IT Innovation within the Esprit and IST Programs. Some Evidence from the UK

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IT INNOVATION WITHIN THE ESPRIT AND IST PROGRAMS SOME EVIDENCE FROM THE UK [1]

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ABSTRACT :

The European Strategic Program for Research in Information Technologies (Esprit) was created back in 1983 as a defensive response to the US and Japanese lead in Information Technologies (IT). Esprit was driven by the belief that intra-EU collaboration is an effective means to enhance the competitiveness of the European IT industry. Esprit has undergone a number of changes to facilitate collaboration and innovation. Yet, only after eighteen years of Esprit did the European Commission appreciate the need to encourage worldwide co-operation within its Fifth Framework Information Society Technologies (IST) Program. In the emerging information society and economy it is conceded that new ideas are as likely to be found outside Europe as within. This paper aims to investigate the personal networks of UK main contractors in Esprit and IST programs with regard to national boundaries and external linkages. It argues that the world of IT innovation is borderless and that Commission policies to impose boundaries to collaboration are unlikely to contribute to successful innovation in the IT industry throughout Europe.

KEY WORDS : Mapping IT innovation networks, EU R&D programs, ESPRIT, IST, UK

INTRODUCTION

Established in 1983, Esprit (the European Strategic Program for Research in Information Technologies) is the oldest of the European Commission's research and technology development (RTD) programs. It is also the largest and has been a model for all the Commission's other RTD programs. Esprit arose from the fear that Europe was lagging far behind the US and Japan in vital Information Technologies (IT) (Assimakopoulos *et al*., 2000a; Georghiou, 1999; Mytelka and Delapierre, 1987). Collaboration, rather than competition, among Europe's IT companies, it was imagined would yield synergies, the flexibility to adapt in volatile markets, and the shorter product cycles essential to international competitiveness (Assimakopoulos and Macdonald, 1999). The complementary notion of pre-competitive research allowed the Commission to subsidize RTD while avoiding the accusation of interfering in the market (Quintas and Guy, 1995). The collaboration of Esprit has attracted considerable academic attention (e.g., Hagedoorn and Schakenraad, 1993; Hagedoorn *et al*., 2000); whatever Esprit's success in encouraging innovation, it has become a classic in innovation policy.

Esprit in the 1980s was very much the child of the large firms of the European IT industry, the Big Twelve. Some would argue that Esprit was still fulfilling their requirements in the late 1990s, when a much broader range of stakeholders was involved in building the emerging information and knowledge societies. Over the years, the Commission has attempted to transform Esprit by encouraging the participation of firms from Europe's less developed regions, of small and medium size firms from across the EU, and lately of stakeholders from throughout the IT supply chain, including users from a broad range of institutional settings. Even so, Esprit stands accused of retaining its technology-driven approach to IT, not necessarily because this produces more innovation and greater competitiveness, but because of the political advantages offered by the doctrine of collaboration (Piekkari *et al*., 2001).

The dual purpose of this paper is to analyze the geography of personal networks of Esprit main contractors based in the UK according to national boundaries, and also explore the significance of their external linkages for IT innovation. The empirical data is based on 10 Esprit projects, examined as case studies. Particular attention is given to the informal networks that link members

of Esprit projects to the most dynamic parts of the IT world in the US and beyond. How do these function in the midst of collaboration and the formal networks it imposes (Osborn and Hagedoorn, 1997)? Formal networks are defined as those bound by a formal contract between the Commission and project partners. In contrast, informal networks include many unacknowledged partners acquired through inter-personal links that transcend formal agreements (Johannisson, 1998). As in other fast developing sectors, informal relationships in the IT industry seem to bring the tacit information and embedded knowledge that is conducive to innovation (Assimakopoulos and Macdonald, 2002; Boisot, 1998; Badaracco, 1991).

The rest of the paper is in four sections. In Section 2, a brief history of Esprit and IST is provided, examining the changes that have taken place within these Programs to encourage collaboration and innovation in the European IT industry. Section 3 describes the research methodology, and section 4 presents the main findings, based on the ten Esprit projects. Finally, Section 5 draws some conclusions.

