

The European Experience in Technology Transfer: The Case of the Innovation Relay Centres, IRC

Regis Cabral

Innovation Relay Centre Northern Sweden

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Uminova Center

Umeå University

SE-901 87 Umeå, Sweden

Introduction

Euro, import quotas, minister meetings: The media gives the impression that European Union institutions only operate at a macro policy level, far away from the practical needs of the European Citizen. The reality is different. For European institutions, the citizen and his/her needs and interests are central. European institutions work for the European citizen, for his/her rights, for the improvement of life conditions and better relations with the natural and social environment as well as more competitiveness and more effectiveness in a global economy. Innovation is the key to successfully address these points and the European Commission has a number of innovation actions and programmes, including technology transfer (TT) assistant for individuals and Small and Middle Size Enterprises (SMEs). A prime example is the Innovation Relay Centre, IRC, a funded by DG Enterprise, the Directorate General engaged in the exploitation of research results, in close co-operation with the other DGs. I present briefly the European Union grand framework for innovation. The evolution of science and technology policy, as it is relevant to innovation and TT, has had several high points such as the FPs, FP, and the green papers. Of the many innovation instruments associated to the FP5, I shall concentrate on those closely related to Directorate General Enterprise. It is not possible to do justice to the wealth of European successful experiences and I will focus on the IRC, describing their structure and goals. The IRCs are the outcome of a long learning process in innovation and TT. The Innovation Relay Centre Northern Sweden illustrates successful TT operations.

1. The European Union and its Institutions

1.1 The Institutions

In addition to the well-known European Commission, there are other important institutions, as shown at <http://europa.eu.int/>. The European Parliament, which has increased its powers over the years, is the main expression of the collective political will of the European peoples, over 370 million citizens. The Council of Ministers takes European political decisions, in co-ordination with national policies. The Court of Justice interprets what the other institutions do in light of Europe's Laws and regulations. Community Law is a uniform body valid at all national courts and, as such, with profound economic significance. The Economic and Social Committee ensures the co-operation between social and economic actors. Its

membership is drawn from employees, employers and interest groups. The Committee of the Regions ensures that European investment produces a harmonious evolution of all regions of Europe. It is mandatory for the European Union to consult regional and local authorities if actions or decisions are relevant to regional or local development. The European Investment Bank, EMI, is a major financial actor, with an annual lending volume of about 20 billion EURO. It should not be confused with the European Central Bank. The European Court of Auditors and The European Ombudsperson protect the citizen interests.

1.2 The European Commission

The European Commission initiates legislative proposals, implements European Union policies and treaties, and manages European international trade. The Commission provides political leadership and must be totally independent of Member States, working impartially for the Union. The budget of the Commission for the period 2000-2006 is agreed to be 93280 bi EURO in engagement by member states and 89387 bi EURO in their payments. The staff, of approximately 20000 persons, organised as in Table I, is led by 20 Commissioners. The European Parliament has to approve the Commission before each term and can demand its resignation. While innovation permeates the work of several Directorates, it is the primary function of Directorate Enterprise.

2. A Very Brief Survey of the Evolution of European Union Innovation and TT

The complex structure for the promotion of innovation and TT inherited by DG Enterprise did not happen overnight, Table II.² European innovation only stabilised by the time of the first FP, 1984-1987. The European Union has roots in WWII and historical links to the atomic age.³

A very prestigious instrument to co-ordinate research for industrial innovation is EUREKA, with strong Commission participation.⁴ EUREKA projects must be market oriented.⁵ During the FP3, 1990-1994, the Commission set up a network of Euro-Info Centres and started the Programme VALUE, Valorisation et Utilisation pour l'Europé, to disseminate research results, aiming at their utilisation and economic exploitation. It included

Collection and dissemination of information...; Identification, characterisation and screening of results; Action on legal protection; network of patent consultants, examination of reports before publication; Dissemination of results that need not be protected, by means of publications, seminars, target groups; Promotion of exploitation: feasibility studies, production plans, provision of financial and technical support, assistance in finding partners.⁶

VALUE was a criticised learning process, resulting in a new, more effective network in the next FP.⁷ There was also a computer communications network. It produced CORDIS, an electronic information source on all EC RTD activities.

3 The Fourth (1994-1998) and Fifth (1998-2002) FPs, Innovation and TT in the European Union

The 1992 Maastricht Treaty formally established the European Union and defined the European Citizen. European TT should be at the service of the European Citizen and European cohesion. Moreover, 'In accordance with Article 130F of the Maastricht Treaty, the Community is responsible for assisting small businesses in their research and technological development efforts,'⁸ known as Activity 3. A mature understanding of technological change,⁹ combined with the VALUE and SPRINT experiences indicate that TT to SMES is not straightforward. Musts are: Creation of a technology friendly business environment in synergy with Regional Policy; practical dissemination of knowledge and technology through the IRCs; and dissemination of information and knowledge, primarily through CORDIS. In the World Wide Web since September 1994 at <http://www.cordis.lu/>, CORDIS provides updated R&D documents and information about potential partners and results, as well as all Commission programmes and services.¹⁰

