Reprints of Selected Papers

presented at the

4th

STRIDE

Conference

held in

Metz, France

7-8th February 1994

COMMISSION OF THE EUROPEAN COMMUNITIES
DIRECTORATE GENERAL XIII
Telecommunications, Information Market and Exploitation of Research
Telecommunications and postal services
Telecommunications and postal aspects of structural interventions

Brussels, July 1994
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XIII-A-7

Reprints of the 4th STRIDE Conference, Metz, France, 7-8th February 1994.

The papers reprinted below focus on the activities of the workshops and the more technically relevant interventions.

Contents Page

Rue de la Loi 200, B-1049 Brussels, Belgium - Office: BU9 2/133
Telephone: direct line +32 2 29 69 052, secretariat +32 2 29 68 863, fax +32 2 29 69 131

WORKSHOPS

IVe Conférence Stride

Arsenal de Metz (France)
7-8 février 1994

Les bonnes pratiques de diffusion locale
des compétences technologiques
Sound practice in the local dissemination
of technological competence

Programme

Lundi 7 février 1994 / *Monday, 7 February 1994*

8h15 - 9h15 / *8:15 - 9:15 a.m.*

Accueil des participants / *Reception of participants*

9h15 - 10h15 / *9:15 - 10:15 a.m.*

Séance officielle d'ouverture / *Official opening session*

Gérard Longuet, ministre de l'Industrie, des Postes et Télécommunications et du Commerce extérieur, président du Conseil Régional de Lorraine, en présence de **Roger Benmebarek**, préfet de la région Lorraine (F)

Les politiques régionales de recherche et développement. L'apport des aides communautaires dans le cadre de la mise en oeuvre de ces politiques.
Regional research and development policies. The provision of Community aid in the implementation of these policies.

Jean-Charles Leygues, directeur, direction générale des politiques régionales, DG XVI, CCE Bruxelles (B)

Pourquoi le programme Stride ? Son insertion dans la politique de cohésion économique et sociale communautaire.
The reasons for the Stride programme and its place among the Community's policy of economic and social cohesion.

Henri Guillaume, président, directeur général de l'Anvar, Paris (F)

Développement de l'innovation au niveau local.
Developing innovation at local level.

10h15 - 10h45 / *10:15 - 10:45 a.m.*

Pause / *Break*

10h45 - 12h15 / *10:45 - 12:15 a.m.*

Aspects généraux du programme Stride.
General aspects of the Stride programme.

Président de séance / *Chairman* :
Nico Van Paridon, secretary of the Stride programme,
Ministry of Economic Affairs, Den Haag (NL)

Miquel Barcelo, director general,
Institut Catala de Tecnologia, Barcelone (E)

Exemple d'un réseau de diffusion technologique en Catalogne.
Example of a technological network in Catalonia.

Robin Miège, head of unit, DG XIII, CCE, Luxembourg

Présentation synthétique des expériences nationales de réseau de diffusion technologique dans l'Union européenne.
Technology diffusion networks : an overview of national experiences in the European Union.

Norman Morrison, chief executive, Industrial Research and Technology Unit, Belfast (UK)

Stride, un outil de développement économique régional.
Stride, a tool for regional economic development.

Discussion / *Discussion*

12h15 - 14h00 / *12:15 a.m. - 2:00 p.m.*

Déjeuner / *Lunch*

14h00 - 17h30 / *2:00 - 5:30 p.m.*

Trois ateliers spécialisés de réflexions et de propositions (programme détaillé ci-joint).
Three specialized workshops for reflection and proposals (detailed programme herewith).

IVe Conférence Stride

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Lundi 7 février 1994 / Monday, 7 February 194
10 h 45 - 12 h 15 / 12:15 - 12:15 a.m.

DOCUMENT DE TRAVAIL

WORKING PAPER

TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Miquel BARCELO
INSTITUT CATALA DE TECNOLOGIA
1, plaza Ramon Berenguer
E - 08002 BARCELONE
(34) 3 31 51 613

LOCAL INNOVATION CENTRES IN CATALONIA

1. Introduction to Catalonia and ICT.

Catalonia, situated in the northern east part of Spain, has a population of around 6 milion people that represents 15,8% of the hole spanish population. Its GNP represents around 19% of the Spanish total and 1,75% of the CE (1991).

Its unemployment rate in 1991 was 12,2% (16,3% for Spain). Two thirds of the total population is situated in the metropolitan area of Barcelona, that concentrates a great part of the total economic activity.

Catalonia is a traditional industrial economic region with diversified industry, predominantly in sectors like machinery (26,4% of the Industrial GAV. 1989), chemicals (13,8%), textile (13,7%) and food production (13,5%). Most of this industrial activity is concentrated in the surroundings of Barcelona, in traditional industrial districts.

The "Institut Català de Tecnologia" is a private foundation created in 1986, by a professional association (the industrial engineers association), that give services to companies (mostly industrial SME's) of information, training and advise. It is a multisectorial, pluritechnology centre (see "The future of RTO's in Europe". DG XIII Sprint/Centrale Management, june 1993), that concentrates its activities in the fields of:

- General technical information
- International Technology transfer
- Quality management
- Information technologies
- Industrial Automation (CIM Center)
- Industrial Environment

Its personnel resources are : (january 1994)

- 97 permanent personnel
- 500 teachers
- 50 external colaborators

Annual Turnover:

	M.PTA.	M.ECU
- 1993	1.100	7,3
- 1994 (budget).....	1.250	8,3

Income structure:

- 60% from private companies (SME)
- 40% from public administrations (catalan, spanish, EU)

2. Reasons of the LTDC project.-

ICT has grown very fast since 1987, and during the period 87-91 has concentrated its main efforts in:

- Creating a consistent professional group
- Detecting real SME's needs
- Generating appropiate services for them
- Improving internal mechanismes and external communications

All its activities were concentrated in Barcelona city for effectiveness reasons, but this result in difficulties in:

- Detecting real SME's needs
- Communicating with them. Commercial activity

Even in a small region like Catalonia, personal contact, phisical and psychological proximity, plays an important role in terms of selling services to companies. This is of great importance in innovation services, where personal confidence is usually the only reason for taking the decision of initiating a concrete programme by an SME.

That was the reason to initiate a study in 1991, where we considered two main goals:

a) To select the appropiate services to be situated in local areas (offer).

b) To analyse the socio-economic situation of the main catalan industrial districts, and their needs (demand).

Regarding the first goal, we study different local innovation centres in Italy, Germany, Denmark, Netherlands and France, that have a general profile lastly referred as RTAC (Regional Technology and Advice Centres). That means services not directly

related to research activities, but to information and technology transfer services. These services, corresponding to actual ICT activities, were considered to be descentralized through small local centres.

Another paralel exercise, was related to the demand side. What was the potential demand of the main industrial districts, and to which possible services it corresponds.

The result of these parallel exercises was a first draft design on the initial profile of a type of Local Technology Difussion Centre (LTDC).

3. Conceptual Bases of the LTDC Model.-

With the LTDC project, partially implemented during the period 92-93, we try to situate ICT near the problems and needs of industrial SME'S.

We consider a local area, or an industrial district, the territory where different industrial activities which take place, due to their proximity and common culture, enhance cooperative relations. In these territories, technological innovation plays an important role and is a determinant factor in the business competitiveness.

A territory with innovative industries also means the presence of technical services associated to these industries and cooperation networks based on knowledge and personal trust.

The existence and use of external technical services to the companies is one of the signs of the maturity and complexity of an industrial tissue, and also one of the elements determining a territory's technological potential. Its mere existence can at times be the outcome of a promotion action on behalf of the public sector which, if well designed and directed, can produce the creation of a market for services which did not previously exist. The use of these services by the companies assumes that their existence is a sign of business modernity, but this also means that the attitudes of cooperation and opening up to the environment have reached a significant level.