1. Esprit and IST

In the early 1980s, European firms had begun to realize that their technology was lagging in such core high technology areas as IT and some had already begun to collaborate (Mytelka and Delapierre, 1987). Policy makers were becoming increasingly concerned about the gradual loss of competitiveness they perceived in the European economy and in the European IT industry in particular. The globalization of high technology industries (Narula, 1999), and the wide disparities between industrial and technological capabilities of the various country members revealed by the continuing expansion of the EU (especially evident in the divide between the wealthy countries of the European North and the poor countries of the European South) further reinforced this perception (Hagedoorn *et al*., 2000). Moreover, policy makers on both sides of the Atlantic had become very enthusiastic about 'Japanese-style' collaborative research and the perceived success of 'keiretsu' (Georghiou, 1999; Ray, 1998).

European industry generally was beginning to show much more interest in collaborating in R&D, previously an activity conducted secretly and independent of competitors' R&D (Narula and Hagedoorn, 1999). According to Narula (1999), the underlying objective of the Framework

Programs of the European Commission was not to encourage collaboration *per se*. Rather, it was to encourage collaboration in the run-up to the single European market in 1992. Collaboration would allow EU industry to restructure and be better able to face the competitive environment of the single market. It was hardly surprising, then, that collaborative R&D became central to Commission policy in the early 1980s (Peterson, 1991), and thus that collaboration became central to Esprit. In 1981, the Commission suggested that the Big Twelve take a concerted approach to IT, and invited their collaboration in drawing up a common strategy (Mytelka and Delapierre, 1987). Following the launch of a small pilot program in 1983, Esprit proper was started in 1984. There have now been four phases of Esprit research (Esprit I: 1984-87, Esprit II: 1987-90, Esprit III: 1990-94, and Esprit IV: 1994-98), all jointly funded by the Commission and the participating organizations. The Fifth Framework Program (1998-2002) initiated the Information Society Technology (IST) Program, placing all European Commission information and communication technologies RTD, including Esprit, Acts and Telematics, under one umbrella program.

The early Esprit was very much driven by the belief that collaboration among industry, universities and public research institutes across Europe was an effective means of narrowing what was perceived as a technological gap between European companies and their American and Japanese competitors (Hagedoorn *et al*., 2000 ; Mytelka and Delapierre, 1987 ; Narula, 1999). As Mytelka and Delapierre (1987, 233) point out, collaboration among European firms was more attractive than alliances with non-European firms because it was thought to involve less risk and to enable firms to take advantage of economies of scale in one or more of their production processes while remaining separate entities.

Over the 1990s, Esprit went through vast changes in its organization and scope (Assimakopoulos *et al*., 2000b). The European Commission responded to new trends in the collaborative behavior of the IT industry by, for example, expanding Esprit participation, encouraged collaboration throughout the IT value chain, and increased emphasis on the users of IT. Some of these developments are summarized in Table 1. Despite these alterations in emphasis, many of the characteristics of the early Esprit were evident until the conclusion of the Program in 1999. For example, Esprit always insisted that the research it supported be collaborative in nature,

specifically that there had to be a minimum collaboration in each project of two partner organizations from two EU member countries.

Table 1 : Summary of Changes in Esprit and IST from the early 1980s to the early 2000s

Dimension	***Esprit (1983-1998)***	***IST (1998-2002)***
Participants in collaboration	Dominance of electronic firms, IT suppliers, and participants from northern Europe as well as less favored regions	A heterogeneous group of organizations representing the entire IT value chain and including SMEs and user organizations
Nature of collaboration	Pre-competitive	Collaboration in competition
Focus of collaboration	Hard science	Soft science (emphasis on socio-economic research)
Organization of collaboration	Research project	Research clusters and networks
Role in the broader community	Inward oriented, isolated	Outward oriented, integrated

The early Esprit was also determinedly pre-competitive, focusing on research that was considered to be distant from the individual market interests of collaborators. The notion of pre-competitive research provided a convenient label for the activity undertaken within collaboration, one acceptable to the free market ideology of most European governments of the period (Georghiou, 1999). It was argued that collaboration in pre-competitive research did not constitute government interference with market forces (Quintas and Guy, 1995), and fitted comfortably within a technology-push model of innovation. However, sweeping changes in the IT industry, together with improved understanding of how innovation is generated, have encouraged Esprit to change its emphasis from technology-push to market-pull. This has required abandoning the idea that partners can collaborate only when they are being pre-competitive. It has been accepted that they may also collaborate when they are cooperating in competition. Indeed, the success of the IST Program was dependent on the willingness and ability of partners to collaborate in competitive circumstances.