Successful innovation needs both the identification of the customer/consumer needs/problems and the introduction/production of a new technology.¹¹ SMEs don't have resources to produce new technologies, so TT appears as a reasonable alternative. Nevertheless, without assistance most SMEs lack the expertise to locate the appropriate technology. For international TT, the best solution is a network of intermediary services. A large network offers more business opportunities and a broader variety of resources. A smaller network is more effective and faster. Whatever the case, the network depends on relations that go beyond the professional level. It is a network of people. The promotion of staff exchanges is useful. The network should focus on the needs of the SMEs, the main client. It must, at least, offer three types of support: to raise the awareness of the opportunities of TT; to provide assistance in general; and to provide specific assistance to individual companies. The network will have to access the SMEs and establish their profiles and to identify their technology potentials and weaknesses.

There are no general recipes to assist SMEs. Thus a personal contact, for instance a visit, a face to face meeting, is a must. For most SMEs technology dissemination and the acquisition mechanisms are different. Once the major characteristics of the SMEs, including type of partner sought and type of co-operation wanted, are identified, the network can be activated to locate partners, supported by a market research. If a potential partner is located, it is necessary to mediate a fit between the two SMEs. A most important moment is the SMEs first meeting. Different cultural backgrounds and expectations require care and attention. The TT network has to keep quantitative indicators, such as companies attending events and number of TT agreements.

These experiences indicated that, from the innovation point of view, research efforts were insufficient, formal and vocational training was minimal, financing was problematic, with little risk capital available, the legal and regulatory environment were unfavourable and public action did not support SMEs. It all converged into an organised renewal of the process, marked by the Green Paper on Innovation, December 1995, the launching of the Innovation Programme, and the First Action Plan for Innovation in Europe of 20 November 1996. The commission proposed 13 action routes to address these problems. The IRCs were prominent in the Green Paper; the only European network listed.¹² The Action Plan indicated three main areas:¹³ Actions, including funding, to foster innovative culture; intellectual and property protection; and, despite great improvement, attention to the old problem of linkages between research and new products and services. Thus, the FP5 was to further assist SMEs to acquire and transfer technology, including non-European knowledge. It was also to approach COST and EUREKA, for competitiveness and employment require innovation. FP5 has given continuity to this process, with the learned experienced incorporated into the more effectively managed Commission.¹⁴ Four issues were brought forth. The first is employment. The second is the quality of life and health, as well as the associated questions of the ethics of research. The third is the globalisation of the economy and its consequences and impact on the rate of growth of knowledge. Finally, Europe has to take into account the emergence of powers in Asia and Latin America. In all cases innovation plays a major role but since SMEs account for 2/3 of European employment, the third activity continues to be central.

4 The Innovation Programme

4.1 Objectives of the Innovation Programme

The Innovation Programme was created to encourage the exchange of information on research, technology, and successful commercial use of research results. It also aims to encourage the absorption of new technologies and innovation by European companies, in particular SMEs, and to ensure a continued supply of new information - in

areas such as best practice, commercial innovations, and partnerships between European companies.¹⁵

The Innovation Programme promotes a number of activities and services to constantly upgrade European innovation and TT competence,¹⁶ supplementing the efforts of Member States by providing an added value at Community level. The programme contributes to relevant co-operation activities with non-EU Member States and with international organisations. The Innovation Programme covers three domains: dissemination and exploitation of research results, dissemination of technology to enterprises and the financial environment for the dissemination of technology. The IRCs are the specialised networks providing the skills and the infrastructure to take care of the first two domains. The third domain requires establishing links between funders and promoters of projects and providing managerial assistance to financial intermediaries. These concrete activities are inheritors of the ESPRIT, SPRINT and VALUE tradition.

4.2 Innovation Services

In addition to the IRC, they include Specific Measures to assist SMEs (getting information, exploratory awards to prepare a proposal, partner search and Cooperative Research or CRAFT Project); Technology Marketplace (how to exploit or find out about a technology); Financing Innovation (venture capital, bank and debt financing informal investors and stock markets); Intellectual Property Rights Helpdesk (patents, copyright, trademarks); LIFT (Linking Innovation Finance and Technology, but including the production of quality business plans); IMT (Innovation Management Techniques, including technology watch, value analysis and the marketing of innovation); and TIP (Technological Implementation Plan, to exploit project results). Information on these and more is available in Cordis.

