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INTERNATIONAL COLLABORATION IN IT

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ABSTRACT

This paper reviews the social implications for the IT community of greater international collaboration, concentrating on UK and European programmes. It sets out some preliminary criteria for choosing between national and international programmes and advocates cooperation between the different programmes.

The topic of this session is the social impact of information technology and international collaboration. This is a very large subject and in the 20 minutes which Professor Karatsu has given me I can only touch on a small part of it, although one which is, I believe, of most interest to this audience, that is pre-competitive R&D. I speak from some personal experience, having started as an academic scientist, but having, within Government, both run a national programme, helped to run a European one, and been involved in other international cooperation, including with Japan. I shall use this talk to review this experience briefly and then ask some further questions which may stimulate discussion.

I should start by admitting that I have never been able to find a satisfactory definition of pre-competitive R&D, although I think most of us can recognise it when we come across it. My predecessor, Brian Oakley, used to say that it was "any research on which people wanted to collaborate". I doubt myself whether any research is really "precompetitive". My memory of the academic world is that it displays all the hallmarks of extreme competition. Moreover most (although not all) collaboration involves cooperation with a restricted set of partners and thus implies some degree of competition with others, either nationally or internationally.

I suppose that there are two chief elements to precompetitive research, cooperation between companies, and cooperation between industry and academia. The second of these has usually been regarded as common in the US but less so in Europe and in Japan. The first has become identified with Japan, largely through the MITI sponsored programmes and indeed many argue that it was the Fifth Generation Programme that itself stimulated (some say hastened) Europe and America to start similar programmes, although reflecting the particular cultural and business background of the countries concerned.

Before going on to the social aspects of cooperation, it may be worth speculating a little on the reasons for this rush into collaborative R&D. It is of course not new; there has been collaboration between companies for many years, both in cartels and between users and suppliers. This has however not usually been organised by, or under the auspices of Government; nor have the arrangements had a particularly high public profile. They have also tended to concentrate on joint ventures or production agreements rather than R&D. I think there is a clear reason for the growth of collaborative R&D. It stems from the increasingly global nature of the IT market coupled with the nature of that market, a shorter product life cycle with increasing scale and risk of the necessary R&D and the tendency - especially in the IT/electronics area, for product development to be influenced heavily by recent scientific results. This provides an obvious pressure to reduce the risks, both of R&D expenditure and any subsequent investment whether in plant or marketing. This pressure is often increased further by the absence of internationally accepted standards. For some time therefore business school texts have included sections on collaboration as an element of corporate strategy.

Now is not the time for a detailed study of the more technical aspects of this collaboration; no doubt the rest of this conference will report on that. I will confine myself to a personal review of the

social implications for those involved, whether as researchers or as managers. This is, I admit, a fairly restricted interpretation of the title of this session, but it is one that is only rarely explored and one where I suspect that there are large differences between countries. It is however one well worth the time since many companies are now spending up to 20% of their budget for longer term R&D on collaborative projects. This is bound to mean a greater mutual dependence as well as a tendency to greater specialisation.

The first social change as a result of cooperative programmes in Europe is the much greater contact between executives of the various companies. My understanding is that when V Davignon called together the Chief Executives of the top 12 European IT companies to create the Round Table, it was the first time that they had met. Now they know each other well.

Moreover the fact that researchers from their companies collaborate on projects means that not only there will be contact at this level, but as those industrial research workers move up their companies, the big change is that they will already know their opposite numbers. By the time they become Chief Executives, they will have known their peers in other European firms for twenty or thirty years. This will normally make cooperation much easier; it will certainly improve their knowledge of what is going on in Europe.

This greater degree of contact is of particular importance in Europe where for too long the firms in individual countries have had insufficient contact with, or knowledge of, each other. Working together on R&D also provides a means for building up relationships in other areas, often closer to the market. Indeed this is one of the major ways in which Esprit - and other similar programmes - support the development of the single European market. It is these commercial considerations rather than solely a desire to do more research that provides the motivation for the involvement of many of the companies and underlies their approach to the formation of the collaborative teams.

The same is true of the national programmes in the UK which have also brought together representatives of the IT supplier companies as well as shared users and suppliers closer together. It is possible, indeed, that this may have contributed to at least some of the takeovers and rationalisations which have taken place in the last year or so. Many industrialists have told me that one of the aspects of collaborative programmes which they value most highly is the means to meet their peers, to get to know them better, and to be able to discuss issues of the day with them in a neutral forum. The fact that a Government run collaborative programme is necessary to achieve this may come as some surprise, particularly to our Japanese colleagues since, if the myths are to be believed, there is constant contact between the different Japanese companies. It is also different from the US where, prior to initiatives such as MCC and the recent relaxation of anti-trust legislation, there was a danger that the Justice Department would assume that a meeting of chief executives of computing companies could have taken place only for the purpose of arranging an illegal cartel! Nevertheless there does seem to be, at least in the UK, considerable advantages from Government organisations holding the ring for these kind of discussions.

In the same way the Alvey programme has also developed the relations between UK industry and the academic world. Five years ago there was, with notable exceptions on both sides, there was too little contact and too little understanding of what the other had to offer. Now industrialists have a greater appreciation of the relevance of academic research while academics recognise the considerable intellectual content of industrial research. This has a significant impact on teaching; not only do students see their professors working with industry but course material starts to use examples taken from industrial experience. Within the UK the research community is now much better developed in a number of areas and provides scope for much better communication over a wider range of interests. It has also stimulated greater mobility of researchers which is perhaps the best way of securing technology transfer. I believe there have been similar developments as a result of other national programmes in Europe, and that the US programmes have also stimulated greater contact.

The social effects depend somewhat on the geographical nature of the co-operation. The UK has normally preferred to have collaborative projects arranged on a distributed basis with researchers remaining in their parent organisation. While this may be because we recognise our lack of success in winding up laboratories which have fulfilled their usefulness, it does have the advantage of facilitating technology transfer back to the participating organisations. On the other hand MITI has often chosen to establish a

central laboratory such as ICOT for the Fifth Generation Programme or optoelectronics to which the partners second staff. MCC and Sematech have taken a similar line in the USA. However one of the most interesting examples is in Europe with the formation of the ECRC by Siemens, ICL and Bull. This is a joint research laboratory for the three companies located in Germany, with a French Director - Herve Gallaire - and whose working language is English!

There have therefore been substantial social results within the IT community as a result of these programmes. I suspect that the largest changes have taken place in Europe where the fragmentation of the community between the different countries has been reduced. There has also been greater contact with Japan, particularly on the part of European academic workers, and contact with the US has been at least maintained, although this traditionally has involved very little direct Government involvement on either side. The economic and commercial pressures are likely to result in a continuation of this increased contact between different parts of the community. Within Europe I believe there will be an increasing concentration of the industrial structure, particularly in the software field, and that this will be facilitated by the greater social contact that has developed over the last few years. In time, the more that companies become genuinely European, rather than regarding themselves as from a particular country, the more we can expect increased interchange between the European IT research community. This will also be helped by the free movement of researchers and the mutual recognition of professional qualifications which has recently been agreed.

However, there are a number of issues that arise from these developments. The first, and perhaps the most crucial, relates to whether these programmes are part of a movement to carry out IT R&D on a genuinely international basis or whether they are part of what might be characterised as "intellectual protectionism". Most of the cooperative programmes are concentrated on a particular country, or, in the case of the European programmes, on a group of countries. Whilst most academic programmes remain international, only some of the more industrially oriented programmes welcome - or acquiesce in - the involvement of "foreign multinationals". Some have been prepared to develop relationships with other programmes; others have not. One might argue that since the reason for the programmes in the first place was to develop (or protect) a commercial advantage for the organising country, it would make no sense to collaborate with other programmes.

Alternatively, the structure of a programme will have been drawn up to reflect the particular needs or position of the industry in that country and these may make it more difficult to accept foreign participants. Both of these are understandable arguments, but to my mind it would be a pity if they resulted in a collection of programmes which were too inward looking. After all no one can seriously believe that that one country, or group of countries, can do all the R&D necessary for its IT development.

To some extent the need for at least a degree of openness is being recognised. Esprit has allowed the participation of companies from non-EEC European countries and, together with some other European national programmes permits the involvement of multinationals, provided the research is carried out in the country concerned. There are also links between ICOT and other countries. But I must still admit to some unease about the dangers of the research equivalent of a trade war. I hope I am wrong and it would be interesting to hear the comments of other delegates.

Perhaps it would be helpful to illustrate these issues, and the opportunities they provide, by looking at two of the decisions that will have to be taken in Europe. At the moment, many Esprit projects contain universities in one country and firms in another and there is undoubtedly significant cooperation between them. However most industry/academic cooperation still tends to be within the same country and universities are usually brought into a consortium on this basis. However after 1992, when the single market comes into force, it may be more appropriate to think in terms of European companies and universities. Thus the UK may want to encourage its companies to collaborate with the best European university, not just the best UK institution, and correspondingly for universities. This would have considerable implications for the way the UK operates its support for research at universities in IT since it would be important to make sure that enough of our universities were of European stature. At the same time our companies would need to become more aware of the European academic world than they are at the moment. And of course I would expect our French, German and Greek colleagues to be doing exactly the same. This could have a significant effect on the structure of collaboration and hence for the development of a genuinely European IT

community.

The second example is the industrial analogue of the first, but is also a key question for Governments in Europe. It is, 'How does one decide what kind of project should be done in a national programme and which in a European programme?' At present there are few clear answers, although my research. In the UK we have been giving some thought to this issue and have been able to produce some initial criteria for making this chance. These are:

EUROPE

a. projects whose exploitation will require very substantial investment in production or marketing, eg VLSI whole processes, parallel processing

b. development of standards, eg PCTE, ANSA

c. projects where European collaboration already exists or is particularly favoured by UK participants.

NATIONAL

a. work becoming interdisciplinary for first time

b. longer term speculative research, often preparing UK for future European programmes, or preliminary work on standards

c. small scale additions to work in category (a) European work

d. areas where UK already has comparative advantage - eg natural language, particularly use of English.

While these do not provide a complete answer to the problem, they are a starting point and allow us to begin to understand the relationship between the two programmes, and hence between the two research communities.

I must admit that we have only just started to think about issues such as these and are by no means clear where they will lead. It would be a pity if the variety of initiatives within the Community was to make Europe inward looking and I hope that we will be able to maintain and develop links with programmes in countries outside Europe as well as with individual companies and institutions.

It is however clear that we need to develop answers to the questions of how a company, university or Government decides whether to pursue particular research topics within its own country; within a programme such as Esprit which involves a defined group of countries; bilaterally with another European country; bilaterally with Japan, the USA or another country outside Europe; or by collaboration between different international programmes. This an embarrassing range of possibilities but the answers we produce and the choices all of us make will define not just the social structure of the IT research community but will also be of great significance for the commercial structure of the industry. It is perhaps too much to hope that we will get the answers right; but I hope we can avoid being too wrong!