The early Esprit was dominated by the rigid conviction that innovation emanated, quite obviously, from science and engineering. Just as the model of innovation within Esprit has changed from technology-push to market-pull, Esprit research is no longer confined to science and engineering and now includes at least some social science research. The IST Program acknowledged that socio-economic research cannot be isolated to a single domain, but must

underpin all its IT research. In consequence, the IST Program cannot be accused of fostering innovation intended to benefit only the suppliers of IT equipment: IST innovation is now directed towards all users of IT. It has been accepted that European competitiveness in IT depends not so much on increasing IT research capital as on increasing social capital. There is now no part of the economy which is not heavily dependent on IT.

The research consortium - termed the 'project' by the Commission - has long been the primary unit of Esprit organization. The project has often seemed to be the only unit. All Commission organization was centered on the project, as was most monitoring and evaluation. In 18 years (1983-2000), some 2,250 Esprit projects have been completed and more than EUR 5.5 billion has been spent (Assimakopoulos and Macdonald, 1999). The project officer – the key Commission official – tended to regard projects as self-contained, to be completed within a specific timeframe as specified by a formal contractual agreement.

The changes that Esprit has undergone in IST with respect to participation, focus, organization and orientation were responses to particular trends and developments in the IT sector, and more general shifts in the competitive environment. Throughout the history of Esprit and IST, the main objective of the Commission has been to create and sustain a fertile platform for collaboration and innovation in research and technological development in IT. However, it is difficult, perhaps impossible, to confine collaboration and to harness innovation by restricting them to a single geographical region, even one with all the resources of Europe. More important, it may be pointless as it will be discussed below.

2. Research Methodology

The sample for this research involved all 67 Esprit projects with UK main contractors included in the Prosoma showcase (www.prosoma.lu) between June 1997 and September 1999. Administrative leaders of these 67 projects were contacted by post or/and e-mail between November 1997 and June 1999, and asked to identify the individual they considered to be the technological leader of their project in the UK. The findings presented here are based on network data collected from ten of these Esprit projects. A formal network for each UK main contractor was identified from the Prosoma and Cordis (www.cordis.lu) databases of the Commission.

Subsequently, personal informal networks were mapped following a multi-step approach. Individuals identified as technological leaders within the participating main contractors were sent postal questionnaires and each was asked to nominate up to seven other individuals who had provided information of significant value for innovation related to the specific Esprit project (see Giusti and Georghiou, 1988). In the second round, these nominated individuals were themselves contacted and asked the same question. The nomination process continued until resources were exhausted and in some cases extended to five rounds. For the majority of the projects, semi-structured, face-to-face interviews were conducted. It is from these that the quotations used in this paper are derived.

The computerised network analysis made use of two software packages for social network analysis and visualisation: Ucinet 5 (Borgatti *et al*., 1999) and Mage 5.4 (Richardson and Presley, 1999). The former was used to compute a sets of coordinates for the personal network of each technological leader, following a common three-step approach. It placed all nominations within a binary symmetrical socio-matrix, revealing who was connected with whom within a particular project. An assumption was made that all ties were reciprocal in nature since nearly all respondents indicated that they supplied information for other innovation of more or less equal value. Secondly, it calculated Euclidian distances among the nominated individuals. Euclidian distance is a measure of structural equivalence or similarity among the nodes of a network. If, for example, two individuals have identical patterns of connections to all others in a network, then the Euclidian distance between them is zero (Wasserman and Faust, 1994). Thirdly, based on Euclidian distances, a set of (x, y, z) coordinates for each individual was calculated using a 3-dimensional scaling routine (Borgatti *et al*., 1999). Based on each set of coordinates, Mage produced three-dimensional kinetic images for exploring the social structure of each personal network. It is pertinent that Mage was initially produced for the visualization of protein molecules, but has since been used to visualize and make sense of social structures (Freeman, 1998).