5. The Innovation Relay Centres, IRC

5.1 The IRC Structure

By far the most important TT and innovation service provided by the European Commission is the network of IRCs. DG Enterprise, Unit C3: Networks and Services manages the IRCs. There are 53 IRCs in the European Union, and 5 in Cyprus, Israel, Iceland, Switzerland and Norway, as well as 10 in Central and Eastern Europe (known as FEMIRCs), Tables III and IV. Nearly 200 organisations cover 30 countries. Each IRC may be a consortium of several units, with a co-ordinator and a regional network. 'Each IRC is its region's window on European innovation, helping companies and research organisations transfer technologies and access the EU's research programmes in a transnational framework.'¹⁷

The IRCs main target is the SMEs, making diagnostics of their technological needs and advantages. Thus, the IRC can give advice on possible technology import or technology export actions. These are known as inward TT services and as outward TT services. When necessary,

appropriate and possible, the IRC may assist the SME on matters related to European Union research and technology funding.¹⁸ In either case, there is a need to locate partners in Europe. Each IRC can count on the colleagues in the IRC network in other countries and regions of Europe and beyond for assistance in locating either partners or potential technology importers or exporters. For a SME, the IRC is open door to the universe of European possibilities in TT and innovation. The home page at <http://www.cordis.lu/irc/> has links to every IRC. Any company with Internet access can thus locate an IRC at close range.

The IRC home pages have a gateway, accessible only to the IRCs, to a BBS for technology offers or requests. Thus, if a SME has a technology offer or request, it may ask IRC to make a BBS announcement, which is kept internal to the IRCs and confidential. Moreover, IRCs staff are constantly visiting each other, the staff exchanges, in order to look into the TT possibilities in detail.

DG Enterprise/C3 and the IRC Co-ordination Unit, IRCCU, in Luxembourg, support each IRC. This structure, necessary given the number of IRCs and the scope of their activities, controls the qualitative and quantitative of each IRC's goals, and assists each IRC with contacts, advice and guarantee information flow between IRCs across Europe. DG ENTERPRISE/C3 is headed by Mr. Javier Hernandez-Ros, the 'brains' behind the IRC and to whom much credit goes for the IRC successes. It has a professional staff to deal with contracts and related issues. George Barton, who has guaranteed the tempo of the enterprise, co-ordinates IRCCU.

5.2 The IRC Concrete Instruments For SME Support

It is naïve, none the less, to expect that SMEs will come flying to the IRCs. Most SMEs have resource difficulties. They will come if there is a real gain to be made. Thus, every IRC take a number of active steps towards motivating SMEs to look into the IRC possibilities. A mapping of existing companies is made, with details of their technological potentials and technological shortcomings. A short interview follows this mapping, sometimes over the phone. Next, a more detailed interview is made. Events are arranged to meet the SMEs needs and questions, such as seminars on intellectual property, EU funding, or assistance for technology import/export.

The preliminary information distributed to SMEs, for instance the IRC Newsletter or the IRC innovation and TT magazine, ITT Magazine, motivates a number of issues and questions to be addressed in events or seminars. SMEs, with developed technology, will ask for assistance in locating potential customers for their licenses. SMEs may find that to import technology or acquire a license may be the most profitable way of addressing specific production or market problems. Finally, there will be an increased interest in participating in European Union R&D programmes. In particular, CRAFT may raise interest. Market research is often needed. IRC can provide training

on legislation, particular European laws, or on specific technologies which may change the SME business scenario. In the events, it is also explained how the IRC can assist the SME in joining or establishing European networks. Finally, the IRC can be a point of access to new ideas and management techniques. In particular, intellectual property rights are of relevance to innovative SMEs. The IRC raises SMEs awareness of the possibilities of TT.

The next step is to provide specific assistance to a SME. The IRC listens to the companies and identifies the possibilities they provide. From an IRC perspective, problems do not exist, only opportunities. Technology offers/requests may be placed in the BBS, if the company finds this interesting. Once this is done, all IRCs are informed of the possibility and can look into their database of SMEs for a potential partner. To complement this function, the IRC performs CORDIS searches.

If a match is found, then the IRC will mediate the contact between the two SMEs. This is not a straightforward matter. Competence and fluency in international business languages are not common among SMEs. Even if the language is known, the SMEs may not feel at ease with a first international effort. Moreover, there are other significant barriers, such as different cultures, different praxis and different expectations. The IRC will follow the SMEs through all the steps, assisting, or identifying assistance when needed to address eventual problems. This includes arranging meetings between the two SMEs and even helping with the legal framework for the buy or sell of the technology license. Eventually a success story of TT may result.

The steps outlined above are associated to a periodic evaluation process. Each IRC has to account for the SMEs participating in awareness events. A control is kept over the number of organisations that were linked thanks to the IRC effort. More important, the actual number of TT agreements has to be specified. The same is true of assistance in funding applications and participation in EU RTD programmes. It takes professionalism to perform these tasks with success at this rate and with these requirements.

Each Innovation Relay Centre is staffed by professionals with experience in business and technology. The Centres have been selected to represent the European Union Innovation Programme in ...[the SME] area for several reasons:

Because they have in-depth knowledge of the technology needs of local industry - especially Small and Medium-sized Enterprises.

Because they have been evaluated as the best resource in each region for advising organisations on TT, innovation and related business questions.

Because they have displayed the ability to develop services that meet the specific needs of the industrial fabric in...[the SME] region.

