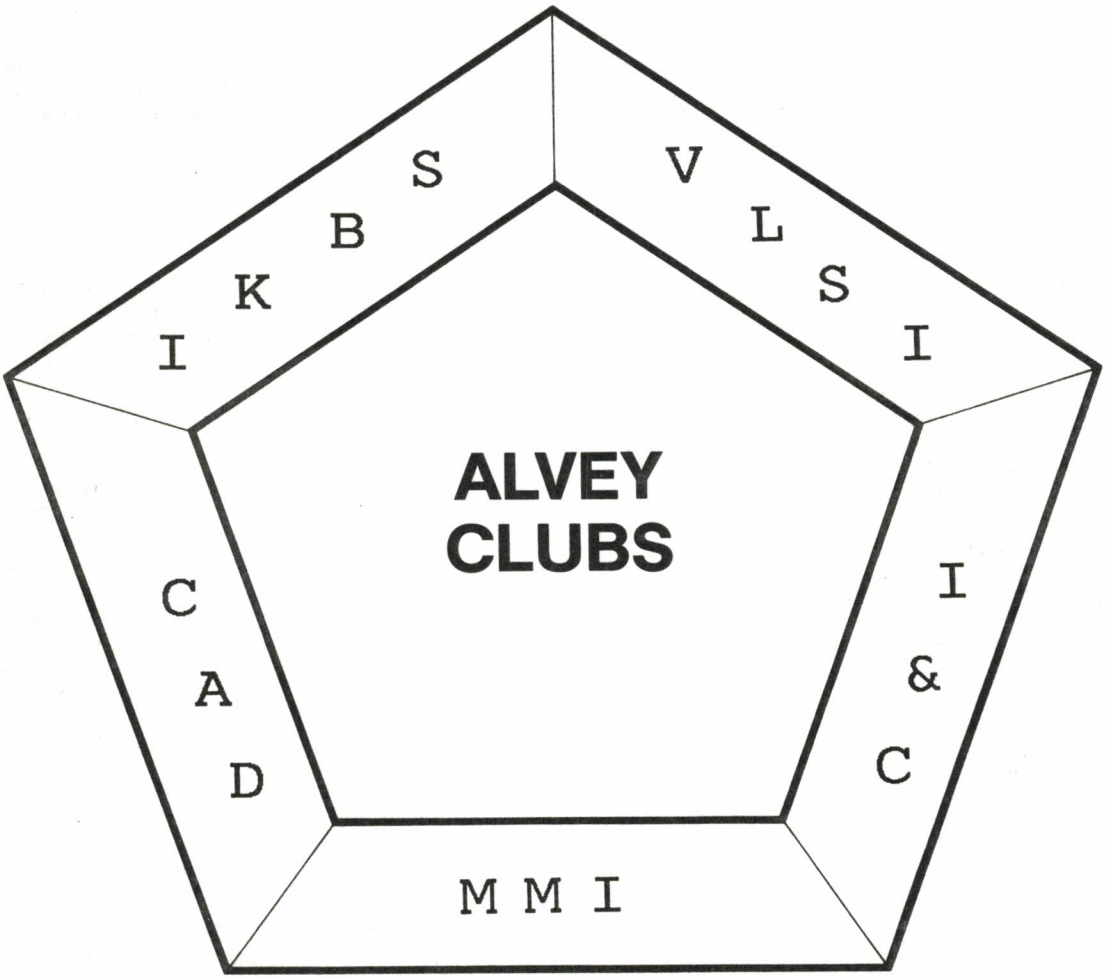
ABSTRACT

This report is based on a case study produced by S Cheng as an MSc project at South Bank Polytechnic which used data from three programs, including one provided by CERL as part of their contribution to the current Alvey project. The current paper is intended as an extension of the former work, with an indication of some of the issues surrounding metric validation that need to be resolved and the direction that will be taken by the research at South Bank Polytechnic.

ALVEY NEWS SUPPLEMENT



DECEMBER 1986

FOR FURTHER INFORMATION PLEASE REFER TO CONTACT DETAILS

ALVEY CLUBS

The Alvey Clubs are seen as a key element of the Alvey Programme aimed at speeding up technology transfer in the various research communities. The decision to vest Intellectual Property Rights resulting from Alvey projects with the industrial partners whilst being a spur to commercial exploitation of these results could have constrained technology transfer to the wider community. To overcome this potential difficulty the Alvey Letter of Grant requires project participants to make basic progress disclosures to other members of the Alvey Category Club, and also to grant free licences to the other members, where necessary, for the purposes of their Alvey projects. Thereafter companies are required to grant licences for exploitation on "normal commercial terms".

As the programme has developed the Club structure has taken shape and a wide range of meetings and workshops has taken place. In all areas it has been found desirable for the main activities to be carried out at a more specialised level than the four basic technologies. There are now many sub-clubs and special interest groups. Reports on the organisation and activities of these clubs are given below, together with a contact point for each. Some, as in the VLSI process clubs, have grown out of "consortium" activity started before the Alvey Programme. Others were formed specially and are playing a useful part in bringing the appropriate community together. In all cases the discussions cover the whole range of the topics rather than being confined strictly to Alvey matters. This makes it easier to view Alvey projects and their progress in the context of other research in companies and universities both in the UK and as parts of ESPRIT, RACE, Eureka, etc.

Membership of clubs is basically confined to those companies, research establishments and academic teams who have grants under the Alvey Programme, although, with the agreement of the club members, the Directorate may invite others who will make a significant contribution to club activities. In some of the Special Interest Groups this is extended to include *all* interested parties, but in that case such members are not automatically entitled to the IPR benefits of club membership.

S L H Clarke

I&C

ALVEY NETWORKING AND COMMUNICATIONS CLUB

The Alvey Networking and Communications Club has been formed as a special interest group rather than as an Alvey Category Club. It brings together those interested and involved in the development and application of computer-based communications. The nucleus is formed from the Alvey Communications projects ADMIRAL and UNISON but other Alvey projects have considerable involvement with the subject, the ANSA consortium for example. Membership is not confined to Alvey project participants. The Chairman is Professor D Shepherd (Lancaster University).

The Club was effectively launched at an IEE colloquium on the 'Communications Aspects of the Alvey Programme' in February 1986, and has since established a pattern of meeting at approximately three-monthly intervals. Each meeting is designed to focus on a different subject such as European Activities or Standards. The Club is biased towards networking and the use of basic communication technologies, although fundamental (bearer-level) issues are also discussed.

The Club has not, to date, promoted any workshops or discussed detailed topics in any depth but it is envisaged that this will happen.

Contact: Ian Dawson (Secretary), Alvey Directorate, Room 920, Millbank Tower, Millbank, London SW1P 4QU. Tel. 01-211 4579.

VLSI

ELECTRONIC COMPONENTS RESEARCH CLUB—LAYER PROCESSING

The Layer Processing Club which is one of the ECRC in the VLSI Technology area promotes and stimulates an interchange between industry, government and university workers concerned with deposited materials and wafer processing aspects of VLSI circuits. Although primarily concerned with silicon technology, links have been established with those interested in similar aspects of GaAs technology. The club which meets approximately every six months consists of representatives of all the major chip manufacturers (Plessey, GEC, Ferranti, Mullard, STL) together with BTRL, RSRE, SERC, DTI and DCVD.

Five Working Groups have been formed, which correspond with topic areas defined by the Alvey programme. These have the following titles and chairman—Dry Etch, Chairman Dr Vas Desmukh, RSRE; Deposition and Contact Systems, Chairman Dr Steve Wright, GEC HRC; Ion Implantation, Dielectrics and Annealing, Chairman Dr Chris Hill, Plessey Caswell; Process and Device Modelling, Chairman Dr D J Godfrey GEC (Hirst) Research Centre; and Silicon Insulator, Dr John Cave, Plessey Caswell

There is obviously a very strong interaction between these topics and both lithography and materials developments. This is reflected in a standing invitation to the chairmen of the Advanced Lithography Club and Silicon Materials Club to attend meetings. Links with the GaAs area are maintained by exchange of meeting minutes and a direct invitation to a representative of the GaAs consortium. Technical inputs on progress of the Alvey collaborative projects are provided by the Working Group Chairmen and the agenda also includes discussions on interaction with related collaborative programmes such as ESPRIT. The club also has presentations from invited speakers on some aspect of general interest.

It is the responsibility of the Working Group Chairmen to co-ordinate the activities within a topic area and to co-opt any group willing to make a contribution. Some groups consist of up to twenty separate organisations, including universities, contract research organisations and equipment manufacturers in addition to the main club members. The objective of the working groups is to encourage work to improve the fundamental understanding of the topic as well as identifying subjects requiring further work.

Contact: Dr P Scovell, STL plc., London Road, Harlow, Essex CM17 9NA. Tel. 0473 643210.

VLSI

ADVANCED LITHOGRAPHY CLUB

Lithography has traditionally been the process which has determined the degree of integration which can be achieved on silicon. The structure of the Advanced Lithography Club working parties reflects the state of the art with 1.5 μm geometries and also most of the likely technology developments over the next 5-10 years when feature sizes may be reduced below 0.5 μm.

The six working parties are:

1 Resists
2 Aligners
3 Maskmaking
4 Metrology
5 Advanced techniques (electron-beam, ion-beam, X-ray, etc.)
6 Cambridge Instruments machine users

Each group has about 20 members and academics, equipment suppliers and users are all represented. Typical business ranges from shared experiences (or prejudices) in groups 2, 3 and 6 to research collaboration and review in groups 1 and 5.

The ALC has many interfaces with other clubs but the most immediate and important are Layer Processing and Advanced Manufacturing Technology.

Contact: Dr J Robertson, University of Edinburgh, Department of Electrical Engineering, School of Engineering, The King's Buildings, Edinburgh EH9 3JL. Tel. 031-667 1081.

VLSI

HIGH PERFORMANCE SEMICONDUCTOR SYSTEMS CLUB

The HPSS Club seeks to reflect the views of users and potential users of semiconductor technology.

Within the Club there are five working groups as follows:

1 Whole Process Assessment, Chairman Dave Colliver (AD/CVD2)
2 VLSI Architectures, Chairman Prof G Nudd (Warwick University)
3 Applications, Chairman Dr B J G Roberts (RSRE)
4 Testing and Inspection, Chairman Mr G Temple (Marconi Instruments)
5 Reliability and Failure Analysis, Chairman Dr J C Henderson (BTRL)

In addition to the normal exchange of information between Alvey participants in the above areas, the HPSS Club seeks to investigate other areas of Alvey technology which its members identify as of particular importance to the user community in achieving full implementation of the advances in semiconductor technology being achieved in the UK. To this end the Club intends to explore with other Alvey Clubs and acknowledged experts the principal objectives of integrated CAD, systems architecture, software for parallel structures and VLSI inference engines.

Contact: Professor J Shepherd, GEC Avionics Ltd., Airport Works, Rochester, Kent ME1 2XX. Tel. 0634 44400.

VLSI

SILICON MATERIALS CLUB

The Silicon Materials Club, which forms part of the UK Electronics Component Research Clubs (ECRC) in the VLSI/CAD Technology area, exists to promote and stimulate interchange and communication between research workers in Industry, Government, Universities, etc, who are active in the field of silicon materials. Existing research consortia on silicon characterisation, epitaxy and crystal growth were merged in 1985 with Alvey Clubs covering relevant projects in the VLSI area, to form a single organisation as part of the ECRC. A principal aim, therefore, is to assist information dissemination and exploitation of results from Si materials work within Alvey.

The Si Materials Club has three working groups, in which membership is drawn from all sections of research activity in the UK:

1 Si Materials Specification for VLSI (WG 4.1)
2 Analytical Techniques (WG 4.2)
3 Si Epitaxy (WG 4.3)

WG 4.1 on Si Specification aims to appraise the availability, quality and means of assessment of silicon wafer materials for the manufacture of advanced silicon devices in UK industry. The membership is drawn from all UK semiconductor companies with active research interests in Si materials, including GEC, Plessey, Ferranti, STC, Mullard, BAe, INMOS, Sinclair and BT, from Government research laboratories such as RSRE and AERE, and from Universities with Alvey projects including Reading, UMIST, Strathclyde, London (KC), etc. The activities cover reports on current research work covering Alvey projects, ESPRIT as well as non-Alvey work, surveys of UK useage of Si wafers and trends in procurement, epi wafers for MOS, reports on standards work under ASTM, DIN and SEMI, evaluation of new materials and assessment methods for QA, and presentations by leading Si materials suppliers such as Monsanto, Wacker, SEH, etc.

The Analytical Techniques Working Group strategy is to ensure links are maintained when and where appropriate with the relevant layer processing working groups in the VLSI clubs. High resolution analytical methods for structural, chemical and electrical evaluations of electronic materials devices and components are crucial to many research programmes, and so existing groups cover such techniques as SIMS and ESCA. The Chairman of WG 4.2 is Professor Ron Newman of Reading University.

WG 4.3 on Si Epitaxy for some time adressed industrial production scale epitaxy and acted as a UK focus for research work on epitaxy. To this has been added advanced techniques research such as MBE and low pressure approaches for future processing applications. Representatives from most UK industrial microelectronics companies are involved, with appropriate University contributions largely through Alvey projects. The Chairman is John Wilkes of Mullard Southampton.

Contact: Dr G R Jones, Supt SP1, RSRE, St Andrews Road, Great Malvern, Worcestershire WR14 3PS. Tel. 06845 2733.

VLSI

ADVANCED MANUFACTURING TECHNOLOGY CLUB

The objective of this Research Consortium is to establish common group by which we can freely discuss and mutually influence topics leading to improvements in manufacturing plant and services. By these means, information and encouragement is given where possible, to vendors or potential vendors to build a much needed and strengthened infrastructure of Support Services, Tooling, Materials and Equipment in the UK.

We have encouraged a policy of active working parties who have produced, for example, reports on Pure Water Systems, Air Flow Modelling and Particulate Results, Water Purity Specification and also an Annual Conference of technical presentations of papers by both vendors and users.

These Working Parties have had the prime effect of setting up the Centre for Engineering Research into Contamination Control, CERCCON at Loughborough University, and the establishment of important relationships with other organisations SSA (American Safety Association) and SEMI (Semiconductor Equipment Manufacturers Inc.).

Contact: Mr H Richards, Plessey (Caswell) Research Centre, Towcester, Northamptonshire NN12 8EQ. Tel. 0327 50581.

VLSI

INTERCONNECTION TECHNOLOGY INDUSTRIAL CONSORTIUM (ITIC)

ITIC was formed on the 6th November 1981 and although the name should have been changed to "Club" when it became associated with the Alvey programme, the members of ITIC felt that their companies preferred the word Consortium; they generally avoid the question by using the abbreviation.

The following are represented in ITIC: British Telecom Research Laboratories, ERA Technology, Cambridge Interconnection Technology, Crystalate Electronics, GEC Hirst Research Centre, STC Exacta, Mullard, Royal Signals and Radar Establishment, Plessey Research, TMC Ltd., GEC Marconi Research Centre, British Aerospace, Standard Telecommunications Laboratory, Smiths Industries, BPA, Department of Trade and Industry. The Chairman is Chris Garnett, a consultant and Director of The Printed Circuit Association.

For the purposes of their discussions, ITIC members define Interconnection Technology as all electronic construction technology between, but not including, connections on silicon and separate connectors. Their interests cover semiconductor packaging, substrates, conductors, resistive materials, packaging aspects of passive components, and the ways in which these elements are put together.

ITIC is unusual in that the different member companies have different fields of interest and experience. ITIC meets four or five times each year and each meeting has a session defining the future programme as well as presentations, factory visits and discussion.

Undoubtedly the topic generating most interest at this time is that of surface mounting technology. The DTI is seeking to set up a club in this field and ITIC has made proposals whereby this

should be done "in an ITIC context" to ensure communication with the rest of the community and to avoid duplication.

Contact: Mr C H Garnett, EPM Services, 21 Tavistock Road, Fleet, Hampshire GU13 8EM. Tel. 02514 7630.

VLSI

UKDA—CAD RESEARCH CONSORTIUM

The UKDA Club is open to all UK workers in CAD. The main objective is to promote better CAD for VLSI in the UK.

UKDA had its origins before Alvey. Currently, the group is fulfilling the role of the Alvey CAD Club. The Main Board is composed of key DA managers from 15 companies with some university professors and representatives of Alvey, DTI and SERC. A key goal is to promote, via workshops and working groups, a good flow of ideas between universities and industry.

Some very effective working group meetings have been held usually on a one-day basis. The Circuit Simulation group has had several meetings to discuss the use of SPICE and requirements for a better successor.

The UK EDIF users group has had several meetings to address the important topic of data interchange between companies. As a result of the enthusiasm and dedication of this group they have earned worldwide respect for their technical input to emerging DA standards. The High Level Design and Specification group chaired by Tim Thorp of RSRE held a meeting on VHDL, the mighty US DoD Hardware Description Language.

Joint evaluation of CAD suppliers has always been an effective enterprise.

Contact: Gordon Adshead, ICL, Wenlock Way, West Gorton, Manchester M12 5DR. Tel. 061-223 1301 (Ext. 2568).

SE

ALVEY FORMAL METHODS SPECIALIST GROUP/CLUB

(Administered by BCS Specialist Group in formal aspects of Computing Science, FACS)

The move of Software Engineering from a craft industry to a true engineering profession has highlighted the need for both a firm theoretical foundation to the subject and for rigorous methods of working for practitioners. Both of these factors are highlighted in the two prime objectives of the Formal Methods Club:

(a) to provide a forum in which the theoreticians can communicate and collaborate and
(b) to provide a vehicle for the dissemination of theory to the broader computing community

Over 200 members are registered. Membership of the Group is open to all.

Contact: Dr D J Cooke, Department of Computer Studies, Loughborough University of Technology, Leicestershire LE11 3TU. Tel. 0509 263171.

SE

SOFTWARE RELIABILITY AND METRICS CLUB

This Alvey Club concentrates on the issues of *software reliability:* its achievement and assessment.

Meetings consist of prepared but informal presentations by three or four invited speakers with an opportunity for short contributions from anyone present. All members receive an irregular newsletter on matters of general interest.

The Alvey Club is organised on behalf of the Alvey Directorate by CSR, the Centre for Software Reliability (CSR forms the Advisory Panel on software reliability matters to the Alvey Software Engineering Director).

Contacts:
Mrs J Atkinson, CSR Computing Laboratory, University of Newcastle upon Tyne NE1 7RU. Tel. 0632 324016.

Ms G Palmer, Centre for Software Reliability, The City University, Northampton Square, London EC1V 0HB, Tel. 01-253 4399 (Ext. 4102).

SE

THE IPSE AND TOOLS CLUB

The aim of this Club/SIG is to present, promote and progress developments in Integrated Project Support Environments (IPSEs) and their associated Tools.

The majority of the meetings are open to all parties with an interest in such developments.

IPSEs are designed to support the entire life cycle of systems development, and as such address many wide ranging topics including project management and control, configuration control, cost estimating, software design and development methodologies, reusability and prototyping, formal methods, reliability and metrics, distribution and communications, microprocessor development, IKBS and MMI. The IPSEs themselves; the tools provided or available; and the interfaces by which tools are ported or added to the IPSE, are relevant to the interests of this club.

Contact: Mr Phil Mair, The National Computing Centre, Oxford Road, Manchester M1 7ED. Tel. 061-228 6333.

MMI

HUMAN INTERFACE CLUB

The primary purpose of the Human Interface Club is to provide a forum to bring together all those working on Alvey Human Interface projects. However, the human interface appears in every IT product, and human interface technology is equally relevant to many other Alvey projects, especially the Large Scale Demonstrators. Club activities range from discussion of Human Interface tools and techniques for interface design, to considerations of the HI requirements in the design process. Although some club activities are restricted to club members, meetings on scientific topics are often open to other researchers who request attendance.

The field of human-computer interaction is both immature and multi-disciplinary, combining the skills of computer science and psychology. It requires the integration into the design cycle of human and ergonomic skills. The goal is a user-centred design process which incorporates the requirements of real users in the early stages, and contributes to user interfaces which are appropriate for the task and easy to use.

Club activities include seminars and workshops, sometimes in collaboration with other bodies on topics of mutual interest. Past meetings have reviewed projects in the Human Interface programme, and discussed techniques for evaluation of the usability of user interfaces. It is intended to set up a number of mini-clubs covering specialised topics. These will be run in conjunction with clubs in other Alvey areas where there is joint interest, as in the case of user modelling.

The Club is complementary to the existing activities of professional bodies in the area. Club activities are promoted in the MMI mailshot, which also contains reports of Club meetings.

Recently established are three new facilities: a video library of HCI applications and techniques, a Who's Who within the bounds of the discipline and a database of available literature (including non-formally published work, such as PhD theses).

Contacts:
Keith Dancey, Human Interface Club, Informatics Division, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX. Tel. 0235 21900 (Ext. 5716).
Crispin A A Goswell, Coordinator, MMI Mailshot, Informatics Division, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX. Tel. 0235 21900 (Ext. 6756).
Chris M Crampton, Curator, Video Library, Informatics Division, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX. Tel. 0235 21900 (Ext. 6756).

MMI/IKBS

VISION CLUB

Membership of the Alvey Vision Club is open to all active workers on vision-related Alvey MMI and IKBS projects. The club acts as a forum for the exchange of research experience and results amongst its members, discussion of future research directions, dissemination of information on research external to Alvey (arising from overseas visits and conferences) and acts as a contact point for other research workers.

The club met for the first time last year just prior to the Alvey Conference in Edinburgh, when members gave introductory talks describing their research topics.

In September 1985, the Pattern Analysis Group of the Man-Machine interface and the Computer Vision Group of the IKBS community jointly held a conference at the University of Sussex. The following topics were discussed:

Optic flow and structure-from-motion
Stereo and 3D model based vision
Object identification
Perspective images and their model-based interpretation

Approximately 40 authors contributed papers, a selection of which have been published in "Image and Vision Computing".

A workshop covering many aspects of "Model-based Vision" was held in Manchester at the end of February 1986.

In September 1986 a second major conference was held at Bristol University. Guest speakers included Dr J Ullman (Weizman Institute of Science) and Dr D Geman (University of Massachusetts Amhurst). Some 40 papers were presented principally by Alvey Grant holders.

The chairman of the club is Mr M B Brown, British Aerospace, Bristol.

Contact: Ms K M Crennell, Rutherford Appleton Laboratory, Department of Computing, Chilton, Didcot, Oxon OX11 0QX. Tel. 0235 446397.

MMI/IKBS

SPEECH AND NATURAL LANGUAGE CLUB

The Speech and Natural Language Club exists to foster contacts between those working on projects funded under the Alvey MMI Speech Processing and IKBS Natural Language programmes. Although there is a wide range of backgrounds and interests within the club, combining the speech and natural language communities has substantial advantages for a number of Alvey projects. However, because of their different detailed interests, it has been useful to separately identify the two sub-communities, which for convenience are referred to as the Alvey Speech Club and the Alvey Natural Language Club.

Chairman: John Holmes (Alvey Consultant)

The Speech Club held its first workshop at Warwick University in July 1985. This meeting was concerned with common infrastructure and the topics addressed included standards for speech data interchange, recording standards, database formats, phonetic notation and a survey of speech processing algorithms.

The themes of the Warwick meeting were developed at a second workshop which was devoted to speech capture and editing. Technical papers on the design and implementation of speech editors were presented and systems were demonstrated by groups from Cambridge University, Edinburgh-CSTR, JSRU, Smiths Industries and University College London. Such systems represent enabling technology for several Alvey Speech Projects and those not actively developing speech editors had the opportunity to view what was available. A full day of the meeting was devoted to round table discussion of the methodology of speech capture and editing.

A Workshop on Speech Analysis Algorithms was held on 15th September at UCL. Two ten second fragments of speech were prepared in advance as common speech material for analysis by each Alvey project team. Results of the analysis were presented and discussed in a lively open forum.

Chairman: Karen Sparck Jones (Cambridge University)

Planning for the natural language programme took place at an initial Research Themes Workshop which was held in December 1983 (report available from the Alvey Directorate); a second workshop on Linguistic Theory and Computational Applications was held at UMIST in September 1985.

In September 1986 the Natural Language Consortium project was announced, based at the SRI Research Centre at Cambridge with seven founder members, and in close collaboration with the University of Cambridge Computer Laboratory. This Consortium significantly strengthens industrial participation in NL research which had previously been largely academic. Links are being established between the Consortium and the Alvey Natural Language Clubs.

Contacts:
Dr E R Hancock (Secretary, Alvey Speech and Natural Language Club), Information Systems Group, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX.
Dr J N Holmes (Chairman, Alvey Speech Club), 19 Maylands Drive, Uxbridge, Middlesex UB8 1BH.
Dr K Sparck Jones (Chairman, Alvey Natural Language Club), University Computing Laboratory, Corn Exchange Street, Cambridge CB2 3QG.

IKBS

KNOWLEDGE BASED SYSTEMS CLUB

The Knowledge Based Systems Club incorporates those Alvey IKBS projects which come within the "Expert Systems", "Intelligent Computer Aided Instruction" and "Intelligent Front-ends" themes. The IKBS demonstrators also belong to this club, and the Alvey Large Scale Demonstrators have been invited to join.

The club's objectives are:

1 To promote the development of common tools, techniques and infrastructure.
2 To exchange research experience and results to the mutual benefit of its members.
3 To reduce the duplication of research effort and stimulate new research.
4 To present and discuss, within the club, the aims and achievements of research within the projects.
5 To exchange information concerning research and development external to Alvey (having due regard for IPR).
6 To coordinate visits, organise reports, etc, for the benefit of club members.
7 To promote liaison with other Alvey Clubs and with ESPRIT and other relevant European bodies.

Club meetings are normally confined to representatives of the projects.

The currently active SIGs and their coordinators are:

Planning	Austin Tate, Edinburgh AIAI. Tel. 031-225 4464
Deep knowledge	Jim Hunter, University of Sussex. Tel. 0273 678051.
Intelligent Interfaces	David Probert, BT Newgate Street. Tel. 01-356 4712.

The Chairman of the KBS Club is Antony Wakeling, Solartron. Tel. 0252 544433.

Contact: Mr J W T Smith, Secretary, Alvey KBS Club Steering Committee, Informatics Division, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon. Tel. 0235 21900 (Ext. 6487).

IKBS

SYSTEMS ARCHITECTURE CLUB

The Systems Architecture (SA) Club acts as a forum for the exchange of information between workers on Alvey SA projects and in particular allows these workers to focus on participating

issues covering (at least most of) the architecture projects. Special interest groups are set up to allow discussion on more specific areas and in areas where there are overlaps in activities outside the Alvey Programme.

The projects directly related to this club fall into three main groups, viz:

1 Parallel Declarative Systems, including: FLAGSHIP; DACTL; Persistent Information Space Architecture; Graph Reduction in Parallel; etc.
2 Knowledge Based Systems, including: Conceptual and Relational Database Systems; Fast Multi-user Prolog Database Systems; Generic Associative Memory; Intelligent File Store; etc.
3 Arrays of powerful processing elements with flexible interconnection capability, as in the Parallel Simulation Facility based upon Transputers.

Links are being set up with Architectural interests in other Alvey Clubs, such as VLSI and MMI. Also formal links are being arranged with ESPRIT projects working in the same research areas, such as Declarative Languages and Systems and Also Transputer Arrays.

The club held its first meeting in June 1986 which essentially consisted of presentations on the main areas of the Architecture programme. A club steering committee has since been established and SIG's are being established on 'knowledge manipulation systems' and 'parallel declarative systems'. The next club meeting was on 'bench marking' in November 1986.

The Advanced Network Systems Architecture Project has great significance in this field of general Systems Architecture awareness and positive liaison will be fostered with this activity.

Contacts:
Mr A C D Haley, Secretary Director, External Technical Relations, ICL, ICL House, Putney, London SW15 1SW.
Dr M B Dunn, Chairman, Informatics Division, Rutherford Appleton Laboratory, Chilton Didcot, Oxon OX11 0QX. Tel. 0235 445862.

IKBS

LOGIC PROGRAMMING CLUB

The Alvey Logic Programming Club incorporates all the projects in the IKBS 'Logic Programming Initiative'. Other Alvey projects, with a substantial Logic Programming content, which are willing to take an active part in the club are also welcome to join. Although, as customary with clubs, membership is restricted to Alvey projects it is hoped that some meetings can involve the wider Logic Programming research community. A mention of the Logic Programming Initiative was made in *Alvey News,* June 1985.

The main objectives of the club are to:

- Exchange research experience to the mutual benefit of club members.
- Promote industrial exploitation of results of Logic Programming Research.
- Act as a focus for gathering and expressing the views of the UK Logic Programming Community.
- Promote liaison with other Alvey clubs and with ESPRIT and other relevant European bodies.

Following an initial business meeting, a one-day closed technical meeting was held on 26th September 1986. This discussed progress in some of the club projects and also heard about experiences of Logic Programming in other Alvey areas. The next meeting is planned early in the new year.

Projects in the "Logic Programming Initiative" will have been formally asked to join the club. Others interested should contact the secretary or chairman who will also be happy to discuss any other aspect of the club's activities.

The Chairman of the Logic Programming Club is Dr Robert Worden, Logica. Tel. 0223 66343.

Contact: Dr C J Pavelin, Secretary, Building R1, Informatics Division, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX. Tel. 0235 44 6407.

IKBS—EXPERT SYSTEMS AWARENESS CLUBS

The purpose of the clubs is to bring to the notice of UK industry and commerce the importance to their future businesses of information technology.

There are nine clubs in the scheme involving more than 180 organisations from various sectors of the economy.

Benefits to club members centre on first-hand observation at relatively modest cost of the construction of a major and relevant Expert System. A secondary benefit is free use of the resulting software.

Each club appoints a chairperson and steering committee to guide and monitor the implementation of the project. The Alvey Directorate appoints an assessor to undertake technical monitoring on behalf of the relevant Alvey Director.

ALFEX—ALVEY FINANCIAL EXPERT SYSTEMS

Objective

The ALFEX Club was formed in April 1985 with the objective of increasing awareness of expert systems techniques, uses and advantages in the financial community. This objective was to be achieved by undertaking a project to develop an industry specific company health adviser which would provide: assessment of company health, diagnosis of company health problems, and limited advice regarding financial and non-financial solutions to problems. The project comprises four phases:

1 Evaluation of commercially available expert system shells.
2 Investigation of non-shell implementation approaches.
3 Development of a market assessor.
4 Development of a full company health adviser.

Progress

Three of the four phases have now been completed. Phase one concluded that it would not be possible to implement an industry specific corporate health adviser using a shell; this was due to the complexity of the system and the domain, and the limited representational powers of shells. The second phase concluded that the final system should comprise four separate assessors; financial health, market, context, and financial sources availability; and that a third phase prototype should address the market assessor part of the system for the high-tech retail sector. The third phase developed a market assessor in Prolog which was demonstrated to club members in March 1986.

Future Plans

The final phase will produce the full company health adviser on a Micro-VAX with the facility to present a demonstration version on the IBM PC-AT.

Contacts:
Chairman: Mr P J Corrigan, Arthur Young, 7 Rolls Building, Fetter Lane, London EC4A 1NH. Tel. 01-831 7130.
Monitoring Officer: Mr A G Wheldon, SERC, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX. Tel. 0235 44 5354.