Furthermore, based on the contact details (i.e. postal address) of nominated individuals across the ten projects it was possible to compile a symmetrical valued matrix showing which country is connected to which other country. The value of each cell, excluding the cells of the main

diagonal, in this matrix reflected the number of nominating links connecting the two countries. The values of the main diagonal showed how many nominations were made within each country. Subsequently, Ucinet was used to compute the Euclidian distances among the nominated sixteen countries showing the extent of structural similarity among these countries. A set of (x, y, z) coordinates for each country was also calculated using a 3-dimensional scaling routine of Ucinet. Based on this set of coordinates, Mage produced a three-dimensional kinetic image for exploring the structure of this global IT innovation network spanning four continents, namely, Europe, North and South America, and Australia.

3. Main Findings

Table 2 summarizes some of the main findings according to a simple North – South classification of countries involved in the study. North includes the following countries: UK, Ireland, France, Germany, Austria, Netherlands, Belgium, Italy, Finland, Norway, Sweden, USA and Australia; South includes the following countries: Greece, Spain and Brazil. Note that a dyadic link is a nomination tie showing that information considered to be of significant value for IT innovation was exchanged between two individuals involved in one of the ten projects.

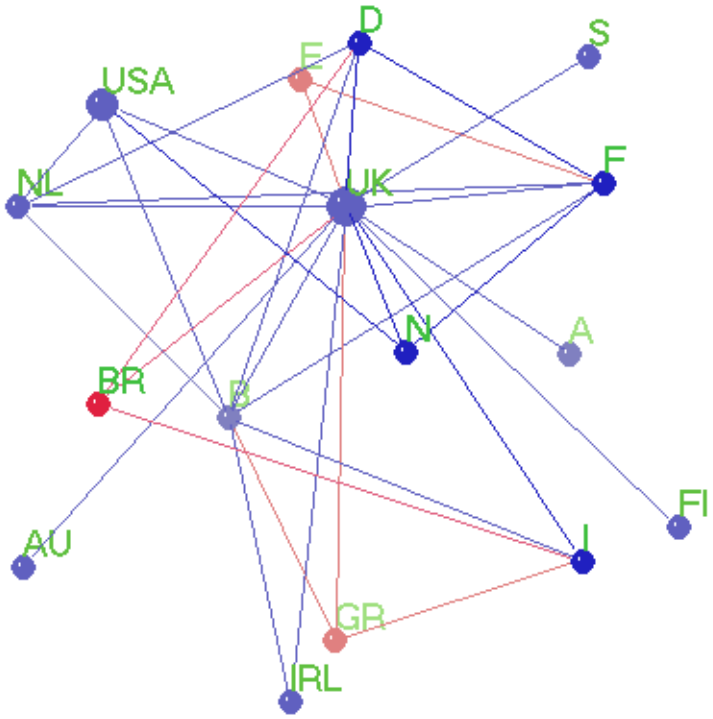
Table 2 : A North – South analysis of links for 10 ESPRIT projects

Project	*N-N (%)*	*N-S (%)*	*Total Number of Dyadic Links*
AMULET	10 (100)	0	*10*
DELPHI	21 (100)	0	*21*
E2S	16 (100)	0	*16*
FIRES	8 (47)	9 (53)	*17*
FLACSCOM	18 (100)	0	*18*
IMPRIMATUR	26 (100)	0	*26*
IMPROVE	21 (100)	0	*21*
PEPSE	18 (100)	0	*18*
PIPER	5 (38)	8 (62)	*13*
TIMELY	6 (55)	5 (45)	*11*
Total Number of Dyadic Links (%)	***149 (87)***	***22 (13)***	***171***

As Table 2 shows, the information flows of only three of the ten projects connected people from the well developed countries in the North with people in the less developed countries of the South. Out of the 171 dyadic links most valued for IT innovation, the vast majority (87 per cent) were confined within the information "rich" North of Europe, USA and Australia. Only 13 per cent of dyadic links important for IT innovation exchanged or transferred information from the North to the South and vice-versa. Since the EU has placed a premium for supporting "less favored regions" in its South for four consecutive Framework Programs this is an important finding reflecting the discrepancy between the ability to provide financial support through formal contracts and the "failure" of policy to re-direct informal information flows from the information "rich" in the North to the information "poor" in the South. Furthermore, the nomination of people as far apart as Norway, USA and Australia indicates the global nature of IT innovation networks as UK main contractors accommodated informal, unacknowledged partners outside the EU with the aim of acquiring information valuable for their innovation from far beyond the EU boundary (see, also, the more detailed analysis of internal and external linkages below).

Graph 1 shows the global innovation network of UK main contractors based on the ten Esprit projects and the sixteen nominated countries. Countries are represented by balls positioned in a 3-dimensional space according to their structural equivalence in the network. Countries in the North are blue and the ones in the South are red. The color of ties also varies according to their natures. Ties connecting countries in the North are blue, and ties connecting North countries to the South are red. The size of balls also varies according to their degree centrality (Wasserman and Faust, 1994, 178) computed by Ucinet (Borgatti *et al*., 1999). As was expected, the most central country in the network is the UK itself. However what it seems surprising is that the second most central country in the network is the USA. The UK and USA are respectively followed in the third, fourth and fifth places by France, Germany and Belgium. The centrality score of USA, a non-EU country that is not allowed to participate as an "equal" partner in EU funded projects, begs for questioning further the role of informal partners in Esprit innovation networks. Towards this end, they are explored below in some depth the patterns of internal and external linkages of the ten projects.

Graph 1: A country-based analysis of links for 10 Esprit projects



A	Austria	D	Germany	I	Italy	N	Norway
AU	Australia	E	Spain	IRL	Ireland	NL	Netherlands
B	Belgium	F	France	GR	Greece	USA	
BR	Brazil	FI	Finland			UK	

Table 3 summarizes the main findings with regard to internal linkages (dyadic ties within the EU boundary) and external linkages for the ten Esprit projects. Note that most external linkages were dyadic ties connecting individuals between an EU and non-EU country, while in some cases both individuals worked for organizations outside the EU.

Table 3 : Internal vs. External Links for 10 ESPRIT projects

Project	*Internal Links Number (%)*	*External Links Number (%)*	*Total Number of Dyadic Links*
AMULET	10 (100)	0	*10*
DELPHI	15 (71)	6 (29)	*21*
E2S	3 (19)	13 (81)	*16*
FIRES	9 (53)	8 (47)	*17*
FLACSCOM	3 (17)	15 (83)	*18*
IMPRIMATUR	19 (73)	7 (27)	*26*
IMPROVE	21 (100)	0	*21*
PEPSE	17 (94)	1 (6)	*18*
PIPER	13 (100)	0	*13*
TIMELY	9 (82)	2 (18)	*11*
Total Number of Dyadic Links (%)	***119 (70)***	***52 (30)***	***171***

As Table 3 shows, the information flows of only three of the ten projects were confined to the EU. Out of the 171 dyadic ties, almost a third (31 per cent) transcended the EU boundary. This is an important finding, given that none of the 10 projects had any formal partners outside the EU. If there was no contractual need to involve outsiders, it seems that the only plausible explanation for these external links is that individuals in the majority of projects believed that external, informal contacts were particularly useful for innovation (Aldrich and von Glinow, 1992). It would seem that the majority of Esprit projects with UK main contractors accommodated informal, unacknowledged partners outside the EU with the aim of acquiring information valuable for their innovation.

As might have been expected, the majority (57 per cent) of UK main contractors' external linkages were with the USA. EU firms have generally been eager to participate with the US companies because of their technological lead in IT (Narula, 1999). The cultural and linguistic connections of individual in UK firms would also explain US dominance of their external linkages. Also striking is the global spread of external linkages: through these individuals, UK

main contractors maintained important links with such countries as Australia, Brazil and Norway. As it has long been known that UK organizations participating in the Commission's RTD programs have more collaborative links than their partners (Georghiou *et al.*, 1992), it is perhaps worth speculating that the attraction of a UK partner may lie less in its intrinsic qualities than in its links with the USA.

Two case studies have been selected to examine in more detail the role of external linkages: Imprimatur and E2S. Some 27 per cent of linkages in the Imprimatur project were outside the EU, and some 81 per cent in the E2S project. Semi-structured interviews with individuals from these projects indicate that external linkages play a critical role in innovation. They transcended local social circles and brought in valuable information from well beyond the project.

IMPRIMATUR (Intellectual Multimedia Property Rights Model and Terminology for Universal Reference)

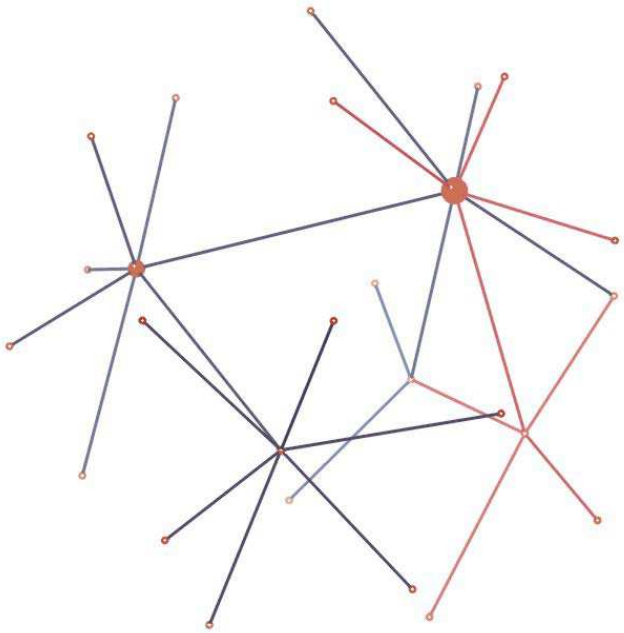
Imprimatur was an Esprit IV project. It aimed to build consensus on electronic copyright management and intellectual property rights (IPR) protection in the late 1990s. The UK main contractor was the Authors' Licensing and Collecting Society (ALCS, www.alcs.co.uk), based in London.

> "The Imprimatur consortium is trying to build consensus around digital rights trading. That sounds very easy. It isn't. At the moment, most content is sold in books, CD ROMs, videos and so forth. When this content migrates onto networks, the question is how can you trade it securely and fairly between the creator, the producer, the distributor and the consumer."

Because the Internet and web disregard national boundaries, problems are caused by differences in cultures, legal systems, and so on. To achieve consensus in such infrastructural issues, a large number of stakeholders must be consulted. Electronic commerce and digital rights are just such an issue.

Graph 2 shows the personal network of the Imprimatur main contractor. The balls represent individuals and the ties represent nomination network data. The size of balls varies according to degree centrality (Wasserman and Faust, 1994), and the colour of ties varies according to their natures (internal or external). Internal ties are blue and external ties are pink. As was expected, the most central individual in the network is the UK main contractor himself (the largest ball at the upper right hand side of the Graph. However, what is even more interesting is that a part of his personal network is outside the Esprit formal agreement.

Graph 2 : IMPRIMATUR : Internal – blue and External – red Linkages



The network includes sources of information essential to the Esprit project in the US (e.g., Digital Copyright Forum, and the Copyright Clearance Center) and in Australia. The network also includes sources in Scandinavian countries and the Netherlands. It is notable how nominated sources outside the Esprit project themselves nominate sources of information within the project so that networks which might have been thought to have been internal to Esprit are in fact intertwined with external information networks. The extent of overlap can be seen in the case of an American contact (bottom right hand side of the Graph) from the Copyright Clearance Center

who is linked with the UK main contractor, but also with two other nominations of the latter: a professor at a Dutch university and an ALCS manager. Such overlaps allow valuable information for Esprit innovation to flow back and forth from the UK to the USA via a number of direct and indirect routes within and outside the ALCS.

It seems that mutual interest and trust hold these information networks together. Neither is easy to establish and both take time and effort. A concern encountered frequently among those interviewed was that the European Commission was insufficiently sensitive to these arrangements and to the personal investment that had gone into making them. In forcing on those working on Esprit projects contacts outside their own personal networks, the Commission put at risk their personal information networks. Consequently, the Commission endangered the very innovation it was trying to encourage. The concern expressed by the technological leader of the Imprimatur main contractor in the UK is typical.

> "My network of contacts spans the world, reflecting the global nature of IPR [intellectual property rights]. It also spans private companies, NGOs, INGOs, supra-governmental organizations like the UN and OECD and governments themselves. One extremely irksome thing the Commission often tries to force on those who work in Esprit is the collaboration with people outside this network of contacts. Such people are outside my network of contacts for both personal and professional reasons. Therefore when the EC insists one works outside one's network, such a collaboration is bound to fail because it is not based on mutual interest or trust."

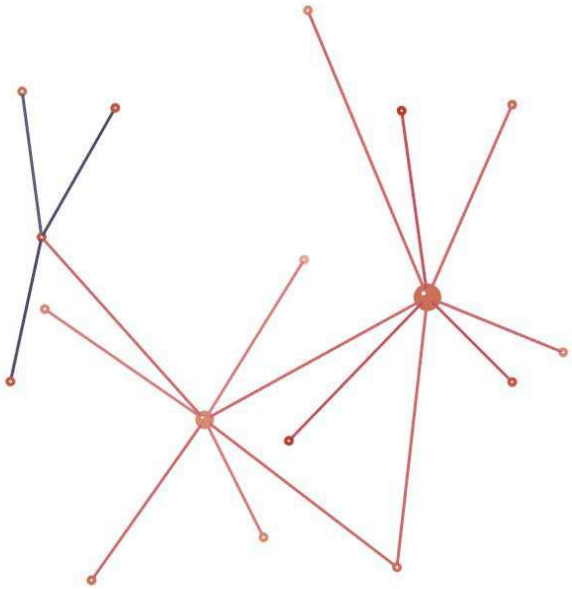
Not surprisingly, there is some tension between project officers in the Commission and participants in Esprit projects. Individuals interviewed insisted that their information networks are deliberate constructs which can easily be damaged by the clumsy efforts of the Commission to create its own dedicated networks.

> "…before you marry somebody you have a period of engagement, you meet, you go to parties together. In a sense, Esprit has sometimes felt like it was trying to force people into marriages before they actually got to know each other."

E2S (Secure Internet Commerce)

E2S was also an Esprit IV project. It sought to develop enabling technologies for secure business to business transactions over the Internet. According to Prosoma, E2S technology is a major step towards ensuring the security of confidential information and commercial transactions over the Internet. The E2S architecture is based on secure electronic transaction (SET) technologies for bankcard payment systems. SET is an open standard developed jointly by Mastercard, Visa and their technology partners to enable card transactions to be made securely over open computer networks using encryption technology. Now available in Europe, SET is enabling European banks to take a leading role in the international development of secured electronic commerce for consumers. The UK main contractor was ANSA Architecture Projects Management in Cambridge. Other key partners in the project were Hewlett Packard (HP) research laboratories located in Bristol in the UK, and in Grenoble and the Cote d'Azur in France. Graph 3 reveals that more than four fifths of the personal network of the main contractor's technological leader lies outside the EU boundary.

Graph 3 : E2S: Internal – blue, and External – red Linkages



Only three internal linkages - to the HP laboratory in Bristol, VISA headquarters in Paris, and the Technical University of Darmstadt in Germany – are within. There are no internal linkages in Graph 3 from the other project partners. For example, contacts at HP laboratories in Grenoble and in the Cote d'Azur did not regard those within the project as important sources of technological information about the project. The most valued sources are in the East and West Coast of the USA. Note that the biggest ball in the network (bottom right hand corner of Graph 3) is the vice-chairman for electronic commerce in an American bank situated in downtown San Francisco. The second most central individual (upper right hand corner of Graph 3) is an engineer at Bell Laboratories in New Jersey. It is also interesting that there is a contact at the Citibank Group in New York (right hand side, in the middle of Graph 3) who is common to both the source in the Bank of America and that at Bell Laboratories. It would seem from the structure of this network that UK main contractors benefit most from personal contacts with individuals in the most dynamic parts of the IT world and these are outside the EU.

4. Concluding Thoughts

Esprit was the first, the largest and the longest of the European Commission's research programmes. Understandably, it became a model for other research programmes, but it was also a child of its time. The early 'eighties expected and required government involvement in high technology, in which IT was fundamental. Europe expected to be internationally competitive in IT, both in the industry itself and in other industries through the use of IT. Government involvement took the form of supporting if not national champions then European champions, firms reckoned to be large and strong enough to take on the best and biggest in the world. In the Esprit case, government involvement also took the form of supporting pre-competitive research carried out in collaborative, technology-driven projects which, because of the way they were formulated, monitored and assessed, tended to focus on what the Big Twelve, the equipment suppliers, wanted to do anyway.

Innovation and technology policy has moved on in the last two decades. The IST Program, which replaced Esprit in the Fifth Framework, was very much market-driven and user-driven. Market-pull has replaced technology-push and the contrived notion of pre-competitive research, which did not survive to see the end of Esprit any more than did the dominance of hardware over

software. And yet, the Commission's insistence on collaboration is as strong as ever in the forthcoming Sixth Framework (2002-2006) program. It is true that collaboration in IST can still be justified in the terms in which it has been justified in Esprit over the last two decades. It is also true that collaboration among firms is hardly going out of fashion, though it commonly takes the form of mergers, joint ventures and acquisitions these days. But European firms would rather collaborate with firms outside Europe, especially firms in the USA, than with those in Europe, and they certainly have no desire to restrict their collaboration to technological innovation. It is surely sobering that an indication of the success of Esprit is that "prior to ESPRIT European firms sought out American companies for technological partnerships. Because of Esprit European companies now seek out European partners" (in Peterson and Sharp, 1998, p.73).

But collaboration did not endure in Esprit and has not been retained in IST for the advantages claimed for it in the early 'eighties, nor because it is still fashionable. No, the Commission has retained collaboration in IT research for other reasons altogether, basically so that SMEs, firms from the "less favored regions" in the South of Europe, and now the users of IT, can be included in projects.

> "The reasons the Commission have to impose some partners is that they will be left out if they don't, and they put money into the pot in Europe, and occasionally they are saying why don't you pick up this company in trouble... Yeah, all right we will have them in the project... It is a pain but we did it because it helps.... The EC is full of politics. Full of it, and we try and avoid that, and try and focus rather hard on what we try to do."

Mere inclusion does not guarantee that new participants actually do participate in projects, that they contribute or benefit at all: the reality of collaboration can mean the same old groupings and little new blood. Though the Commission justified its requirement for collaboration among participants in its RTD programs in terms of the advantages for innovation, collaboration also satisfied the Commission's own political requirements. Collaboration may bring political benefits for the Commission, but not necessarily benefits in terms of IT innovation. Much Esprit collaboration was nominal in that it was arranged to satisfy application requirements, to improve

prospects of funding, or to please project officers with the consequence that some partners made little or no contribution to innovation. Such collaboration could hardly have improved the prospects of innovation. It may even have imposed a cost on innovation for which the benefits brought through informal networks extending beyond the formal collaboration were some compensation.

This study indicates that much of the information for innovation in Esprit did come from external sources – external to Esprit projects and often external to Europe. Very often it was acquired by personal and informal means. It would seem that the formality of collaboration in Esprit managed to accommodate this informal networking, not because the Commission was sensitive to the importance of these networks and anxious not to disrupt their operation, but because their members were absolutely determined that the Commission would not interfere with their networks.

Non-European firms may now participate in European Commission programs, but as non-funded and therefore unequal partners. This is some concession to reality, but still inadequate recognition of the non-European contribution to EC programs in IT. The Commission still requires European firms to collaborate so that they may be more efficient in IT research, more innovative, and thus more competitive, especially against the Americans and Japanese. Such a notion is really no longer appropriate in the modern IT industry, an industry whose product, structure, ownership, research, innovation and market are utterly global. It is positively surreal in a research program like IST, which specifically seeks to exploit networks and clustering, and in the very IT technology which facilitates information networking, both formal and informal. The consequence of the Commission's continued insistence on European collaboration may well be reduced IT activity in Europe, and this is far too great a price to pay for the political convenience of the European Commission.

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