Often the external services related to technological innovation have an associative nature of their own, in such a way that they represent the product of a cooperative culture which finds its roots in patterns of social behaviour. In this case, the use of the services is considered in a much more natural way,

to the degree in which the companies consider themselves as participants in the institution offering them, since that institution was generated as a result of certain behaviours already assumed by the different individual and collective agents.

Cooperation networks between companies in a local territorial ambit are usually of an informal nature and have a basically economical purpose, in spite of which they can also collaborate in cultural and social objects. Cooperation in technological innovation is one aspect of cooperation networks which is not the most relevant in Catalonia, nor indeed in the south of Europe as a whole, but which occurs quite often even without the awareness of the agents themselves. Personal contacts provoque the exchange of information which can be the source of innovation not only of products but also of processes.

Companies cooperate together because it is easier for them to find outside their ambit, the information, service or product that they themselves are unable to generate, or that would be complicated for them to generate. Thus we come to a basic point: it is the territorial environment or milieu which determines the possibility of offering cooperative conditions, and therefore one can speak of more or less innovative milieus. The territorial environment is an essential element in explaining the capacity for innovation, and thus for competitiveness, held by a group of companies situated within a given territory.

Nevertheless, we should mention that the fact that cooperation networks existing among companies and the presence of technical services that could be considered as the knots of this network, are merely the result or consequence of certain patterns of behaviour based on what we could call the industrial culture that exists whithin a given territory.

The existence of an industrial culture is normally based on a certain historical background, relating productive activities in an area with industrial production in such a way that a milieu emerges where the urban landscape and behaviour pattners are strongly impregnated by the work at the factory. Economical and organizational rationality, as inherent values within an industrial society, are deeply rooted in the conscience of the population in such a way that, cooperative actions which allow us to speack of a territorial network are fully assumed as yet as a further element participating in the local culture, in this case of a local society.

The existence of a relatively homogenious and small economical and social environment such as that which is characterized as a Local Area, involves a certain industrial culture which facilitates cooperative actions such as the creation of common services of an associative nature which, in turn, facilitate the diffusion of the technological innovation through the area's industrial environment.

But facilitating cooperativing actions does not necessarily mean to really create a private association in order to generate the necessary services. Actually, in practice, SME'S normally cooperate in an informal way, but have big difficulties to create common services with other SME'S from the same or from a different sector.

Now coming to that point, and considering such type of services, the problem that arises is how to connect with SME'S needs. And more precisely:

a) What type of services must be promoted on a private cooperative basis.

b) Which type of institutional model must be the instrument for these services.

4. Operation of an LTDC Centre.-

4.1 Type of services.

The services to be offered by an LTDC Centre, are the following:

- identification of technological needs,
- information on the existing services,
- cooperation through collaboration agreements between companies,
- providing information on public programmes,
- collaboration with Small- and Medium-Size Companies in the application of technological management policies.
- integration of resources and solutions within groups of companies,
- collaboration with other local social agents,
- detection of needs for technological services in regional companies,
- offer of information and technology information,
- promotion of initiative for innovation and development within groups of local companies,
- offer of consulting services, advice and training.

The centre initiates the contacts, tries to be aware of the needs of the companies and contacts the proper ICT unit - or other centre situated in Catalonia - to solve the problem detected.

This way of operation makes the communication capacity of the responsable of the center very critical. Its professional profile and personal capacity is the most important factor in determining the possible success of the centre.

4.2 Typology of the centres.-

From the experience accumulated during the last two years, we can consider two different types of local centers:

a) A centre situated in an already existing local public institution, through an agreement between this authority (normally a city council) and ICT.

b) A new centre created from an agreement between different private and local public institutions.

In both cases, we try to implicate all existent private institutions in the area, but sometimes it is not possible because of the enterprises tendency to lack of associative initiative.

A specific strategy must be designed, case by case, for the generation of the centre, taking into account that every situation is different. In that sense, we must consider the existing private associations and their relations with the private sector or the existence of general purpose institutions like Chambers of Commerce or Local Saving Banks.

The whole strategy is important in order to avoid that SME's consider the new centre as something imposed from outside. In the case of type b, we make and effort to convince the local agency's personnel, but assuming that the possibilities to involve private companies with the centre are not going to be the same.

4.3 Other operational considerations.

a) Organic structure

During its first year, the minimum personnel required for the centre to start functioning is two persons: a director and an administrative employee. Their main activities will consist of diffusing, training on ICT activities and internal organization to the companies.

During the second year, and depending on the market demand, a new technician can be mostly dedicated to commercial work, to visiting companies.

These staff are in permanent contact with ICT units to implement the annual programme, technical advise and to select and distribute business opportunities.

b) Annual budget.

A Centre's budget:

The budget for the expenses in a CDTL, recently created and of average size, without using human resources nor equipment from other activities, would be the following: (it is assumed that the building is provided by a local entity)

EXPENSES (Thousands PTA.)

Year	1	2	3
Staff (1)	8.500	11.000	11.000
External collaborators	1.000	1.000	1.000
Equipment depreciation	1.000	1.000	1.000
Promotion	1.000	1.500	2.000
Documents fund	500	1.000	1.000
General expenses	3.000	3.500	4.000
Participation to structural coordination costs (ICT)	3.000	3.000	3.000
Total	18.000	22.000	23.000

(1) year 1: 1 manager, 1 administrative staff
year 2 and 3: 1 manager, 1 administrative staff, 1/2 techniciens.
This budget of expenses will increase according to the level of activity of the Centre.

INCOMES

The level of inputs for each centre will be determined as much by the level of activity as by the number and type of companies within its area. Usually it is not planned to obtain self-financing within those Centres, due to the experience of the Centres in other countries presenting similar characteristics, who were able to obtain levels of self-financing close to 50 % in specific cases.

The deficit should be covered by the entities forming the board of management, and also by grants provided by Public Administrations: E.C. (FEDER and ESF Funds), Spanish Administration, Catalan Administration, and others.

The targets planned shoud be adjusted after a pilot period during the first year, but these could be estimated to the following for a medium-size Centre as above:

YEAR	1	2	3	4
INCOMES	18.000	22.000	23.000	23.000
- Services	3.000	7.000	11.000	15.000
- Contributions made by members of the Board of Management	6.000	9.000	9.000	8.000
- Grants from administrations	9.000	6.000	3.000	--
- Expenses	18.000	22.000	23.000	23.000

The costs will only increase if the services or grants are increased.

c) Annual program

The most important document for the centre is the annual programme of activities, where the local centre - and therefore the local companies needs - and ICT define their respective engagements about the activities to be developed during the year.

This document represents the equilibrium point between the stimated needs of the local companies and their capacity to be fullfiled by ICT and by the LTDC staff. It is also a reference for a comparison of the day to day reality in order to take the most appropiate decisions.

4.4 Succes and Failure factors

From the experience as local centres in Catalonia, we can conclude that they have fullfiled a real need and that they represent a dynamic system that has to adapt all the time to the changing conditions of competition, while considering all institutional organizational and functional factors.

More precisely, and as a reflection for a comparison with other similar experiences in Europe, I can propose some success and failure factors learnt from the past but mainly to be considered for the future. These are the following:

a) Succes Factors:

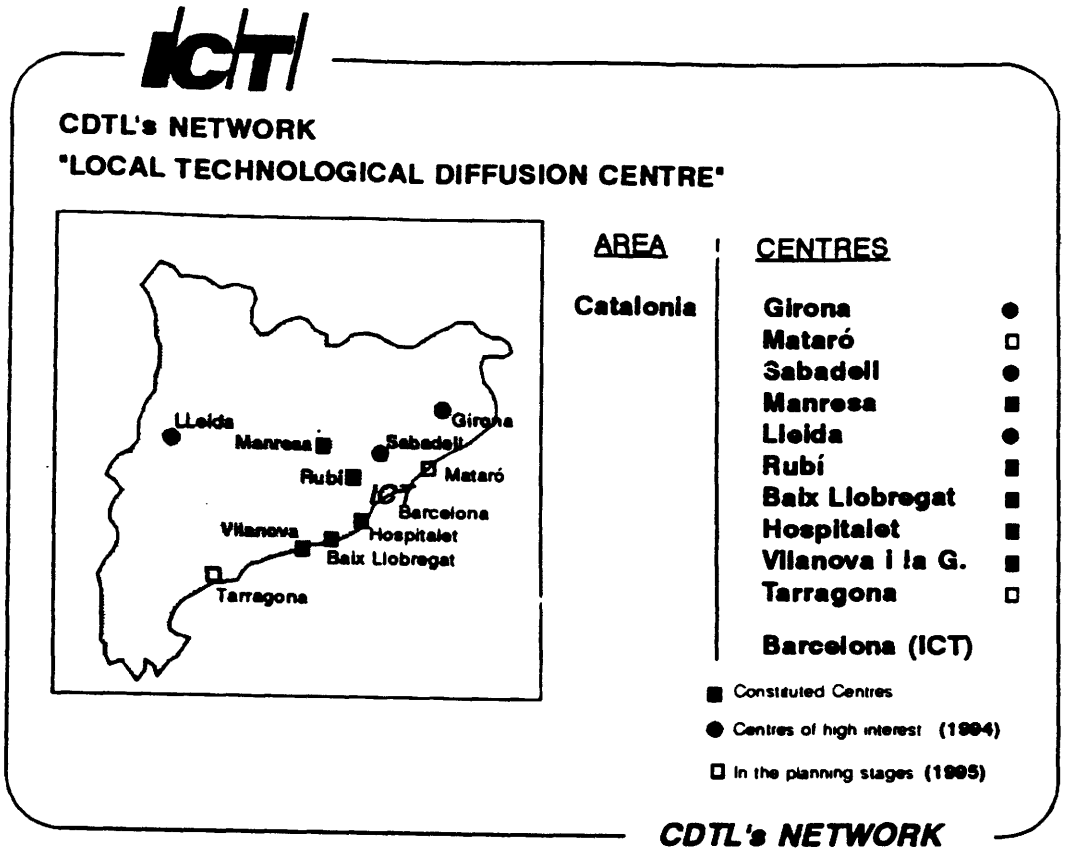
- Existence of an industrial environment and culture.
- Participation of private economical and social agents through business and professional associations.
- Support from the public authorities without their participation to the management of the centre, which has to be professional and independent from political changes.
- The presence in the board of management of a well qualified human team, deeply involved with the center's objectives.

b) Failure Factors:

- The lack of any of the referred succes factors.
- An excessive "budged pressure" due to the lack of initial support.
- An annual programme that does not correspond to the real needs of SME.

4.5 Actual situation. Advantatges of a network of local centres.

The actual situation is represented in the next figure:



We consider the relation between ICT and a centre not only in a bilateral basis, but also in its network nature.

The creation, consolidation and operation of a LTDC network in which the ICT acts as motivator is considered as a key element in this approach in order to obtain a technical infrastructure suitable for technology diffusion within Catalonia.

The following objectives of a network have been identified:

- exchanges of experience between LTDC's. Group meetings.
- Coordination between the various LTDC's, and also with the existing Centres providing similar services to companies,
- plan of actions and commun programmes,
- presentation of common proposals and claims to the Publique Administrations,
- Use of information resources and networks,
- Work teams for the development of specific initiatives,
- Synergy of marketing efforts,
- Integration to international initiatives.

It is considered that the running of a network should be dynamic and bureaucratism free. A minimum duration for the meetings should be established but the main criteria should be flexibility and ability to adapt and respond to each situation and specific opportunity.

Operating within a network brings additional advantages, some of which are the following:

- benefiting from Training programmes for LTDC staff and easiness of doing so,
- maximised administrative support framework,
- maximised use of local needs know-how,
- strategies of services for Small- and medium-size companies,
- contribution to the company development through advanced technological services,

- making possible the participation in Administrations' programmes and easing the expansion of such programmes,

- maximise the services to companies with limited human resources particular to LTDC's.

Metz, 7the february 1994

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TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Robin MIEGE
Head of unit
CCE - DG XIII
Bâtiment Jean Monnet
Plateau du Kirchberg
L - 2129 LUXEMBOURG
(352) 43 01 34 180

TECHNOLOGY DIFFUSION NETWORKS IN EUROPE:

RATIONALE

- technology changes rapidly: its wide diffusion and rapid absorption secure competitive advantage

- a dense fabric of innovative SMEs is a key asset for competitiveness

- SMEs have inherent weaknesses: they have difficulties in accessing knowledge and external resources

- many SMEs do not use available public support infrastructures or incentives

TECHNOLOGY DIFFUSION NETWORKS IN EUROPE:
OBJECTIVES

- to promote awareness of technology
- to organise local delivery of, and simple access to, innovation services (one-stop shop)
- to meet the needs of companies (demand-driven + integrated approach)
- to develop synergies between service providers
- to encourage networking or clustering of companies

WHAT IS INDUSTRIAL MODERNIZATION?

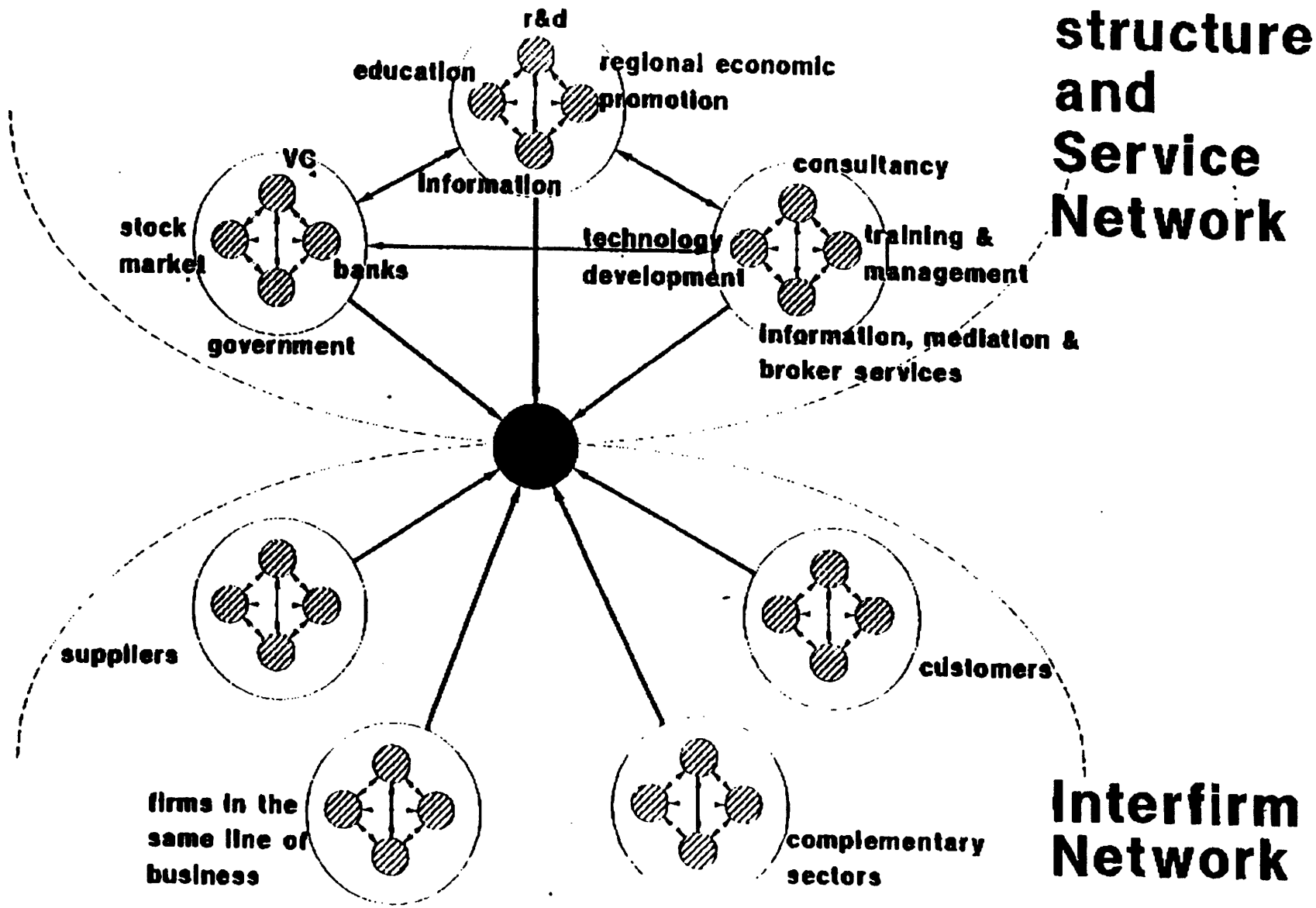
• **Upgrading of firm's capabilities**	• to produce competitive, high quality products • at best practice, international levels
• **Involves improvements in**	• technology, training, design, marketing, management, etc. • business-to-business interactions • public-private relationships
• **Focus of industrial modernization**	• small and mid-size manufacturers • linkage with large firms • linkage with complementary private services and public centers
• **Approach to technology**	• pragmatic...(hard) technology + (soft) techniques + organizational change
• **Measured by**	• "competitiveness" -- cost/unit, quality, value-added/empl., technology deploy. • "cooperativeness" -- internal organization, networking, linkages • benchmarking (firms, industries, regions)

Source : P. Shapira - 1993

Modernization Methods and Tools

- **Information provision**
  - seminars, workshops
  - electronic information services
- **Assessment and diagnosis**
  - problem definition; relationship initiation
- **Benchmarking**
- **Demonstration**
- **Training**
- **Referrals to other information and assistance sources**
  - important of "qualifying" and "monitoring" referrals
- **Field service (assessment->implementation assistance)**
- **Clustering and network brokering**
- **Brokering complementary services**

Source : P. Shapira - 1993


r&d
education
regional economic promotion
VC
information
consultancy
stock market
banks
technology development
training & management
government
information, mediation & broker services
suppliers
customers
firms in the same line of business
complementary sectors
Infra-structure and Service Network
Interfirm Network

TECHNOLOGY DIFFUSION NETWORKS IN EUROPE :

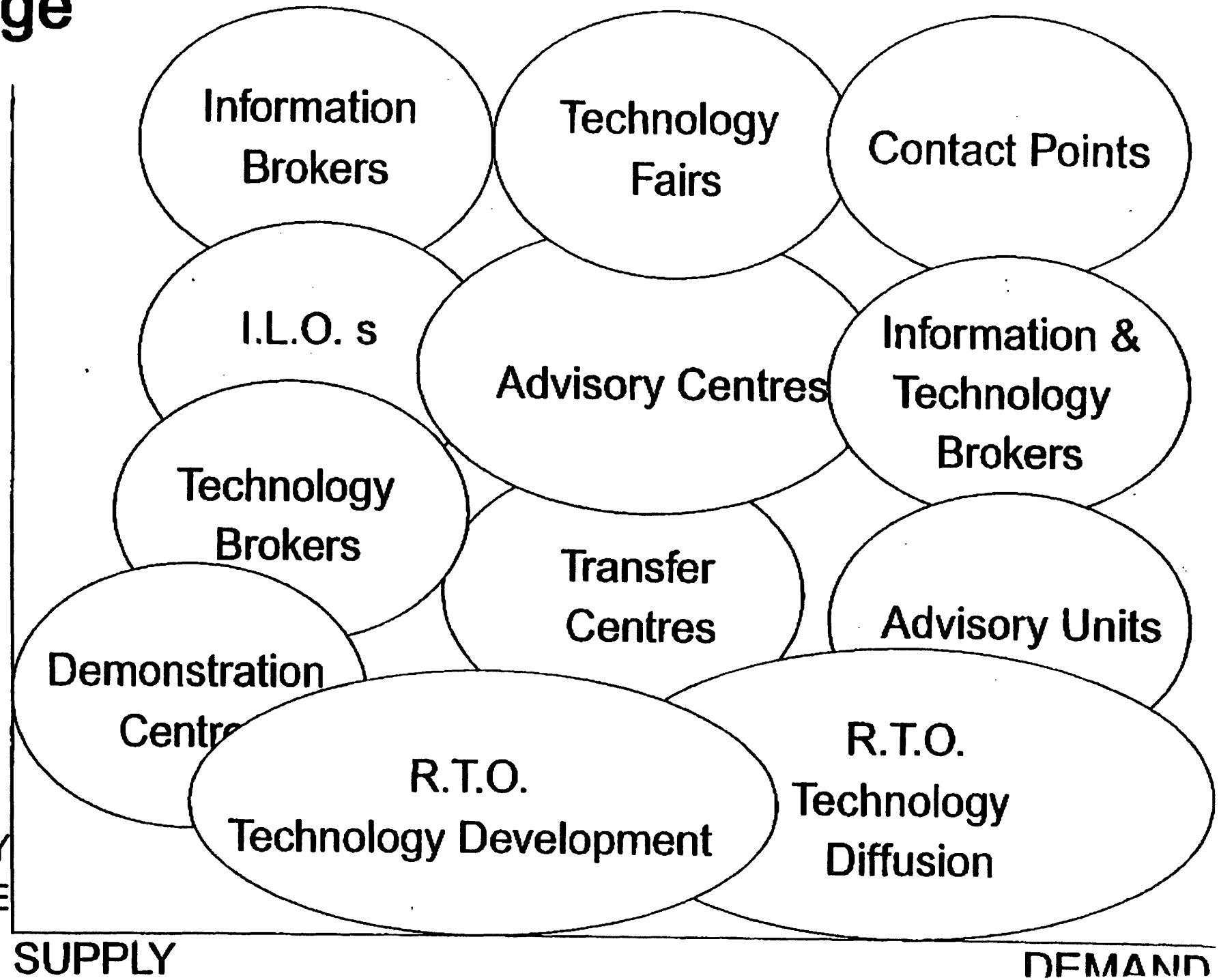
INTERMEDIARY FUNCTIONS

- Information on supply and demand
- Finding and assessing resources
- Pooling and structuring supply and demand
- Developing contractual arrangements
- Monitoring transfer and use of resources
- Adaptation

Source : O. Bräunling 1993

Brokerage

Source:-G Braunling



Regional Technology Advisory Centres

Country	B	DK	GR	IRL	I	NL	UK	UK
NAME	IRSIA	TICs	Sectoral Research Companies	Forbairt		Innovatie Centrum	Regional Technology Centres	Business Links
Creation	1976 (4)	1971-1981	1984-1986	1987	1985	1989	1986	1993
N° of centres	30 in 18 Sectoral centres	17	4	7	52 of which 6 Consorzio Ricerca	18 + Central office	13	83 planned
Sectoral	X		X		X			
Regional		X		X		X	X	X
Partners	State Regions Sectoral	State Regions	State Industry	Regions Universities	State Prof. Assoc. Bank. CCI	State Regions Industry	State University Industry	State TEC's
Total Staff	48	80	90	Total 457		200	60	
per office	1-2	5-6		1-2		6-13	2-16	
Public Funding	90%	97%	Dominant	90%	Self financing in long term	100%	Decreasing over 3 yrs.	Decreasing
Specfic Functions	Applied Research	Management Technical Development	Applied Res Development Consultancy				Training Advice Studies	"One Stop Shop"
National Network	Yes	Yes	Yes	Yes	Yes	Yes	4 meetings per year	Planned
Functions of N.N.	Monthly meetings Mgt Report	Coordination Public Relations		Monthly meetings Tech supp.		Mgment Public Relations		
Challenge	Region-alisation		Motivation of firms to R & D cooperation	Motivation of firms Resources	Network Evaluation Self finance	Targetting firms	Self financing	

TECHNOLOGY DIFFUSION NETWORKS IN EUROPE:

THE RTACs CASE

- recently created
- often a national level decision
- public-private partnership
- local or regional base
- small teams (generalists + industrial experience)
- public funding
- roles include:
  - mediation
  - demand stimulation, analysis, aggregation
  - information dissemination
  - granting of public aid
  - networking companies

TECHNOLOGY DIFFUSION NETWORKS IN EUROPE:

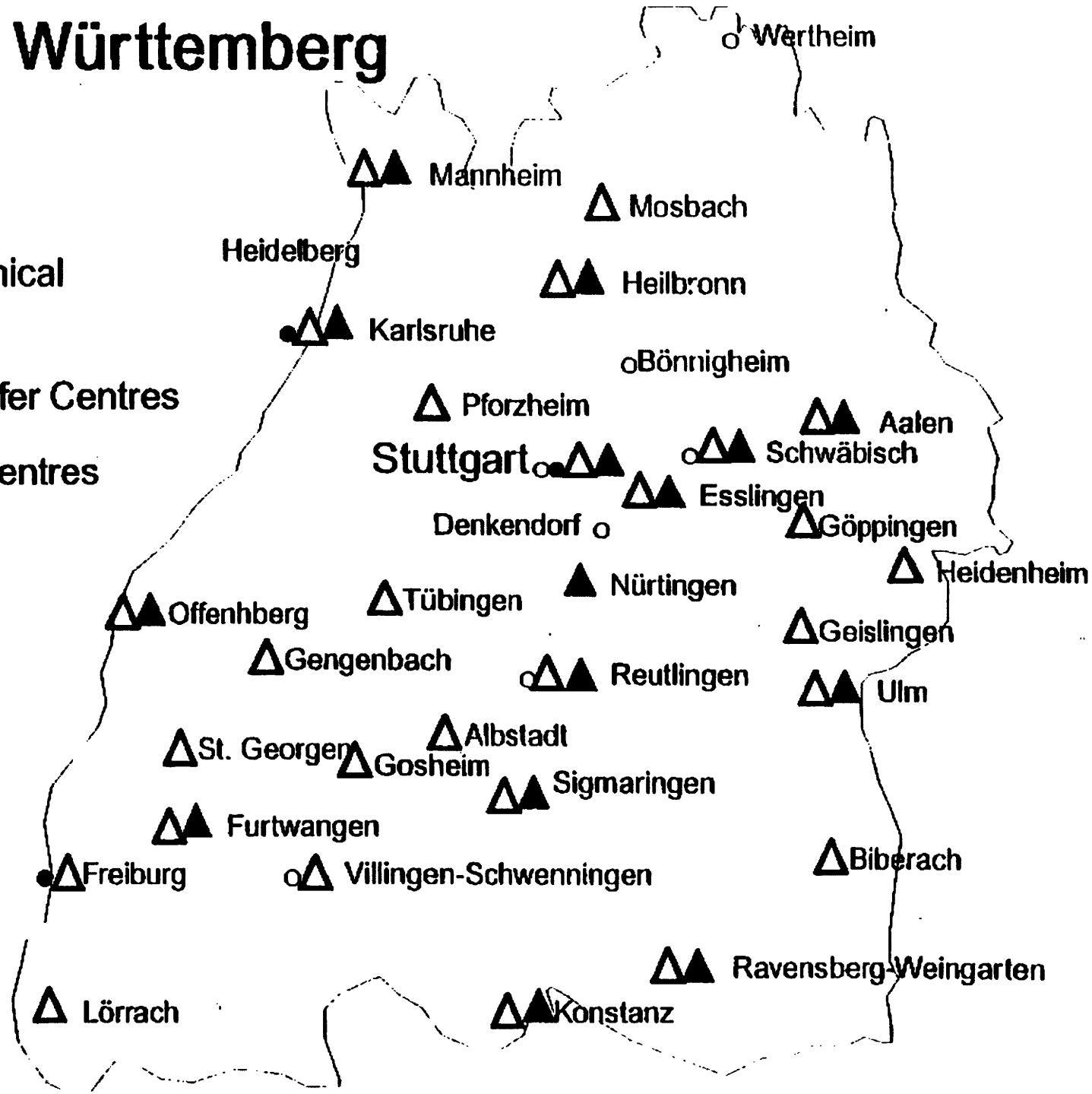
GERMANY (BADEN-WÜRTTEMBERG)

- RTOs
- Fraunhofer Gesellschaft
- Steinbeis Foundation

Source:-Ministry of Economic Affairs. Baden-Württemberg.

Germany. Baden Württemberg

- ● Fraunhofer Institutes
- ▲ Steinbeis/Polytechnic Technical Consulting Centres
- △ Steinbeis Foundation Transfer Centres
- o Industrial Joint Research Centres



TECHNOLOGY DIFFUSION NETWORKS IN EUROPE :

TECHNOLOGY TRANSFER IN BADEN-WÜRTTEMBERG

150 YEARS AGO

- Setting up and using centres for technological competence at different levels
- Improving the absorptive capability of firms
  * awareness
  * training
  * mobility
- Establishing fora for best practice
- Supporting for the creation of technology based firms
- Developing networks of support institutions
- Stimulating the transnational dimension

Source : G. Bräunling 1993

TECHNOLOGY DIFFUSION NETWORKS IN EUROPE :

TECHNOLOGY TRANSFER IN BADEN-WÜRTTEMBERG

FRAUNHOFER-SOCIETY

- technology oriented
- applied R&D for industry and public sector
- independent organisation with corporate identity
- institutional links with Technical Universities
- highly decentralised
- national coverage

Source : G. Bräunling 1993

TECHNOLOGY DIFFUSION NETWORKS IN EUROPE :

TECHNOLOGY TRANSFER IN BADEN-WÜRTTEMBERG

INDUSTRIAL RESEARCH ASSOCIATIONS

- sector based
- collaborative R&D for SMEs' needs
- related services
  - * information
  - * testing, certification
- developing industrial networks
- restructing of networks
- diffusion of best practice

Source : G. Bräunling 1993

Technology diffusion networks in Europe. R. Miège. Metz 1994

TECHNOLOGY DIFFUSION NETWORKS IN EUROPE :

TECHNOLOGY TRANSFER IN BADEN-WÜRTTEMBERG

STEINBEIS-FOUNDATION

- Problem-oriented
- Technological support for SME
- Valorisation of technological competencies of Technical Colleges
- Working mechanisms
  - * demand-led
  - * incentives
  - * common procedures]
  - * joint marketing] " Franchise"
- Highly decentralised

Source : G. Bräunling 1993

Technology diffusion networks in Europe. R. Miège. Metz 1994

TECHNOLOGY DIFFUSION NETWORKS IN EUROPE:

UNITED KINGDOM

. a centralised system

. RTOs

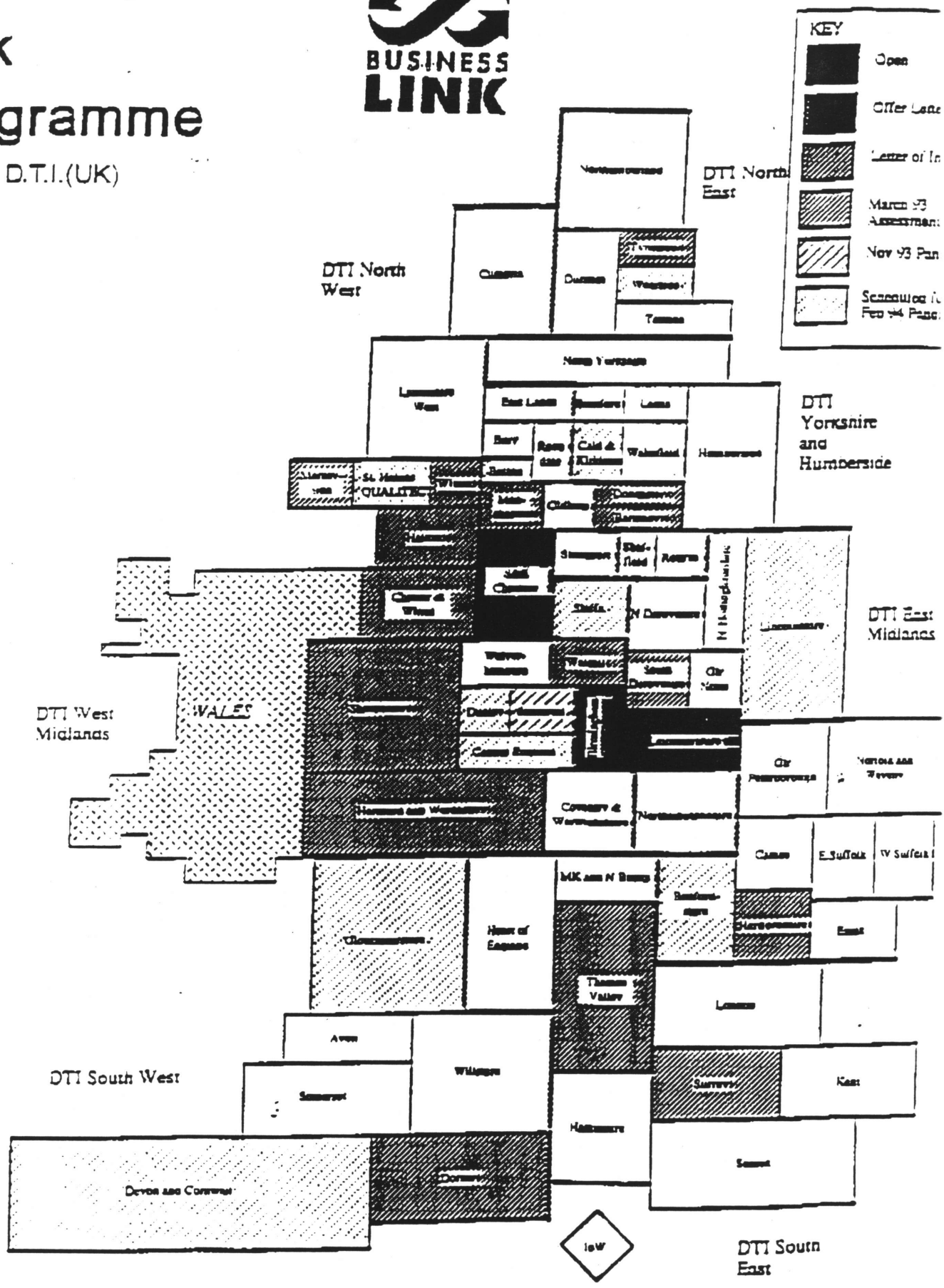
. RTCs

. the Business Link programme (one stop shops)

. the regional systems (Scotland/Wales)

Business Link Programme

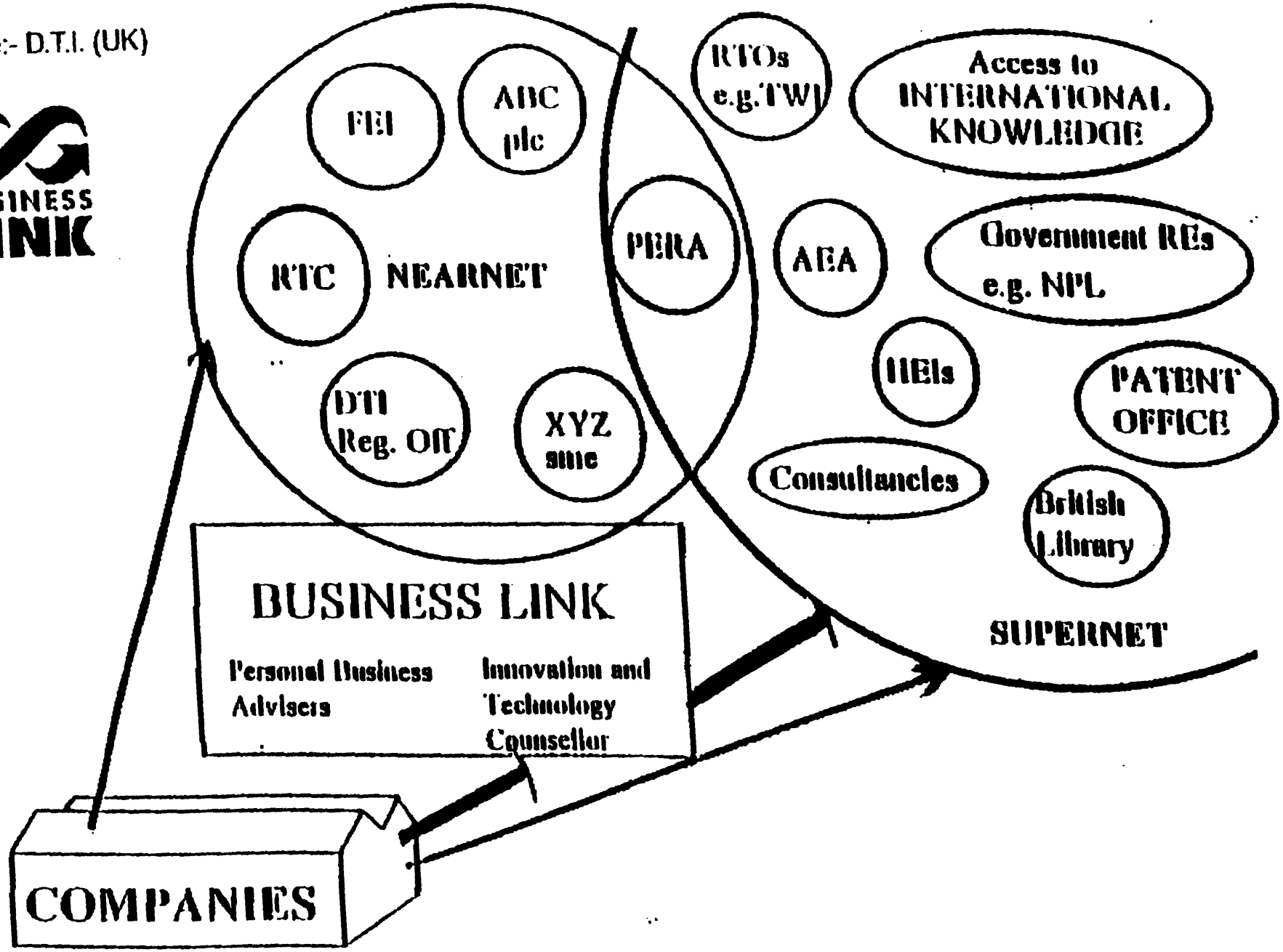
Source:- D.T.I.(UK)



Technology diffusion Networks. R Mieae. Metz. Feb 1994

UK Business Link

Source:- D.T.I. (UK)



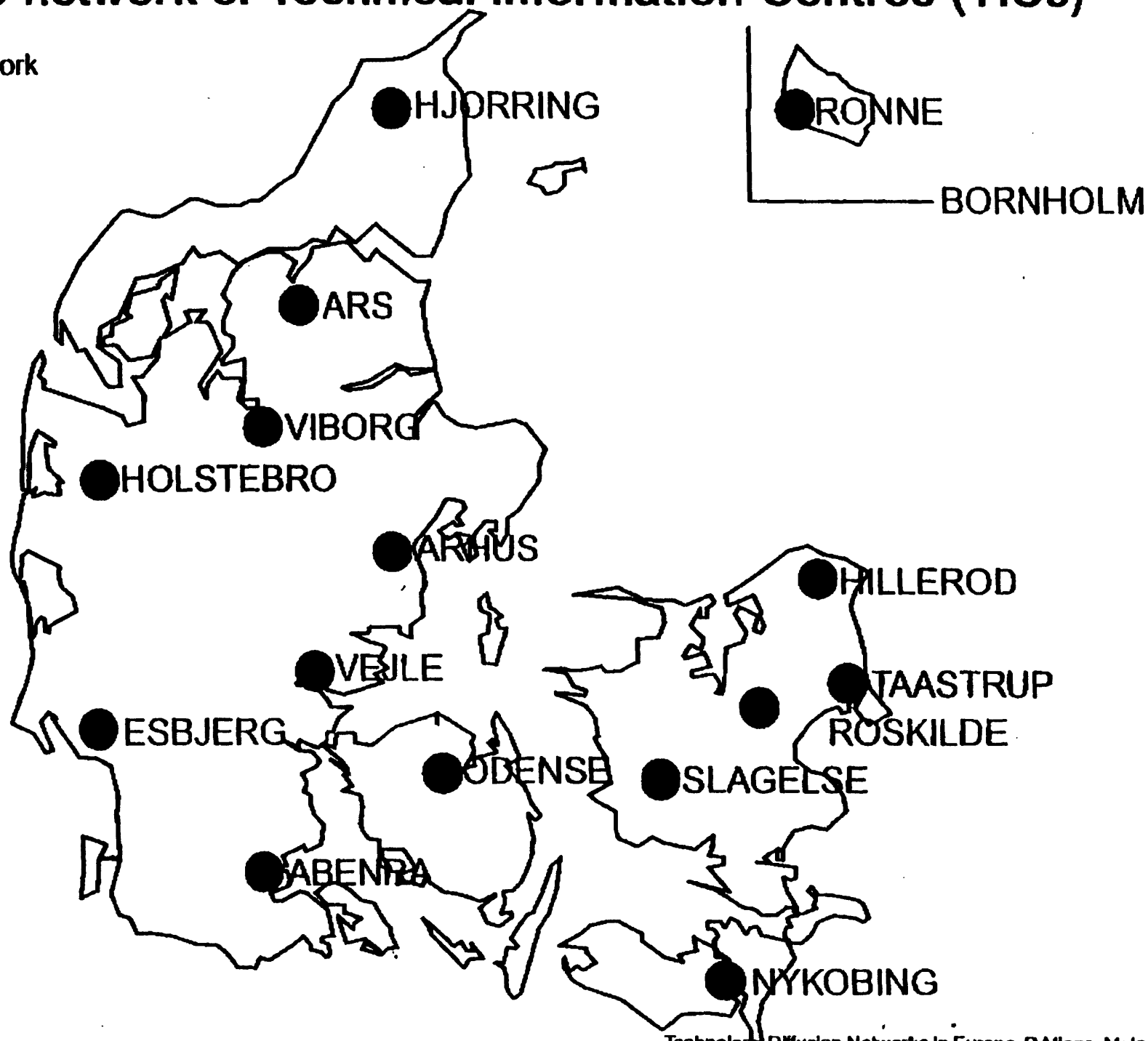
TECHNOLOGY DIFFUSION NETWORKS IN EUROPE:

DENMARK

- The TICs
- DTI
- ATV centres
- The network brokerage scheme

Denmark. The network of Technical Information Centres (TICs)

Source:-Danish TIC Network



TECHNOLOGY DIFFUSION NETWORKS IN EUROPE:

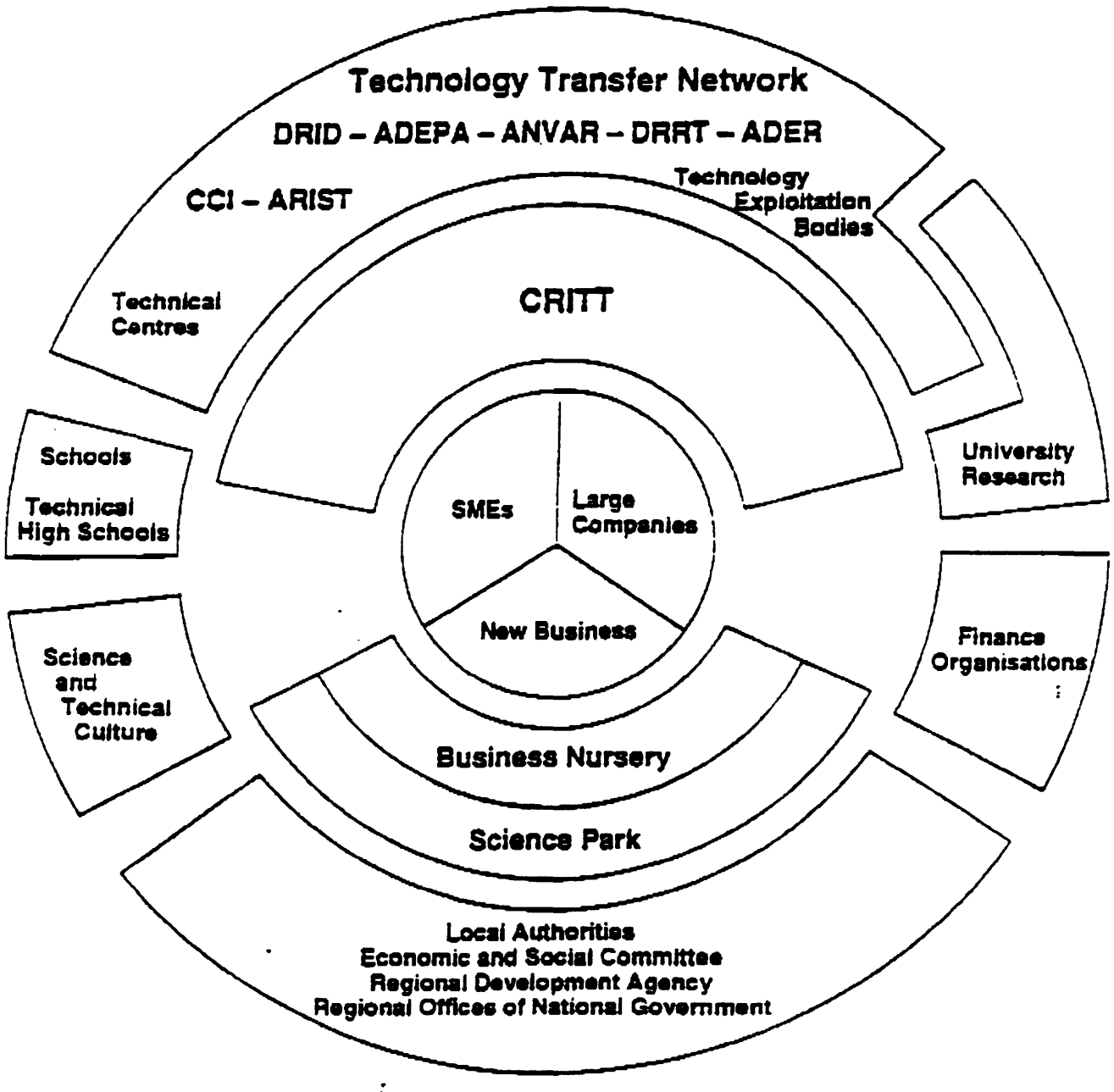
FRANCE

- The regional technology diffusion networks

- The Chabbal report

France.

Source:-C Lemaignan."Le dispositif de transfert de technologie en France" 1989



Technology Diffusion Networks in Europe. R Miege. Metz: Feb. 1994

FRANCE : THE REGIONAL TECHNOLOGY DIFFUSION INFRASTRUCTURE

NAME	NUMBER	PARENT ORGANISATION	LEGAL	MAIN FUNCTIONS
CRITT	100	HEI and/or Firm	Private, non profit	Technology transfer (own resources + demand led)
ANVAR	24	National Agency	Public	Innovation support / financing / EUREKA
DRIRE	24	Ministry of Industry	Government	Regulation / animation / delivery national schemes
DRRT	24	Ministry of Research	Government	Network / animation / delivery of national schemes
CREATI	20	Large Firms	Private	Technology transfer / support (own resources)
CCI	154	Local SME's	Semi-public	Local economic development
ARIST	24	CRCI	Semi-public	Scientific and technical information
AgRégDev	24	Regional Authority	Local government	Regional development policy and support
Technopoles	40	Local consortium	Private	Technology transfer / local development
CTI	18	Industrial sector	Private	Applied research / technology transfer (own)
Tech Centres	?	Mixed structures	Private, non profit	Technology development and demonstration
Réseaux CURIEN de Diffusion Technologique	12	MRE/ANVAR/CEA	----	Networking regional technology diffusion bodies

TECHNOLOGY DIFFUSION NETWORKS IN EUROPE:
SPAIN

. A less favoured country perspective

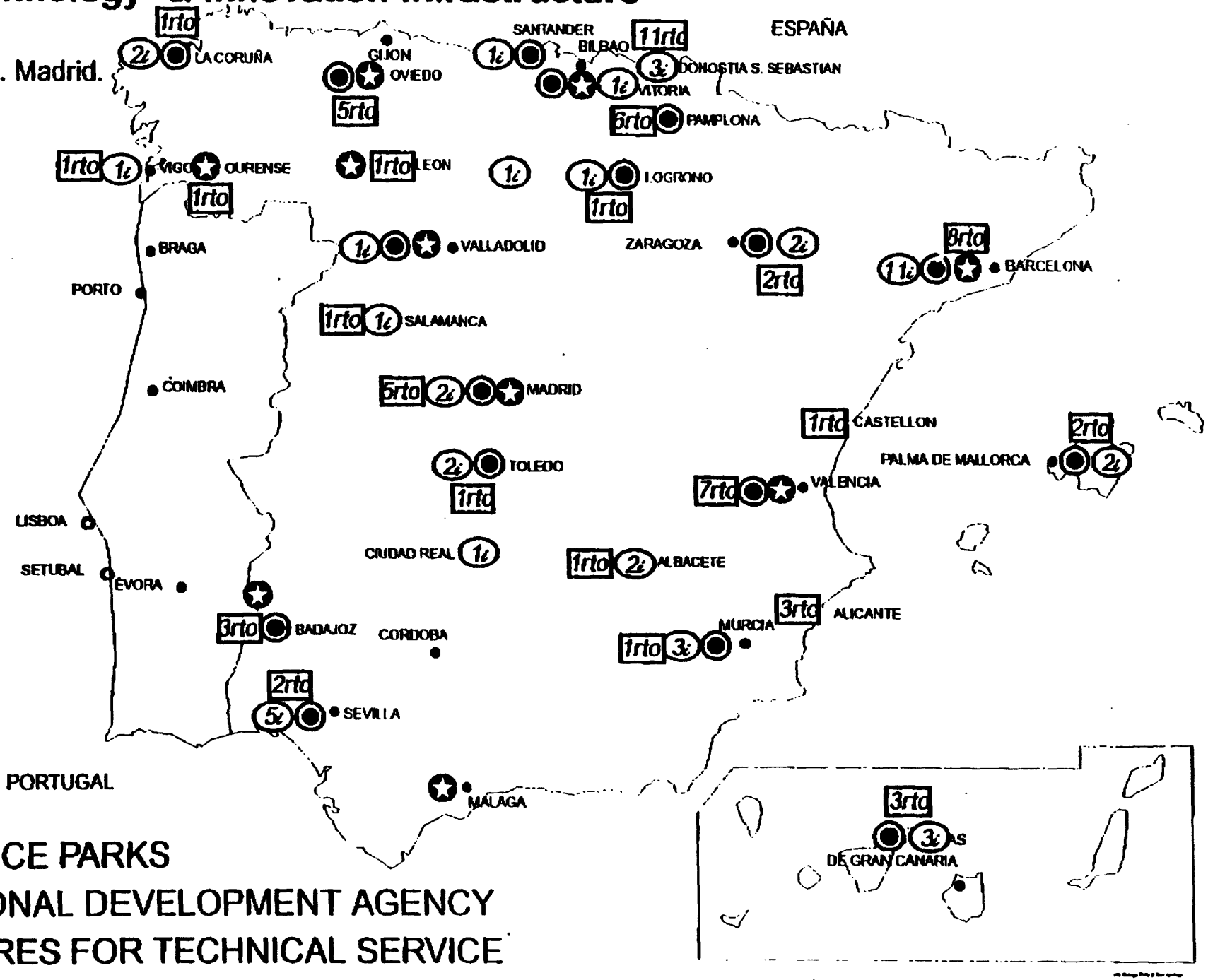
. a recent construction

. central networks
  * CDTI
  * IMPI
  * OTT

. regional organisation
  * the Basque country
  * the RTACs

Spain.Technology & Innovation Infrastructure

Source:-I.M.P.I. Madrid.



KEY

- SCIENCE PARKS
- REGIONAL DEVELOPMENT AGENCY
- (1i) CENTRES FOR TECHNICAL SERVICE
- 2rtd INDUSTRIAL TECHNICAL INSTITUTES

TECHNOLOGY DIFFUSION NETWORKS

- JAPAN

- 170 Kohsetsushi centres
- 18 Technopolis
- Long term vision

- UNITED STATES

- 170 Manufacturing Technology Centres (Clinton Gore-plan)
- Federal and State initiatives

Technology Services to SMEs in Japan: Kohsetsushi Activities and Services

- *170 Prefectural & Local Centers Activities and Services:*

✓ Research

✓ Examination and Analysis

✓ Technical Advice and Guidance

✓ Information Dissemination

✓ Training

✓ Open Laboratories and Use of Equipment

✓ Registered Technological Advisers

✓ Diffusion of Technology Groups

Source : P. Shapira - 1993

COMPARISON OF JAPAN'S KOHSETSUSHI AND U.S. INDUSTRIAL MODERNIZATION PROGRAMS (1)

	KOHSETSUSHI, JAPAN	FEDERAL-STATE PROGRAMS, US Present	FEDERAL-STATE PROGRAMS, US Estimated, 1994+
Centers/Programs	170	30	100+
Total Funding (Average Budget)	$745m ($4.4m)	$70m ($2.3m)	$400 m ($4.0 m)
National Funding	10-15%	17%	30 - 50%
Technological Assists (Field Service)	471,000 (24,700)	13,500+ (6,600)	45,000+ (22,000+)
Inspections/Exams	710,000	?	?
Open Labs/Demos	63,500	1,740	increased
Diffusion Groups	2,200	50	large increase

Source: data from MITI; U.S. state surveys
Note: U.S. data for 1994+ are estimated.

COMPARISON OF JAPAN'S KOHSETSUSHI AND U.S. INDUSTRIAL MODERNIZATION PROGRAMS (2)

PART I	Japan: Kohsetsushi	US: Federal-State Programs
• AIMS	Technology & R&D assistance to SMEs (SME= under 300 empl)	Technology brokerage, problem solving, deployment (SME=under 500 empl)
• SPONSORS	Prefectures, cities	States, non-profits, colleges & universities, others
• SERVICES & SCOPE	Standardized & nationwide	Varied Patchwork→nationwide
• STABILITY	High	Low→medium
• FLEXIBILITY	Low	Medium→high
• STAFFING	Stable→problematic Training: OJT	Flexible→mobile Training: OJT + formal (emerging)
• CORE SKILLS ASSESSMENTS SME TRAINING TESTING NETWORKING	Engineering Rarely Direct Integral Emerging (but standardized)	Engineering→varies Emerging best practice None→referral→direct Rarely Emerging (and experimental)

Source : P. