



THE ALVEY DIRECTORATE

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Our Ref:

Your Ref:

March 1988

Date:

Dear Colleague

The Government announced in January a new national programme of collaborative R&D in IT in the White Paper 'DTI, The Department for Enterprise'. We need to develop the details of this programme and this has been a prime task of the Directorate over the last few weeks. I am now writing to seek your help in refining these ... research plans, summaries of which are attached to this letter. Many of you will be receiving the full version of one or more of the plans, and further copies can be obtained from Peter Chandler in the Directorate (Telephone No: 01-215 8353). These proposals reflect our first attempts on which it would be helpful to have your comments. They take account of the draft proposals which were prepared following the IT86 Report and which were circulated widely last year. At this stage the research plans cover the activities likely to be important to the UK irrespective of the detailed means of finance which may include European as well as UK programmes.

To set them in context it may be helpful to say a little about the responsibilities of the new Directorate and its structure. The Information Engineering Directorate (IED) includes both the former Alvey Directorate and that part of DTI's LA Division which covered R&D in the component and associated industries. IED now has responsibility for virtually all DTI support for collaborative R&D in the IT and electronics industry; this includes Gallium Arsenide, Optoelectronics, Superconductivity, the LINK schemes for molecular electronics and advanced semiconductor materials, the National Electronic Research Initiatives, and the DTI's support for related work at RSRE in software, electronic materials and processes. We therefore have the opportunity to run these programmes in a more coordinated way than before. It will for example be particularly helpful to the Directorate to have responsibility for both silicon and non-silicon activities and it should be easier to ensure complementarity of research between the various technologies.

The research plans envisage a cooperative programme between SERC and DTI involving industry and the academic community and contain a rough indication of the relative contributions. Discussions are now in hand between SERC and IED about the organisation and management of new programmes as well as the content and scope, and the exact involvement of SERC and its relationship to the new Directorate must await the outcome of these talks.

The bringing together of technologies will be one of the major themes of the new directorate and is now possible because of the progress made in the Alvey Programme. For understandable reasons, a significant objective was to bring together the various communities in each of the enabling technologies as well as to develop the technologies themselves. Independent assessments show that it was largely successful in meeting that objective. We can now move on to the next stage which involves getting the different communities to work together. This will often involve a different kind of collaboration from that in Alvey. We need now to bring together the various disciplines, often with new groupings of companies and universities who have not previously worked together. Applying the technologies developed in one area to the problems of another area will be a major part of the new programme and represents a deliberate attempt to build on the experience of the Alvey Programme.

A policy of bringing technologies together naturally invites the question of which technologies should be covered in such an exercise. So far our remit has been largely confined to the technologies included in the IT86 Report, together with those others which are the direct responsibility of the Directorate. Nevertheless it has been argued that it would make sense for at least the planning stage of the programme to cover a wider range. We are now in discussion with SERC and colleagues within DTI about this possibility.

You will see that there are three summaries attached to this letter, reflecting our intention to cover the technologies with three Directors, rather than the five or six currently in the Alvey Programme. These three areas will broadly correspond to:

Devices including CAD for VLSI and both silicon and non-silicon components.

Systems architecture including speech, vision and distributed systems.

Systems engineering including IKBS, software engineering and human factors.

In addition there will be a number of Assistant Directors with responsibility for a specific technology. Since many of the technologies naturally run across much of the Directorate's work the Assistant Directors will usually report to more than one of the programme Directors. The number and nature of these will reflect the skills of the individual people filling the posts (many of whom will, as in the past, be on secondment), but could include, for example, formal methods, human factors, knowledge based techniques and CAD.

Producing research plans which reflect the new aims is no simple matter, and they need both to reflect the interaction between the different technologies and take into account the new responsibilities of the Directorate. It is unrealistic to suppose that we can produce overall plans immediately and we would not presume to do it solely within the Directorate. I have therefore asked the present Directors to produce a first draft, based on previous work and comments from their communities. I should emphasise that they have not been endorsed collectively by the Directorate, nor have they been approved by Ministers or by SERC or any of its committees. They are offered as a first attempt on which we invite comments.

In these draft research plans, we have tried to identify the options which are available to us and to indicate in particular (assuming suitable project proposals):

Those areas where it seems appropriate for the work to be done within ESPRIT.

Those areas which we regard as unlikely to be supported.

Those areas which we regard as likely to be supported in the UK.

There will, of course, also be areas for which there is greater uncertainty or where decisions will need to be made in the light of the comments we receive and when the full shape of the programme and the detailed budgetary profile are clearer.

This brings me naturally to the budget. The research plans do not yet deal in detail with the allocation of funds between the different technologies, although there are some indications of relative expenditure within each plan. It is also possible that some part of the plans will be more appropriate for sources of funds other than the national programme announced in the White Paper. ESPRIT is the obvious example but as I explained earlier, IED itself has responsibility for other DTI programmes. IED will also be working closely with its DTI colleagues in IT Division who also provide funds for some activities in, for example, software engineering and parallel processing. Although IT's funds are not normally available for purely research purposes our programmes will be coordinated. I have already referred to the discussions with SERC on how best to work together in these and related areas and similar discussions have started with MOD and some other Departments.

I should also emphasise that the three research plans which we have prepared do not yet cover all IED's work, let alone the whole

IT area. We hope to integrate the non-silicon with the silicon work during the next few months. There are also a number of other topics outside those covered by the plans, some of which are already the subject of Government programmes.

I hope you will find these workplans represent a constructive approach. We look forward to your comments, which should be sent to the Director principally concerned by 15 April.

Yours sincerely

Timothy Walker

TIMOTHY WALKER

SYSTEMS ENGINEERING PROGRAMME (Summary)

Introduction

Under the new IED programme it is planned to bring the direction of the IKBS, HCI and software engineering programmes together into one programme to be known as Systems Engineering. This is in order to exploit the increasing degree of overlap of the research issues in these subjects. The first draft of the Systems Engineering document does not attempt to achieve maximum synergy between the proposed programmes but presents programmes, based upon advice given to the Directorate by the respective academic/industrial communities, for each area. In the next round of consultation efforts will be made to unify these three programmes to achieve maximum synergy.

The Programmes

Under the Alvey and Esprit programmes all three subjects have made major advances and a great improvement in the relationship between academia and industry has been achieved. All three fields suffer from the difficulty of measuring the benefits to be obtained from the application of their respective technologies and, to varying degrees, the lack of clear physical expression of the technology. (Expert Systems being essentially application are the exception). This is impeding the take up of the technology by industry. The programmes being proposed are designed

- a) to fill gaps in existing technology in order to improve the possibility of application
- b) to press forward with research topics revealed as strategically important
- c) in conjunction with other agencies to improve the awareness of existing and evolving technology and hence accelerate technology transfer

Specifically, aims under each heading are:-

IKBS

- To develop further techniques for the construction of computer systems which can cope with uncertainty in the information presented to them, interpret situations and/or exhibit more complex behaviours and provide greater relevant information support to users.
- To consolidate Alvey and Esprit work on AI & IKBS tools and integration with the tools work for Software Engineering. (Both IKBS applied to SE and vice versa).
- To apply AI Technology to "real-world" problems involving uncertainty, knowledge and reasoning in order to develop and test the methodology of building knowledge based systems.

HCI

- To achieve an increase in the generality and applicability of HCI results. An essential part of this objective will be the codification of the results.
- To increase the UK's HCI specialist and nonspecialist manpower resources
- To work with other parts of the programme and with other agencies to produce demonstrators of the efficacy of the application of HCI

technology

Software Engineering

- To populate with appropriate tools current and evolving IPSE's in order to support the methods of systems development most commonly used in industry. To continue research into future generations of IPSE and in particular ways in which industry may adopt this technology.
- To industrialise mathematically rigorous formal methods of system development.
- To develop more effective metrics for measuring the software development process and its impact upon the developer and user
- To develop methods of maintaining the large body of installed software which exists commercially.
- To investigate alternative paradigms for system development and assess their benefits.

Resources

The proposed allocation of resources within each programme is given in the attached tables 1-3. Clear overlaps of subject area will be merged in the next iteration of the strategy. Not all the activities will be supported by the IED IT Programmes but may arise from UK involvement in Esprit II or other agencies' programmes.

The IED programme would be managed in conjunction with other programmes in order to approximate to the overall balance.

Table 1.

Proposed allocation of resources in IKBS

The following list of IKBS work areas proposes types of activity for each and two weightings for each work area, given as percentage of budget available for IKBS within the Information Engineering Initiative. These weightings are headed "% Ideal" and "% Fallback" corresponding to two extreme situations where some or none (respectively) of the funding for that work area is provided by other agencies as appropriate (eg Esprit, SERC, SPPs, other IEI themes).

In practice of course the balance of funding should fall between these two extremes.

Some advice has been taken in producing these weightings but further feedback from the IKBS community would be welcomed both on the weightings themselves and the type of activity that should be undertaken in each work area

	% Ideal	% Fallback
K1. Cognitive Science/Engineering, assumed to include Deep Knowledge & Qualitative Reasoning (Ideally also supported by the SERC tri-partite programme)	3	5
K2. IKBS/SE Synergy (Assumed to be funded within Software Engineering)	0	8
K3. Explanation for Expert Systems	5	3
K4. Natural Language Programme	15	10
K5. Knowledge Based Planning	10	6
K6. Knowledge Based Training	15	6
K7. Logic (& Declarative Languages)	15	9
K8. Real-time, Co-operating Expert Systems	9	6
K9. Application of AI to Robotics	8	5
K10. Speech Technology	5	4
K11. Intelligent Signal Processing & Sensor Fusion inc. Real-time (assumed to be funded from Systems Architecture)	0	4
K12. Image Understanding (assumed to be funded from Systems Arch.)	0	5
K13. Large Knowledge Bases (Hopefully funded by Esprit)	0	5
K14. Tools and Toolkits, as recommended in "What the UK needs to do about AI Toolkits" (Hopefully funded by Esprit and/or other Government Agencies)	0	8
K15. Integration with Systems Architecture (assumed to be funded from Systems Arch.)	0	4

K16. Exploitation To be co-ordinated with other agencies	0	0
K17. Awareness	9	6
K18. Infrastructure	6	6
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	100	100

Table 2

Proposed allocation of resources HCI

H1	HCI topics derived from IT engineering requirements	+
H2	Task specifications : issues & techniques	+
H3	Methodological issues	+ 36%
H4	Individual and task metrics	+
H5	HI requirements for future systems functionality	+
H6	Generic interactive architectures	+ 36%
H7	Identification of critical functional elements	+
H8	Advanced issues task and cognitive user modes, language & cognitive, acquisition of skills-knowledge	6%
H9	Journeyman schemes	10%
H10	Support for industrial design using Human Factors	6%
H11	Directed research toward critical HI enabling technologies	6%

Table 3

Proposed allocation of resources Software Engineering

The following is an estimate of the proportion of UK resources which should be applied to each subject area. This is to include UK involvement in European programmes. No attempt is being made to put absolute figures to each item as yet.