Because they have in-depth knowledge of the European Union Research and Technology Programmes.¹⁹

Tables III and IV show how extensive this network of qualified professionals is. In fact it is even larger. It is a network of networks because each participant organisation heads a consortium of organisations. The IRC network has the unique feature of combining the advantages of large and small networks. The IRCs can organise themselves into several smaller specialised networks according to the specific needs of their companies, the Thematic Groups, Table V.

6. The Innovation Relay Centre Northern Sweden

A recent evaluation placed this IRC North Sweden among the five best in Europe. It covers Sweden northern most counties: Norrbotten, Västerbotten, Jämtland and Västernorrland. This vast area, larger than the UK has only about one million inhabitants. Traditional economic profile includes mining, wood, pulp and paper and some engineering firms. The universities and research centres have opened new possibilities in biotechnology, computer software and space technologies. The major sources of employment are SMEs with less than 100 employees, with companies normally far a way from each other. The recent population move to a few larger towns has left SMEs in smaller towns in need of assistance.

Given this regional and company profile, IRC Northern Sweden has developed a 'hands-on' strategy, going directly to the SMEs with a package which includes advice on technology needs and possibilities, financing, business plans and marketing issues. Given the SMEs lack of international experience, advice and assistance when it comes to technology import/export agreements are of crucial importance.

As the other IRCs, IRC Northern Sweden engages in searching for partners but given the particular business cultures of the region's SMEs, the person to person approach is essential. Whenever activities are carried out, like seminars to present new EU RTD programmes and funding possibilities or training on the importance of intellectual property rights for innovation, a special invitation is sent to the SMEs, followed by a personal contact. In all cases, the courses, training and seminars are adjusted to the SME's needs.

The very large geographical coverage required the establishment of a consortium, composed of three organisations with extensive and long experience in TT. They are successful and innovative university industry liaison offices.²⁰ Uminova Center is the current co-ordinator. As the industrial liaison office of Umeå University, it has a wide experience in assisting advanced student and researchers in commercialising their research results. Uminova Center is also the home for the UNITEK Project, which places students in companies and has received recognition nationally and internationally as well as from political and regional development bodies.

Uminova Center has also long experience in assisting entrepreneurs with patent and technology licensing matters. Uminova Center's key to success is the emphasis on the practical assistance to transform ideas into products and services. The two partners in the organisation have a similar background. CENTEK is the industrial liaison office for Luleå Technical University. It has also solid experience with collaborative projects in the Barentz region. KIC is the equivalent for the Mid Sweden University.

Regional particularities required a local solution to complement the standard IRC's instruments. Uminova Center assembled a group of bi-cultural consultants, The **UNIPILOTS**, to assist Northern Swedish SMEs with international TT. The IRC North Sweden co-ordinator is also the UNIPILOT co-ordinator, Göran Nilsson. He identified that a major barrier confronted by SMEs in a new international market was the lack of knowledge and living experience with the new business culture. The UNIPILOTS have this knowledge for several cultures and countries and, at the same time, have Swedish cultural roots. In practice, the UNIPILOTS can translate proposals, new ideas and descriptions from one business culture to another. The UNIPILOTS are not language translators, although fluent in Swedish and in the language of the culture they specialised in. They successfully overcome the business cultural barrier. As such, the UNIPILOTS go hand and glove with the IRC network.

7. Success Stories from the IRC Northern Sweden

These two cases demonstrate the IRC are not a paper construction or theoretical bureaucratic exercise. It is very easy to discuss TT and innovation in theory. The cases below show that this is real life, with lessons to be learned from.

7.1 The Case of the Mobile Abattoir

Thanks to the IRC, Swedish makers of a mobile abattoir, STAB, designed for slaughtering Lapland reindeer have teamed up with an UK partner, HUMAS to develop a product meeting all the hygienic and humane requirements of animal slaughter. It is now marketed worldwide. The project is also receiving the growing support of pressure groups that want to stop the export of live animals and unnecessary animal transportation. The equipment supplies its own energy, operating in excellent health conditions at temperatures from -40 to +40 degrees Centigrades. It has EUREKA status as the 1336 SANMO Project.²¹

STAB, Sandströms Transportprodukter AB, is a small North Swedish family coach-building firm adapting trucks for specialised purposes. In the 1960s they started with a small mobile abattoir for the free range Lapland reindeer. The 1987 improved version sold in Norway, Siberia and Sweden, could attract other markets, if adjustments were made to other type of livestock. Inquiries existed, but this family SME didn't know how to handle them. According

to Göran Nilsson, they couldn't "go from an offer to a deal." The network located a partner to complement what STAB needed, "marketing strength ... in a British partner." Humas Ltd, from Bury St Edmunds, eastern England, had experience with a mobile slaughterhouse for deer. Humas had tried, without success, to meet the challenge created by public protest at the export of live animals and the closure of UK abattoirs due to strict EU regulations. STAB model was the solution. The two companies complement each other, with Humas in charge of the global marketing of the STAB slaughterhouses. Humas also designs and markets auxiliary products and "docking stations" for permanent on-site installation. STAB keeps the Nordic and some other markets.