ARIES—INSURANCE COMMUNITY CLUB

Objective

The club aims to give members useful experience in developing expert systems for the insurance industry. The final goal is that members should be able to decide if such systems are relevant techniques to use, including software and hardware, and should also have a good appreciation of the difficulties a successful implementation is likely to face.

Progress

Two projects, clothing trade fire risk assessment and buy/sell decision evaluation in equity investment, have been selected from a short list of four. Hardware and Software, Standards and Methodologies, and Knowledge Acquisition are in operation to assist members in the learning process. Three open days have been held, including a large-screen demonstration of the fire risk system. Four very detailed project reports have also been produced to document what has been learned so far.

Future Plans
The buy/sell system will be developed by the autumn; the problems of porting the development systems to other hardware and software will be investigated in the final phase of the project. Four further major project reports are to be produced to completely document the club's experience.

Contacts:
Chairman: Mr A R Butler, Colonial Mutual Life Assurance, 24 Ludgate Hill, London EC4P 4BD. Tel. 01-248 9861.
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DAPES—DATA PROCESSING EXPERT SYSTEM

Objective
The club has been formed by major organisations with large data processing operations to explore the application of expert system techniques to data processing. The aims are two-fold:

1 To transfer experience in building of expert systems from the specialist contributors (Expertech and National Computing Centre) to the club as a whole.
2 To build a significant expert system of practical use to club members.

The pilot project is in the area of helping to maintain satisfactory operation of DP services provided to users over a network. In the first phase two prototype systems are being built using an existing expert system shell. One is a prototype "help desk assistant", hosted by W H Smith. This diagnoses user problems or, for more complex problems, advises which support group should be called in and ensures the user provides the relevant information. The other prototype, hosted by Trustee Savings Bank, diagnoses problems with communications equipment and user work stations.

Progress
An initial study identified the club members who are now acting as test site for the prototyping work. The help desk assistant prototype has been completed and has been delivered to individual club members at the beginning of July. The TSB diagnosis prototype will be ready in early August.

Future Plans
Based on the experience gained in prototyping, the club will finalise the content of Phase 2. This is expected to involve the development of one or both prototype systems into a significant system, addressing the problems of extending current expert system technology to meet the requirements of operational systems.

Contacts:
Chairman: Mr P H Drake, BP Chemicals Ltd., Belgrave House, 76 Buckingham Palace Road, London SW1W 0SU. Tel. 01-581 6614.
Monitoring Officer: Mr K W Benn, SERC, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX. Tel. 0235 44 5164.

EMEX—THE ECONOMETRIC MODEL BUILDING EXPERT SYSTEMS CLUB

Objective
The primary aim of the project is to promote awareness amongst the club members of the potential of expert systems technology. This is done in the context of an application that is of mutual interest to the members. This application is an expert system to assist in the task of building econometric models. The system will be aimed at market specialists who have a good knowledge of a market but do not have the skills to build a mathematical model of that market. At the time of writing there was still opportunity for a few interested companies to join the club.

Progress
The project has been making good progress. It has seen the development of a prototype shell for use in testing the knowledge. A textual form of the knowledge base has been produced and most recently the shell and knowledge have been combined to provide feedback to the experts and so stimulate refinement of that knowledge. A series of working papers have been distributed detailing the work. One econometrics workshop for the club members has taken place and dates have been set for further workshops on econometrics and expert systems.

Future Plans
The project is still in its first phase and so the vast majority of work lies ahead. This phase though will see the development of a prototype system for use by the club members. It will concentrate on a subset of the full task, but provide expertise in depth for that subset. This will give the members a chance to comment on the behaviour and appearance of the system, and to benefit from the emerging expertise. The awareness aim for the project will be fulfilled by the continuing series of workshops and the distribution of working papers.

Contacts:
Chairman: Mr D E Owen, Strategy and Resources Unit, CWS Ltd., New Century House, Manchester M60 4ES. Tel. 061- 834 1212 (Ext. 5564).
Monitoring Officer: Mr A G Wheldon, SERC, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX. Tel. 0235 44 5354.

PLANIT—THE PLANNING IKBS CLUB

Objective
To address three types of medium term planning activities: project planning, process planning and job-shop scheduling. The four main aims of the project are:

1 To develop a prototype interactive planning assistant (IPA) which would help planners to: react to changing circumstances while planning was being executed; react to the addition of new goals or constraints; give advice on the consequences of change; explain the functions of the plan.
2 To test the software using real test cases based on members own data.
3 To determine the potential and the limitations of knowledge-based systems in the field of planning. This is the key aim.
4 To identify the relevant current issues.

Progress
Three 'Demonstrators' have been constructed, one for each planning topic, showing how each topic could be addressed by different techniques. A high level specification of IPA functionality has been completed. The prototype IPA is being developed, in stages, on a KEE/TI Explorer system supplied on loan by Sperry Ltd. Working parties, one per planning topic, were set up and function to: (a) assist member interaction and awareness; (b) add detail to the functional and specification; and (c) elicit knowledge. Progress has been made in identifying the knowledge used in planning, the structure of the knowledge and the degree of common representation which can be used across the planning topic.

Future Plans
Following delivery of the first system demonstration in July 1986 the combined function IPA will be demonstrable by November and deliverables with members by April 1987.

Contacts:
Chairman: Mr R Muir, Rolls-Royce Ltd., PO Box 31, Derby DE2 8PJ. Tel. 0272 791234.
Monitoring Officer: Mr A G Wheldon, SERC, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX. Tel. 0235 44 5354.

QSES—THE QUANTITY SURVEYING EXPERT SYSTEMS CLUB

Objective
To promote the development and use of expert systems in the quantity surveying profession by exploring areas of possible application and preparing appropriate computer software.

Progress
The research team at Salford have been operational since January and have produced four extensive reports. Knowledge

has been elicited from the twelve members of the user group and two expert systems are now operational at the demonstration level. More work needs to be undertaken to develop and fine tune these to the requirements of practice.

Future Plans
The Stage I programme is in the process of completion and the steering committee are drafting the Stage II brief. It is likely that this brief will continue the 'lead consultant' role to include de-briefing of the client, time forecasting and the integration and extension of the systems developed so far.

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Monitoring Officer: Dr M K Jackman, SERC, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX. Tel. 0235 44 6619.

RESCU—REAL TIME EXPERT SYSTEM CLUB OF USERS

Objective
The club has three aims:

1 To increase awareness of the potential of expert system technology in the field of process engineering.
2 To make members more familiar with both technical and managerial aspects of the development of expert systems.
3 To demonstrate a real expert system application that is of close relevance to the area of interest of the club membership.

Progress
An Expert System has been installed linked to the existing control system on an ICI plant at Wilton. This Expert System provides advice to the plant operators to assist them in recipe formulation and control of product batches. The system is currently undergoing a six months evaluation period following which a final assessment of the technology in this application will be made. This project has been completed substantially to time scale and cost.

Future Plans
The project to meet the RESCU objective is moving towards completion, demonstrating the applicability of the Expert System technology in this area. Consideration is being given within the club to a further phase of activity, probably geared to the specification and production of a real time Expert System shell for general application.

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Chairman: Mr R D Peebles, BNFL, Sellafield, Cumbria. Tel. 0940 28333 (Ext. 25519).
Monitoring Officer: Dr A G Wheldon, SERC, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX. Tel. 0235 44 5354.

TRACE—TRANSPORT AND TRAVEL CLUB

Objective
Gain an understanding of the benefits offered by applying expert systems technology to problems in the transport and travel industries. A microbased system, written in Prolog 2, is under development which will assist enquiry clerks in route selection and retail travel sales staff in selection of packaged holidays. Key characteristics are excellent MMI, rapid internal processing and capability to interface with electronic databases, e.g. holiday reservations systems.

Progress
The project is advancing to prototype stage and this is expected to be demonstrated in the late summer. From this the final product will be defined. The system is being developed using compilable Prolog on an IBM AT personal computer, which will also be in the delivery hardware. Fortran and 'C' are used, as appropriate, for the procedural elements of the system. Communication with remote databases, which is a key feature of this project, is being done using various participants' databases and communication networks. The contributors are currently working to a design document, agreed by the steering committee which, among other things, described the interesting formalism of 'context graphs' around which development of the expert system is based.

Future plans
A demonstrator system will be constructed for delivery to participants which will be used as a vehicle for illustrating to members the techniques used in development. The club aims to produce methodology guidelines to assist in creating project life cycle standards for ES so that they can become an efficient tool in the range and development facilities available to public and commercial organisations.

Contacts:
Chairman: Mr C R S Kauntze, The Thomas Cook Group, PO Box 36, Thorpe Wood, Peterborough PE3 6SB. Tel. 0733 502300.
Monitoring Officer: Mr A G Wheldon, SERC, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX. Tel. 0235 44 5354.

WIESC—WATER INDUSTRY EXPERT SYSTEMS CLUB

Objective
A number of public and private sector organisations in the water industry, a software house, two universities, one polytechnic and HM Department of the Environment have formed a club to demonstrate the application and relevance of expert systems methodologies tools and techniques to the water industry. The project, which will run until the end of 1987, has the following aims:

1 To increase the awareness of the potential of expert systems technology in the water industry.
2 To build two expert systems for the industry, one for water distribution network control, and the other for sewerage rehabilitation planning. These topics cover a major part of the activities within the industry.
2 To make members more familiar with both technical and managerial aspects of the development of expert systems.

Progress
The applications team, now well established and briefed, has produced the requirement specifications for the two systems, and the design work is in progress. The club has also established three working groups to disseminate information to the membership. The principal domain experts, at the Water Research Centre (Swindon) and Wessex Water Authority (Bristol/Poole), are very much involved in the project, and knowledge elicitation is continuing; video-recording techniques have been found to be very fruitful. In addition to the planning and design documents, a number of working papers will be written and circulated to the membership. The WIESC project is being carried out jointly by the University of Surrey and Software Sciences Limited. Of the two expert systems, one is based on a water distribution network in Poole, and the other on sewerage rehabilitation systems in Poole, Chesterfield and Bournemouth.

Future Plans
The hardware (Sun Workstations) and software (QUINTUS PROLOG) is to be procured in the second half of 1986, and an initial prototype is to be produced by the end of that year. This will be followed by a design revision which will lead to the development of the final prototype, which is intended to be demonstrated by the end of 1987. The club members, individually and through working groups, will be closely involved at all stages of design, development, evaluation and delivery of the two expert systems.

Contacts:
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