	%
S1 Metrics and the Measurement of Quality	10%
S2 Industrialisation of IPSE's and tool research	30%
S3 Formal Methods and Declarative Programming	20%
S4 Requirements capture and Knowledge Elicitation	10%
S5 Alternative paradigms	10%
S6 System Maintenance	15%
S7 The Impact and Management of the SE process	5%
S8 Awareness, training and development of standards	Program conducted as part of DTI activities in these areas. Not funded by IED

SYSTEMS ARCHITECTURE PROGRAMME

Summary of Main Themes

1. General

Within the timeframe of this plan, the national programme will strictly limit its investment in the build of novel systems. Such activities are deemed to be more appropriate to complementary European programmes.

The main emphasis of the next phase of the UK research programme will be on the underlying theory and understanding of emerging novel systems, and on their efficient and cost-effective utilisation.

2. Parallel Architectures

Exploitation of Parallelism:

- computational models
- computational strategies
- problem solving algorithms
- languages and language extensions
- compilation techniques, etc

Systems Architecture on Silicon:

- formal specifications of systems requirements and
- error free transformation into cost effective silicon components.

Intelligent File Stores:

- significant performance improvements are required in the manipulation of large knowledge bases.

Sensor Data Processing:

- the architectural requirements of this field of information capture, interpretation and processing, particularly at the more demanding end of the spectrum.

Simulation and Analysis:

- early, economic, pre-prototyping of new concepts and their utilisation
- the emphasis is on analysis, to prove design correctness, to check performance and to aid the tuning of design efficiency.

Novel Architectural Concepts:

- investigation and evaluation of new concepts which emerge as the IED programme proceeds.

3. Distributed Systems

Architecture:

- ODP/OSI; common architectures for office, factory, home, etc

Multi-media Information Transfer and Processing:

- control of multiple streams with different characteristics
- mixed real-time and non-real-time data
- storage and retrieval of multiple information forms; (multi-media databases).

Relationship between ISDN and OSI:

- high performance OSI
- OSI with outband control and circuit-switching
- multi-media Open Systems

Distributed Systems Techniques:

- user agents in complex systems
- security, authorisation and access control
- shared information systems
- testing methods and procedural standards
- formal methods and descriptions

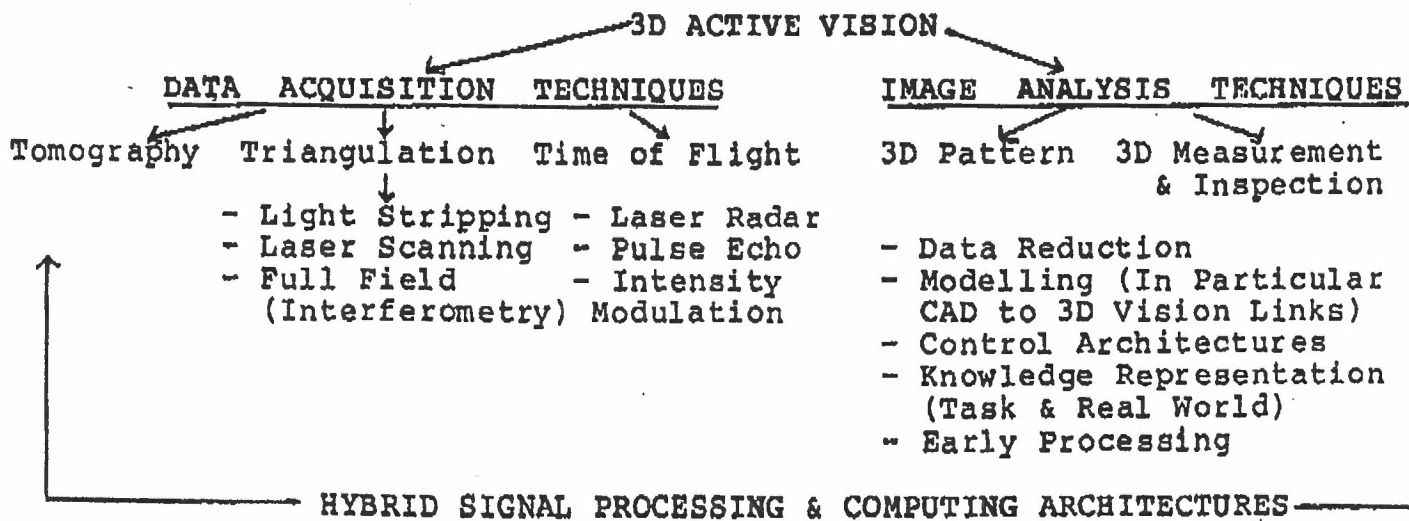
Human Factors

- user interfaces and remote systems
- effects of distance, delay and distribution on division of tasks between users and systems.

4. Vision Systems

- adding extra dimensionality to vision by collaboration with, and integration of, related technologies, such as optics, digital signal processing and architectures
- an emphasis on active 3D Vision data capture, analysis, interpretation and resultant actions
- improved reliability and robustness
- improved useability and decreased inscrutability.

The following table clarifies the technical areas on which the programme will be focussed.



5. Speech Systems

- Convergence of methodological options for speech recognition and synthesis
- integration of research on speech and natural language analysis to facilitate progress with the meaningful understanding of speech signals
- an essential criterion must be the wider industrial take-up, and commercial relevance, of the research output.

SILICON TOWARDS
2000

A SUGGESTED VLSI/CAD
SCIENCE AND TECHNOLOGY
PROGRAMME FOR THE UK

UK VLSI/CAD
Strategy Working Group

March 1988

1. SUMMARY

Advanced semiconductor devices provide the fuel which powers the Information Technology revolution. Nations with ambitions to build their market position in all areas of electronics see semiconductor technology and integrated circuit design capabilities as crucial areas for strategic investment to achieve these goals.

Application Specific Integrated Circuits (ASICs) have in the past ten years grown in significance to the point where they are perhaps the most effective method used by electronics systems businesses to differentiate their products and penetrate new markets.

The UK semiconductor industry is successful in the design and manufacture of ASICs, but competing nations appreciate the critical importance of this technology to the development of their electronics systems businesses and are investing heavily in ASICs as a result. All past industrial experience suggests that leading edge user companies emerge in proximity to the source of a technology. If the UK does not have access to an indigenous source of system silicon, the consequences for our electronics systems businesses could be dire.

Distortion of the market both directly by foreign governments and indirectly by major vertically integrated manufacturers poses a severe threat to the UK and European technology base on which the UK electronics industry will increasingly become dependant.

Building on the success of the Alvey and ESPRIT I programmes in Very Large Scale Integration (VLSI) and Computer Aided Design (CAD) for VLSI, a radically new strategy for the development of UK semi-conductor science and technology has been developed by a group of senior representatives from semiconductor supplier and user companies, together with the academic community.

This strategy aims to develop the next generation of silicon VLSI technologies, design tools and techniques, targeted to match UK systems company needs and supplier capabilities. This will be carried out via coordinated national and European science and technology programmes.

A major UK effort is planned in the areas of CAD, VLSI architectures and semiconductor science which is designed to take advantage of new technologies developed within the Alvey and ESPRIT I programmes.

The programme is designed to complement other activities in this area being supported by the DTI, SERC and other government departments. These include the Gallium Arsenide initiative together with relevant Link programmes and the Research Initiatives.

A coordinated programme of national and European collaborative work is suggested to address these requirements. The major elements in this suggested programme are as follows:

- . Active participation in the European ESPRIT II Microelectronics Programme where appropriate to UK semiconductor supplier and user needs, particularly within projects where international collaboration is vital to overall viability.
- . Development of a new concept of Industry Technology Centres to act as foci for the integration of scientific and technological innovation into whole semiconductor processes in an efficient and cost-effective manner.
- . Optimisation of scientific endeavour by the development of a new concept of Semiconductor Science Consortia designed to focus academic and industrial scientific work on clearly defined short- and long-term goals.
- . Maximisation of return on production investment by means of a new programme of advanced Manufacturing Technology designed to address the special low-volume, high product variety needs of ASIC suppliers.
- . Improvement of the interface between silicon and system by the instigation of a new programme addressing the requirement for high density and high speed integrated circuit Packaging and Interconnection Systems.
- . Development of the crucial interface between semiconductor suppliers and users by investment in a new programme of CAD Infrastructure and Standards.
- . Achievement of new targets for design quality, productivity accessibility and testability by the development of a range of advanced new CAD Tools.
- . Reduction in design cost and improvement of supplier choice by the creation of a new collaborative initiative on comprehensive vendor-independent Cell Generation Techniques.
- . Creation of stiff challenges for emerging VLSI technologies by the development of a number of advanced new VLSI Demonstrator Circuits.
- . Harnessing of UK talent for design innovation by investment in selected longer-term VLSI Architectures Projects to investigate new methods of mapping systems requirements onto silicon, enabled by the availability of new sub-micron VLSI technologies and advanced CAD tools.

It is estimated that the work will require a minimum total investment of £255 million from industry and government for a five year collaborative effort. This figure includes an estimate of UK participation in the relevant areas of the ESPRIT II Micro-electronics programme. Contributions are also expected from national sources, including the recently

announced £29 million DTI support for IT research in industry together with related initiatives within SERC and other government departments.

To be effective, this coordinated programme requires the active involvement of industry, government and the academic community. Moreover, the investment will be largely wasted if it is not complemented by a substantial commitment to develop and grow the UK semiconductor manufacturing industry. This urgent issue must be addressed in concert with the establishment of the proposed science and technology programme.

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PROPOSALS FOR MANAGEMENT ARRANGEMENTS FOR A JOINT SERC/DTI NATIONAL COLLABORATIVE PROGRAMME OF RESEARCH IN INFORMATION TECHNOLOGY

THE BASIC ASSUMPTIONS

1. In these proposals it is assumed that:
 - (i) the SERC and DTI wish to work together in a national collaborative research programme in IT;
 - (ii) the SERC and DTI are the only Governmental parties involved, OGDs being ignored for the time being;
 - (iii) the DTI interest is equivalent to that of the Information Engineering Directorate, other divisions being ignored for the time being;
 - (iv) both the DTI and the SERC would assign all their relevant activities to the national collaborative programme;
 - (v) neither the SERC nor DTI would on their own initiate new activities in the area of the programme without obtaining the agreement of the other.

OPTIONS FOR A MANAGEMENT FRAMEWORK

2. The essential features of a management framework must include the following:
 - (i) it must be responsive to the programmatic and financial objectives of all the parties involved;
 - (ii) the decision-making process for the expenditure of public funds should be as far as possible common to both SERC and DTI;
 - (iii) approval of projects should be through a combination of peer review and directed action.

3. These criteria can be fulfilled within a structure of the kind shown in the annex to this note. This is a three-tier hierarchical structure of peer review and advisory bodies and programme managers, activities being grouped by technical area, and lower levels being subject to guidance from the higher ones. The structure has the following characteristics:

- (i) the IT Board would report to the Engineering Board of the SERC and the appropriate body in DTI;
- (ii) each of the three main technical areas includes activities of both a collaborative and a non-collaborative nature;
- (iii) senior programme managers would be associated with the three main committees and would have the principle responsibility for making proposals for the strategic direction for the relevant area of technology;
- (iv) programme coordinators would be associated with many of the bodies at subcommittee level and would be responsible to them for implementing a programme through the establishment of consortia and coordination of activities.

4. The principles for the operation of the arrangements are as follows:

- (i) The Board would be responsible for integrating and agreeing the strategy of the programme as a whole, advising its parent bodies on resource requirements, and making recommendations on the allocation of whatever resources were made available.
- (ii) The main committees would be responsible to the Board for strategic advice regarding the objectives of the programme in their area of technology, and for advising on the distribution of activities between national and international programmes.

- (iii) The subcommittees would have front-line responsibility for the supervision of individual programmes, and may initiate new programmes subject to the agreement of the main committee.
- (iv) These bodies at all levels may approve projects within the levels of authority delegated to them.
- (v) Programme managers would be responsible for establishing strategic objectives for the relevant group of programmes in consultation with the appropriate main committee; programme coordinators would be responsible for the definition and guidance of individual programmes subject to the approval of the relevant subcommittee;
- (vi) Programme managers and programme coordinators may approve expenditure within the levels of authority delegated to them.
- (vii) Programme coordinators would be responsible to their subcommittees rather than to the senior programme managers, but would be expected to work within a strategic framework established by the latter.
- (viii) Within each main area of technology there will be a spectrum of activity ranging from the speculative to the highly directed. The respective authorities of the committee, programme manager or programme coordinator will depend on the nature of the programme concerned.

THE RELATIONSHIP BETWEEN MANAGERS AND PEER REVIEW BODIES

5. The main feature about the relationship between programme managers and peer review bodies is that it should depend on the nature of the programme concerned. It is proposed that there should be three categories of peer review body, every programme being required to conform to one of them. The categories are:

- (A) Speculative, mainly non-collaborative research, funded largely by SERC.

(B) Jointly-funded mainly collaborative research, including LINK.

(C) Highly-targeted mainly collaborative research, industrially led and with the majority of funding from DTI.

6. In the case of category A, normal SERC rules of peer review (and for approval of DTI expenditure where appropriate) will apply. Programme managers will however advise subcommittees and committees on programme objectives, interfaces with other programmes and on project approvals, but will not have delegated authority to approve grants. In category B, normal rules for project approvals in SERC and DTI will apply in relation to their respective financial contributions. Programme managers will offer advice as in category A and may have delegated powers to approve grants in respect of both SERC and DTI expenditure. In category C, substantial responsibility for approving grants will rest with programme managers in respect of DTI and SERC expenditure, but they will be expected to seek the advice of the relevant committee. All decisions taken by officers in categories B and C must be reported subsequently to the relevant committee.

7. Where project approvals are recommended by Committees, the level at which approval is given will depend on the expenditure involved. In the case of expenditure of SERC funds, these levels will be the same as for existing subcommittees, committees and boards. A possible scheme of permissive delegated authorities is as follows:

Category	Authority of officer		Authority of subcommittee		Authority of committee		Authority of Board	
	SERC	DTI	SERC	DTI	SERC	DTI	SERC	DTI
A	0		£200K		£300K		£400K	
B	£25K		£200K		£300K		£400K	
C	£100K		£200K		£300K		£400K	

NB1. The authorities for determining DTI expenditure have yet to be determined.

NB2. All approved expenditure by SERC should be authorised by an officer of the Council in the normal way.

NB3. At present there is no agreement within SERC that the proposed IT Board should have the status of a Board reporting to Council. On the other hand, if the ITB does not have the status of a Board the proposed infrastructure would be incompatible with the remainder of the Council's committees and subcommittees. For the time being therefore, the proposed ITB is assumed to have the delegated powers of a Board but for programmatic purposes would report to the Engineering Board but would not submit grant recommendations to it for approval.

8. All peer review bodies should include both industrial and academic representatives. In the case of category A there will be a preponderance of academics, in category C of industrialists, and in category B an approximate balance but with a bias towards industrialists. The full membership of all bodies will be approved by both SERC and DTI through their normal procedures. The terms on which all members of a particular committee are appointed will be determined by the practices of the lead department. (At the subcommittee level this would be SERC in category A, DTI in category C and a mixture in category B.) Since there would be no obvious lead department in the case of the other bodies, an arbitrary decision - or possibly new composite rules - may be necessary.

HANDLING OF GRANT APPLICATIONS

9. It is proposed that, as in the Alvey programme, each funding body should employ its normal procedures for dealing with grant applications, and should be accountable for its own expenditure. The experience of the Alvey programme has demonstrated the need in a collaborative programme for a highly efficient system for handling grant applications. The essential characteristics are:

(i) the procedure for making applications should be logical and clear to all applicants;

(ii) the database should be computer-based and available to all officers in both organisations concerned in the programme;

(iii) numbering and filing systems should be consistent across the whole programme;

- (iv) procedures and computer systems required for collaborative working should be compatible with existing systems and should minimize duplication of procedures;
- (v) procedures for transfer of files between the participating organisations must be fast and foolproof.

10. The arrangements put in place for the Alvey programme achieved some of these objectives, but not all. Arrangements in the new programme would be more complex in view of the wider range of activities involved. Some LINK programmes have already advertised their own arrangements, which may be incompatible with the overall requirements. This problem needs further study, and no preferred arrangement is proposed here, but it may be necessary to set up a joint arrangements, presumably located in London, to record the receipt of applications and route them to the appropriate offices for processing.

FINANCIAL MANAGEMENT

11. Problems of financial management loomed large in the Alvey programme, mainly because of the need for each funding agency to account for its own expenditure and the difficulty of matching programmes to the available financial provision within each agency. Similar difficulties can be expected in a new collaborative programme, made worse by the greater scope of the collaboration. The requirements may be characterized as follows:

- (i) the matching of total commitment to the available financial provision within each funding body;
- (ii) the coordination of the timing of commitment to match the available financial provision on a year-by-year basis within each funding body;
- (iii) the transfer of funds between bodies if commitment does not match financial provision over the short term;

- (iv) the subdivision of the total available commitment within a funding body to the various programme elements in accordance with the needs of the programme as a whole;
- (v) adherence to the provision of not more than 50% of funding for any collaborative programme from the public sector;
- (vi) adjustments to the overall programme in response to changes in the funds made available by the funding agencies.

12. Formal procedures will be required to control commitment and expenditure for the programme as a whole, and between elements of the programme, to meet these requirements. On the SERC side these will include:

- (i) submission of annual five year Forward Looks from the IT Board to Council (or to the Engineering Board), based on the strategy of the IT Board as a whole, and integrating the programme plans of the committees and subcommittees;
- (ii) each programme element (eg solid state devices, JASMRS etc) would have its own line of expenditure within the Forward Look against which commitment would be made;
- (iii) annual allocations to IT from the Council's annual budget would be based on the provisions of successive Forward Looks.

13. There will also be formal requirements on the DTI side, not yet identified. The SERC would expect however that the DTI would wish to identify financial provision over several years for each element of the programme and to make commitments against them.

14. In general, it will be impossible to make commitments against budget lines in such a way that each line for each agency can be managed as a discrete entity. The desired patterns of commitment, and the actual patterns of expenditure that result, will be such that the management of expenditure will need to be dealt with across the

programme as a whole, adjusting commitment between programmes as circumstances dictate, and transferring resources between agencies as necessary. This calls for a fully integrated financial management system, transparent to both sides, and will need to be developed for the purpose.

STAFFING

15. Staffing requirements appear to be of three kinds:

- (i) programme managers and programme coordinators who are acknowledged experts in their fields, together with appropriate support staff; some or all of these will be seconded to the programme from other organizations;
- (ii) committee secretariats to manage the business of the committees and to liaise with programme managers;
- (iii) officers concerned with finance, contracts and general administration.

(There may be some overlap between (i) and (ii)).

16. Each peer review body will have staff associated with it from each side, at least in the form of committee secretaries or assessors but possibly also through membership. In some cases this will be nominal but it is important that both sides should be informed of the whole programme. In the case of category A subcommittees, DTI would be consulted over agendas and be represented at meetings. SERC would have a similar status in respect of category C subcommittees. Category B subcommittees would have joint committee secretaries and include representatives of both bodies in their membership. All main committees and the Board itself would have joint secretaries as a minimum.

17. SERC staff would report to the Head of the Council's IT Directorate. DTI staff would report to the Head of the Department's Information Engineering Directorate. Senior programme managers would report to the Head of IED. Programme coordinators would report to the organisation which appointed them. The Head of IED, the three senior

programme managers, and the Head of the Council's ITD and his deputy would form the Management Board for the programme.

18. It is very important that the national collaborative programme is perceived by the community as a joint activity between the organizations concerned. Perceptions are strongly influenced by the location of meetings. Accordingly, although the location of meetings for category A subcommittees would be determined largely by SERC, and those of category C by DTI, meetings of all other bodies would be alternately on DTI and SERC premises, the joint secretaries taking the lead alternately. New stationery will be needed for all activities.

THE MANAGEMENT BOARD

19. The function of the Management Board would be:

(i) to coordinate the activities of the SERC and DTI in the execution of the programme; and

(ii) to manage the flow of business through the IT Board;

The Chairman of the Management Board will be the Head of the IED of DTI; the deputy Chairman will be the Head of the Council's ITD.

INTELLECTUAL PROPERTY RIGHTS AND COLLABORATION AGREEMENTS

20. At the outset, the assignment of intellectual property rights will follow the current pattern governing all collaborative research activities, assigning ownership of ipr to industrial partners and providing financial compensation to non-industrial partners. There are at present small differences between the various extant schemes, and it would be desirable to standardise on one set of rules for all activities, including LINK. These rules are however different to those employed for the ESPRIT and other EC programmes, and the Council of the SERC, has initiated a review of whether EC conditions would not be more in the interests of the academic community. The Council therefore gives notice that it may wish to reopen this issue at a later date.

21. Model collaboration agreements have been prepared under the auspices of the Alvey programme and should be employed where possible for all collaborative research. Neither side should announce grants prior to the receipt of a signed collaboration agreement, where appropriate.

THE ROLE OF RAL

22. During the course of the Alvey programme, RAL has provided substantial manpower resources for the management of computing infrastructure, for coordination and support of research programmes, and for research. Decisions on the resource to be utilized at RAL were made by the Alvey Directorate. It will be necessary to review the role of RAL in a new collaborative research programme, and to identify the level of resource to be deployed there, which would be expected to be lower than in the current programme. This will largely be a matter for the IT Board assisted by its subordinate bodies. In addition however, the Council must have regard to the need to constrain the utilization of money and manpower within its laboratories to acceptable levels and may seek to influence the decision in the light of the needs of its manpower policy overall.

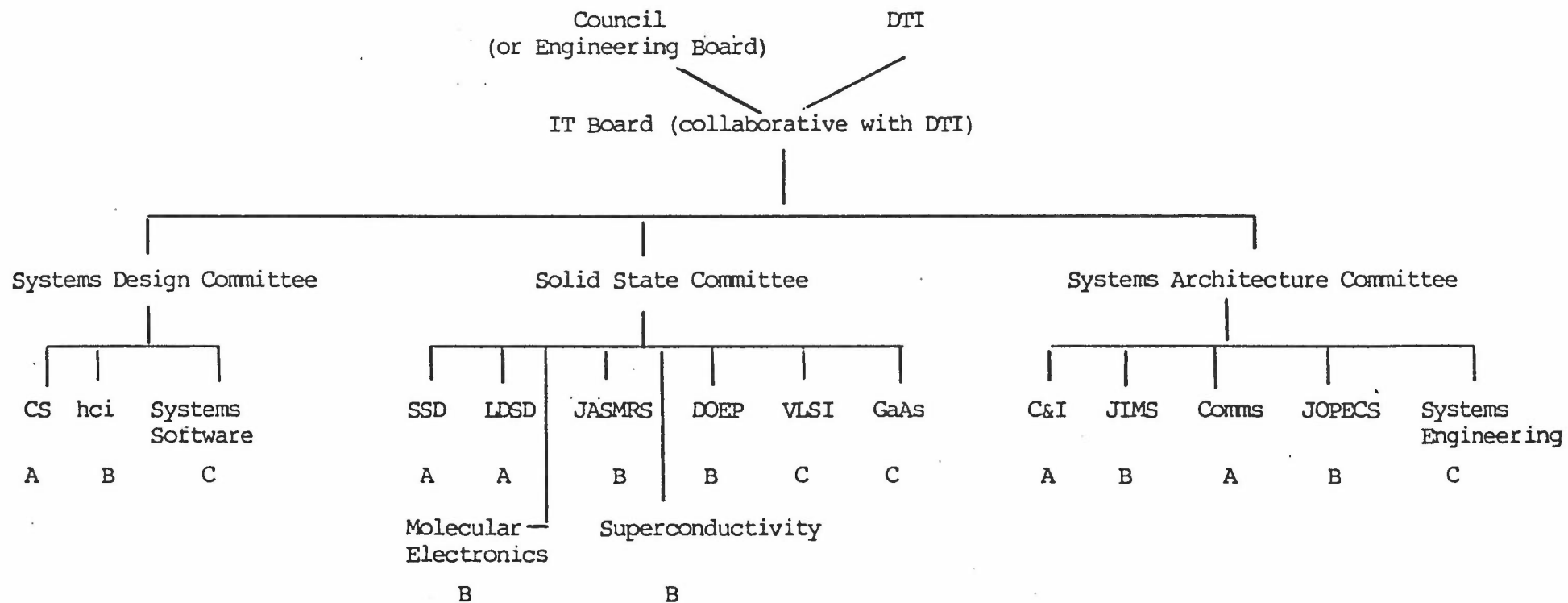
INTERFACE WITH THE REST OF DTI AND SERC

23. The proposed organization includes components of both DTI and SERC which are not at present the responsibility of respectively IED or ITD. Both organizations should determine whether internal reorganization can bring their respective responsibilities into coincidence.

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NOTES OF THE MEETING OF THE IEC STRATEGY WORKING GROUP, 7 MARCH 1988

HELD AT THE PHARMACEUTICAL SOCIETY

1. Those present: Dr Wilkins, Dr Worsnip, Mr Monniot, Mr Gardner, Mr Williams, Professor Wand, Dr Clark, Professor Farrell, Mr Smith, Mr Selway.

2. The Working Group accepted terms of reference outlined for it in paper IT-SWG 1.

3. Dr Wilkins outlined the current scene as detailed in paper IT-SWG 2. He emphasised the particular need for the SERC, and IEC in particular, to formulate a clear position to present to the DTI who are clearly aiming to be the focus for all government activities in IT. There is added urgency given to the Committee's deliberations as the DTI is planning to issue broad statements of policy in the near future with a view to being able to consider applications this autumn. This need to present a clear picture of SERC's intentions to the DTI was recognised.

During the discussion, two points of clarification were sought against statements made in the recent white paper. The first of these concern the statement that "SERC has plans to devote £55M". Dr Wilkins replied that the £55M had been included in the Forward Look. However, given the usual vagaries of the SERC and Engineering Board planning, there was no absolute guarantee that all of this money would in fact end up with IT. However, given that the SERC had made this statement to the DTI, it could be expected that provided the policy and strategies of the IEC etc was seen to be sound and appropriate, it would be difficult for other parts of the SERC to make successful bids against these funds. There was however, significant pressure building up within the Engineering Board to divert some of the IEC and IT budgets towards the application of IT in other Engineering areas. It was not yet clear how the Board will react to this subject and whether it will view it as being more appropriate for action by the relevant subject committees or by the IEC itself.

The second point raised concerned the meaning and usage of the word "applications". It was clear that a number of meanings were being attached to this, both within the SERC and the DTI. With respect to its exclusion from the forthcoming IT programme by the recent Minister's statement, it was felt that the meaning here was the application of IT results to the market place. In SERC terms the meaning is the application of basic IT research to other areas of Engineering research. Clearly whilst care needed to be taken in expression, the two were certainly not mutually exclusive.

4. Dr Wilkins introduced the paper on proposed management arrangements for a national collaborative programme in IT as detailed in paper IT-SWG 3. In the following extensive discussion there was clear support for the suggestion that a joint structure should be established between the SERC and the DTI to deal with the collaborative programme. Not only would a joint structure give a clear political focus for the programme but it would also provide vital integration of assessment for all IT proposals, policy and strategy.

In response to various questions concerning the detail of the proposed arrangements, Dr Wilkins replied that the most important thing at this stage was to agree whether such a structure be formed, so that planning could proceed within DTI and SERC, and that various matters of relative detail in the structure, membership, co-ordination and so on could be worked out at a later date. There was general agreement that the structure proposed in Annex 4, with an ITB collaborative with DTI, was the most acceptable. As a fallback position if 4 should not go ahead, the structure proposed in Annex 5 was considered to be the next best option. All members expressed their feelings that the SERC should ensure that it had much more input into the strategy and running of the forthcoming programme than it had with the Alvey programme.

There was also concern that the areas previously classified as non-Alvey should retain sufficient autonomy within the new structure and not be handicapped through the considerations of the need to foster as much collaborative work as possible. There was general agreement that similar technical areas should be kept together within the structure rather than being split up into collaborative and non-collaborative groupings. Technical groupings would give clear advantages in the ease of transfer of fundamental work into more applied research.

All members emphasised the need for the co-ordinators and various management personnel that the system would generate to be given terms of reference that were adequate to ensure their direction by the appropriate peer review or technical bodies rather than their establishment hierarchy.

5. At this point Dr T Walker of the DTI's IED joined the discussion. Dr Walker briefly outlined the changes in policy within the DTI that had resulted in the move away from near market research to research of a more fundamental nature. He said that at this stage the most important thing to be agreed would be a framework within which the SERC and the DTI could operate in developing the programme further. There was general agreement within the meeting that the framework discussed earlier would be acceptable to all concerned. There was the recognition that at this stage any framework discussed would have a number of loose ends and would be at best a "best fit" compromise.

The framework could however be subsequently adjusted to take into account future developments.

There was considerable concern expressed by the SERC side that the decision process currently operating within DTI appeared to very much concentrate down the lines of the old Alvey disciplines. There were various areas such as telecommunications and measurement which appeared to be missing from the current deliberations. Whilst Dr Walker believed that his directors had undertaken extensive soundings within the research community, he acknowledged that it would be a benefit to all concerned if the evolving area strategies were formally offered to sections of the SERC committee structure for comment. He did add however that decisions taken on the future disposal of SERC funds on non collaborative work, ie that not directly concerned with DTI, would be solely at the discretion of the SERC and the DTI would not wish to make any significant input in those areas.

There remained a concern of some of the subcommittee chairmen that those areas of work termed as "blue skies" will be squeezed out. There seemed to be no clear response to this, although it is likely that given some degree of control over budgets, bodies within the new structure would be able to determine their own priorities of balance between applied and fundamental research. It was also made clear that the new programme would include not only existing programmes run within IEC but also new programmes and strategies that would evolve.

In summary, there was general agreement that the framework previously outlined should be adopted as a starting point. It was recognised that the framework would need to be flexible to allow for future alterations in programmes. Further consultation with the relevant communities was required on the DTI area strategies that were being prepared. In the first place this contact should be with the relevant subcommittee chairmen. Dr Wilkins undertook to establish a suitable mechanism for this consultation to take place.

6. After lunch and Dr Walker's departure, Dr Wilkins outlined the reasoning behind the establishment of the Committee's Strategy Working Group. The Committee had now identified the clear need to be able to present a coherent policy to the Engineering Board, in order to guarantee to some extent its funding from the Board and also to assist it in its own planning and budgeting across its various areas.

Following considerable discussion, the idea of setting goals or themes which would be applicable to all areas of Information Technology was selected. The reasoning behind this selection was that such goals or themes, if they were properly selected, would act as incentives for developing various areas of Information Technology whilst presenting to the Engineering Board and other committees a topic of clear relevance and one which they can easily understand. This would serve the dual aim of demonstrating to other committees and the Board that the work undertaken by IEC was relevant and should be supported and would also guide fundamental research in most of the areas of IT to be undertaken. The emphasis would therefore be on selecting suitable topics which would be of sufficient longterm interest to enable suitable programmes to be developed and also covering as many areas of the existing programme as possible. Amongst the areas suggested were Safety Critical Systems, Integrated Design, Vision and Sensors Technology, Embedded Systems/Machine Computer Interface and Loosely Distributed Large Systems. Particular emphasis was placed upon the topics of Safety Critical Systems and Vision/Sensors Technology. It was felt that both these topics offered relevance to an Engineering Board that was looking for the applications of IT whilst also covering most of the research areas within the Committee. It was also felt that in identifying these topics, and the drive that they would give to a number of technologies, considerable prompting could be given to DTI in moving away from what appeared to be an Alvey mark II approach to the new programme.

Whilst it was considered that the identification of goals/themes could be a major way of illustrating and developing IEC policy, there was considerable doubt as to the exact make-up of these areas, in discipline terms, and the way in which they would be implemented for instance via Specially Promoted Programmes, Initiatives, IRC's etc. It was therefore decided to leave the discussion at that point and to convene again in the near future to explore the matter in more detail.

7. Two dates were suggested for the next meeting. These are 31 March and the 21 April. The office will select the most appropriate date in consultation with the members.

(Note: It subsequently transpired that Mr Selway, who had left the meeting before dates were fixed, was not available on 21 April. This date has been moved to 22 April)

N L Williams
Alvey Group
Information Technology Directorate
9 March 1988