The design is very creative. Each slaughterhouse comes with a trailer unit or a separate trailer to be driven to the required site. On arrival, the trailer is unfolded and the roof raised to provide spacious accommodation for all the usual slaughterhouse functions. Carcasses can either be put into cold storage for transport or passed to a separate processing unit for on site butchering. 60 reindeer/hour or the 5 cattle/hour can be processed. The model can be adjusted to buffalo, sheep, goat and chickens. The abattoirs meet all the Canadian, US and EU's tough regulations. The product's advantages are obvious: "In many places they have problems with the long distances between the slaughterhouses and where the animals are kept," says Mr Sandström. "So the animals are going to lose weight in transit and the meat is not going to be as good as if you slaughter them on site." The mobile slaughterhouse highlights the IRC's instruments: Networks to locate partners; assistance in the negotiations and co-operation agreements; support to obtain financial backing; negotiating with regulatory authorities.

7.2 The New Dental Workstation

Dental technicians precise work requires comfort for good performance. A northern Sweden SME has come forth with a new ergonomic workstation. Thanks to IRC Northern Sweden Northern Sweden and its transnational Unipilot network it has penetrated the German market. This illustrates how the IRC adapts to local realities and takes into account the SME best interest. Göran Nilsson explains: "Up here, a company employing 200 people is really big, and our potential base is probably only 800 companies. So we have an advantage: we can work hands-on, sit in on negotiations, and help write agreements. But on the other hand the attitude to the European Union is very sceptical, so it's difficult to get SMEs to join European programmes. What they are interested in is being part of the single market. We concentrate on product licensing and TT rather than on export pure and simple."

A one-man, Bengt Lundin, Umeå SME called Lergoproduct wanted to expand the market for its ergonomically designed dental workstations. The Lergoproduct design is fully adjustable vertically, enabling users to move from standing to a sitting position. It eliminates a source of back

problems. Angled work surfaces place the necessary equipment within easy reach. The station is easy to clean because a cylindrical central column hides all the cables and ducts. The station saves on energy and space.

Mr. Nilsson tells the story. "Bengt Lundin had designed an innovative piece of equipment, and exhibited it at the Stockholm Dental Fair in 1993. There, he met Günter Arp from Hamburg, who is himself a dental technician, and has excellent connections in the profession." IRC helped with contracts, intellectual property and commercial aspects. Since Lergoproduct cannot afford full EU patent protection, IRC helped with design protection, a cost of only a few hundred EURO. The German Unipilot, Rainer Herrmann assisted on the commercial side. After the initial success, the collaboration between Lundin and Arp extended into design. Mr Arp's company Ergonomische Arbeitsmittel refined the flexible support for the lower arms, containing built-in tool attachments. Thanks to Herrmann it was presented at the Soring 1997 Cologne "Dentalschau" with promotional material into appropriate German. Within six months a laboratory station had been sold to Hoechst. The partners also successfully negotiated an agreement for continuous co-operation and sales. A development licence is in the making.

In this case, microbusiness, the IRC was a contact facilitator and supporter, complemented by the Unipilot. No grant support were required and the much need jobs will come to the periphery.

8. Learning from the European Union Experience

It is impossible to do justice to the innovation and TT effort of the European Commission, given its wealth and scope. There will be always more to say. Innovation and TT have been central to the making of the European Union. Through science and technology, starting with EURATOM, the initial concrete and practical steps were taken which have contributed to open the doors and communications channels for a peaceful Europe. But the very successful TT mechanisms now operating in Europe were not constructed overnight. Neither did they result from a magical signature of a brilliant politician. They were constructed step by step, a slow and constant learning process, always review. Do not expect to read these lines and go to your country and implement such a process in a week. But it will help if you start at the practical end of things.

This is a lesson to be learned. But there are others. The network approach is sound, provided that there is qualified, paid, professionals operating at the network nodes. These professionals have to be monitored quantitatively. They also must have the capacity to listen to the SMEs and good knowledge of the local business culture. The professionals must also be active and must realise that SMEs will not come to their office. The TT professional must go to the companies. Which means that he/she must have the skills or the staff to carry out mappings of these companies and their needs, as well as the time to visit them. Events and

activities must be set up which give clear signals to the SMEs that there are gains to be made with TT. The professionals must be ready for hands-on-approach, coming out of the office and into the field. Sitting at an office or getting entangled in a political debate will not produce TTs to SMEs. At the same time, it is fundamental that field officers have the support and backing of good and professional administrators, including at the central level. Training of these professionals is possible and the European Commission has produced a wealth of materials, which can be used, some of which listed in the references to this paper.

The network needs to be soundly managed. The existence of a European co-ordination in Luxembourg, which is, moreover, a source of ideas and inspiration can not be underestimated. A central but accessible co-ordination can assist in transferring the experience from one IRC to another, as we'll perceive the total picture and identify best practices. The Innovation Programme is Europe at its best. Finally, there is commitment and competence at the higher political level, at the higher administrative level and at the local level.

Given the globalisation of the economy, one should not expect that appropriate and sustainable technology would be found at home. Quite on the contrary, The European experience has shown that employment is generated primarily by SMEs, which are companies with little resource or time to develop their technology. TT is a must if these companies are to stay alive and if employment is to be generated.

There are barriers to this process. One of them is the lack of risk capital, an issue that the Commission is now addressing with full force. There is also the issue of intellectual property rights. Most SMEs do not realise how important this issue is. They must receive orientation in this matter. Without protection to the results of the innovation work, there will be little motivation to proceed. The other is the cultural barrier. The UNIPILLOT approach has demonstrated that it is possible to overcome this barrier. The TT expert has to realise that specialised business professional who have dual, or even more, cultural identities, can assist in complementing the bridge across cultural boundaries.

The IRC is a successful instrument for TT and innovation in Europe. There is little theory here, it is practice and learning from experience. It is known that the social and economic well being of Europe depends on the successes of SMEs. But, by their own nature, these are companies which have difficulties at obtaining the technology they need to expand, grow, or even keep their market share. This is even more so when the technologies are available at an unknown culture or different business environment. The IRC, with its networks can access these technologies, new or old, and transform them into innovations for the local SMEs. With the IRC, the range of innovation possibilities for the European SMEs have greatly increased and assumed an European dimension. Given the size, scope and variety of

the European technology systems, it is in principle, possible to find or to motivate the production, of almost any technological needs of SMEs. But it is not an easy process and it requires dedicated professionals, supported by a functioning and well managed structure, to produce the necessary translations from one business culture to another, from one technological culture to another. It is, actually, easier to fail than to succeed; not because the technology is not out there, but because the bridge can not be crossed. The IRC lower the costs of that crossing for the SMEs. The range of training and the contacts with European possibilities by the IRC has a positive effect on the local SMEs. As time passes they become more familiar with the

processes involved and have easier time dealing with international TT processes. It is important to highlight that the staff has increased its effectiveness. While it is too early to make a judgement, it would not surprise me that the tempo of TT and the resulting innovations will greatly increase in Europe, thanks to the actions of the IRC. The IRC demonstrate that the results are possible and this has healthy impact on local SMEs, as these results become more and more known.

Can the European IRCs be a source of inspiration for other regions of the world? I believe so. It is no miracle, just good sense and hard work.

9. Tables

| Table I: How the European Commission is organised | |
|--|--|
| <u>GENERAL SERVICES</u> | |
| Eurostat | Press and Communication, Publications Office |
| Secretariat General | |
| <u>POLICIES</u> | |
| Agriculture | Competition |
| Economic and Financial Affairs | Education and Culture |
| Employment and Social Affairs | Energy and Transport |
| Enterprise | Environment |
| Fisheries, Health and Consumer Protection | Information Society |
| Internal Market | Joint Research Centre |
| Justice and Home Affairs | Regional Policy |
| Research | Taxation and Customs Union |
| <u>EXTERNAL RELATIONS</u> | |
| Common Service for External Relations | Development |
| Enlargement External Relations | Humanitarian Aid Office – ECHO |
| Trade | |
| <u>INTERNAL SERVICES</u> | |
| Budet | European Anti-Fraud Office |
| Financial Control | Inspectorate-General |
| Joint Interpreting and Conference Service | Legal Service |
| Personnel and Administration | Translation Service |

| Table II: Selected European Innovation Landmarks, 1948-1995 |
|---|
| 01 Jan 1948: BENELUX customs union |
| 17 Mar 1948: Treaty of Brussels institutes the Western Union |
| 16 Apr 1948: OEEC - Organisation for European Economic Co-operation, 16 countries |
| 18 Apr 1951: European Coal and Steel Community treaty signed |
| 25 Jul 1952: ECSC in force, Jean Monet president |
| 10 Feb 1953: Common Market in coal, iron ore and scrap metal |
| 01 Jul 1953: CERN treaty signed |
| 23 Oct 1954: Western European Union |
| 16 Dec 1954: European Foundation for Culture |
| 25 Mar 1957: EURATOM and EEC treaty signed in Rome |
| 16 Jan 1958: EEC Commission first meeting |
| 19 Jan 1958: Inaugural session of the joint (European) Assembly of ECSC, EEC and EURATOM, Strasbourg |
| 07 Jul 1958: EURATOM Scientific and Technical Committee approves the first research and training programme, 1958-1962 |
| 00 ooo 1960: European Scientific Information Processing Centre set up at Ispra, JRC |
| 00 ooo 1962: Concorde aircraft agreement |
| 05 Mar 1965: PREST - Scientific and Technological Research Policy |
| 00 Sep 1966: Fanfani document on Europe's technological backwardness |
| 01 Jul 1967: ECSC, EEC and EURATOM amalgamated: One Council and One Commission |
| 00 Jul 1967: PREST report on research and innovation policy |
| 06 Jul 1967: Commission of the European Communities set up with 14 members. |
| 29 May 1969: Airbus Agreement |
| 28 Oct 1969: Council approves PREST projects(informatics,telecommunications and environment) |
| 16 Dec 1970: Council adopts a common S&T research policy |

22 Nov 1971: 19 Countries initiate COST
19 Apr 1972: European University Institute convention signed
00 Jun 1972: UN Conference on the Environment, Stockholm
00 Jun 1973: DG XII Directorate General for Research, Science and Education created
14 Jan 1974: CREST replaces PREST
18 Jan 1974: European Science Foundation first meeting
00 Jun 1975: European Foundation for the Improvement of Living and Working Conditions created
15 Apr 1975: European Science Agency created
18 Jul 1977: JRC programme for 1977-1980 adopted
25 Jul 1978: Council adopts FAST, Forecasting and Assessment in the Field of Science and Technology, 1979-1983
00 Dec 1979: Ariane rocket
00 Jun 1980: European Patents Office grants patent No 1 to a JRC invention
03 Dec 1982: Council adopts a science and technology for development programme, 1983-1986
06 Dec 1982: European Development Committee for Science and Technology, CODEST, established
21 Dec 1982: Council adopts the ESPRIT programme for information technologies
25 Jun 1983: Council adopts the FP1, 1984-1987, including ESPRIT, BRITE, RACE, BEP, etc
25 Nov 1983: Council adopts SPRINT to create the necessary infrastructure for technological innovation and transfer
28 Jun 1985: European Council agrees to harmonise EUREKA with Community R&D
05 Nov 1985: EUREKA aims defined
00 Jun 1986: DG XIII becomes Directorate-General for Telecommunications, Information Industry and Innovation
15 Jun 1987: ERASMUS Programme for university students mobility
01 Jul 1987: Single European Act in force
20 Jun 1989: Council adopts VALUE
00 Nov 1990: CORDIS, Community Research and Development Information Service starts
07 Feb 1992: Maastricht Treaty on European Union signed
16 Mar 1992: Council adopts the Mobility programme, 1990-1994
01 Jan 1993: Single Market
06 Jan 1993: DG III assumes ESPRIT
02 Feb 1994: European Training Foundation, Turin
26 Apr 1994: Approval of the FP4, 1994-1998
20 Jan 1995: Edith Cresson, Commissioner responsible for Innovation
00 Dec 1995: Innovation Programme launched
1998 – 2002: FP5
16 Mar 1999: The Commission presents its resignation
00 Sep 1999: A new Commission, keen on reform, takes office
00 Jan 2000: The Directorate Generals are re-organised
00 Jan 2000: Commissioner Erkki Liikanen responsible for Directorate Enterprise.

Table III: European Network of Innovation Relay Centres and their Internet address

| Country | IRC Co-ordinator | Geographical Coverage | Internet address |
|---------|-------------------------------|--|---|
| Austria | BIT - Vienna | National | http://www.bit.ac.at |
| Belgium | TBB | Brussels | http://www.Birc.technopol.be |
| Belgium | VIA | Flanders | http://www.iwt.be |
| Belgium | CRIW | Wallonia | jc.disneur@mrw.wallonie.be |
| Denmark | EuroCentre | National | http://www.eurocenter.schultz.dk |
| Finland | TEKES | National | http://www.tekes.fi/eng/international/inno.html |
| France | CRI-Sud-Ouest | South-West France | vcollins@anvar.fr |
| France | ARIST-Bourgogne | Central-East France | http://www.euro-innovation.org |
| France | ARIST-Rhône-Alpes | Rhône-Alpes, Auvergne | http://www.arist.rhone-alpes.cci.fr |
| France | ARIST Lorraine | Alsace, Lorraine | Damien.Lemaire@lorraine.cci.fr |
| France | CRI, Bretagen Innovation | Lower Normandy, Brittany, Pays-de-la-Loire | http://cri.bretagne-innovation.tm.fr |
| France | Route des Hautes Technologies | French Mediterranean | rht@rht.cr-paca.fr |
| France | CRI - Paris | Paris, Ile-de-France | http://www.ccip.fr/cri-paris |
| Germany | AGIL | Saxony | http://www.uni-leipzig.de/~tz/firmen/agil/irc.htm |
| Germany | HTS | Hessen, Rheinland-Pfalz (excluding Trier) | http://www.hlt.de |
| Germany | VDI/VDE | North Germany | http://www.vdivde-it.de/irc/default.html |
| Germany | Steinbeis | South Germany/German Switzerland | http://www.steinbeis-europa.de |
| Germany | NATI | Lower Saxony, Saxony-Anhalt | http://www.nati.de/irc/irc.htm |
| Germany | ZENIT | North Rhine-Wetsphalia | http://www.zenit.de |
| Germany | Bayern Innovativ | Bavaria | http://www.bayern-innovativ.de |
| Greece | Hellenic IRC | National | http://hirc.ekt.gr |
| Greece | HF | National | http://www.help-forward.gr |
| Ireland | Enterprise Ireland | National | http://www.enterprise-ireland.com/irc |
| Italy | CIRCE | Lazio, Abruzzo, Sardinia | http://www.roma.ccr.it/circe |
| Italy | Camara di Comercio di Torino | North-west Italy - ALPS | alps@to.camcom.it |
| Italy | LARICE | Lombardy | http://www.mip.polimi.it |
| Italy | ENEA/IRENE | North-east Italy | http://rise590.bologna.enea.it/Irc/ |

| | | | |
|------------------|---|---|---|
| Italy | Tecnopolis CSATA Novus Ortus | South Italy | http://ocean.csata.it/adviser/ |
| Italy | Consorzio Catania Ricerche | Sicilia, Calabria | http://www.mediainnovation.it |
| Italy | Consorzio Pisa Ricerche | Toscana, Umbria | http://www.recital.it |
| Luxembourg | LUXINNOVATION | Gran-Duchy of Luxembourg, part of Rheinland-Plazt, Saarland | http://www.luxinnovation.lu |
| Netherlands | Senter | National | http://www.irc-nl.org |
| Northern Ireland | LEDA | National | http://www.ledu-ni.gov.uk/irc |
| Portugal | AdI | National | http://www.adi.pt |
| Portugal | ISQ | National | http://www.isq.pt/ |
| Scotland | EIC | National | http://www.cali.co.uk/irc/ |
| Spain | CENEMES | East and South-East Spain | http://www.ua.es/cenemes |
| Spain | D.G. de Investigacion de la Consejeria de Educacion y Cultura de la CAM | Madrid | www.madrimasd.org |
| Spain | Instituto Tecnologico de Aragon | Castilla-La Mancha, Extremadura, Aragón, Navarra, La Rioja | http://www.ita.es |
| Spain | CIDEM | Catalonia | http://www.gencat.es/cidem |
| Spain | Fundacion para el Fomento en Asturias de la Investigacion Cientifica Aplicada y la Tecnologia | Asturias | http://www.ficyt.com |
| Spain | CESEAND | Andalucia | http://www.ceseand.cica.es/ |
| Spain | SPRI | Basque | http://www.spri.es |
| Sweden | Industrial and EU-Liaison | Central Sweden | http://www.um.se |
| Sweden | Uminova Center | North Sweden | http://www.uminovacenter.umu.se/IRC/ircnorr.html |
| Sweden | IVF | West and South Sweden | http://extra.ivf.se/irc/ |
| United Kingdom | MIRC | Midlands | http://www.mids.demon.co.uk |
| United Kingdom | RTC | North England and Nord Manche | http://www.rtcnorth.co.uk |
| United Kingdom | SouthWest IRC | SouthWest England | http://www.southwest-irc.org.uk/ |
| United Kingdom | Kent Technology Transfer Centre | London and Southeast England | http://www.seirc.org.uk |
| United Kingdom | Welsh Development Agency | Wales | http://www.wda.co.uk/business/relay/ |
| United Kingdom | St. John's Innovation Centre | East of England | http://www.stjohns.co.uk/eeirc |

Table IV: Non-EU Network of Innovation relay Centres and their home pages

| Country | IRC | Geographical Coverage | Internet address |
|-----------------|------------------------------------|-----------------------|---|
| Iceland | IRC Netherlands and Iceland | National | http://www.irc-nl.org |
| Norway | SINTEF – EU Innovasjon | National | http://irc.indman.sintef.no |
| Israel | MATIMOP | National | http://www.irc.org.il |
| Cyprus | CIT | National | http://www.industry.cy.net |
| Switzerland | Cast EPFL | West Switzerland | http://www.epfl.ch/cast |
| FEMIRCS | | | |
| Bulgaria | ARC Fund | National | http://www.irc.bg |
| Czech Republic | Technology Centre | National | http://www.tc.cas.cz/femirc.htm |
| Estonia | EENET | National | http://www.femirc.ee |
| Hungary | OMIKK | National | http://femirc.omikk.hu |
| Latvia | Latvan Technological Centre | National | lrc@latnet.lv |
| Lithuania | Lituanian Innovation Centre | National | http://www.lic.lt/femirc |
| Poland | FNP -Foundation for Polish Science | National | http://www.fnp.org.pl |
| Romania | ANAMOB | National | http://femirc.imm.ro |
| Slovak Republic | BIC Bratislava | National | http://www.bicba.sk/femircsk.htm |
| Slovenia | Josef Stefan Institute | National | http://www.femirc.ijs.si |

Table V: IRC Thematic Groups

| | | | | |
|------------------|-------------------------------|---------------|---------------------------|----------------------|
| agrofood | automotive | biotechnology | environment | fire and fire safety |
| fish technology | marine science and technology | materials | medical technology | |
| renewable energy | textiles | wood | multimedia and electronic | business |

10. Notes and References

¹ The views here are the author's and may not represent the views of funders or employers. Portions of this article derived from ATAS XI article by the author.

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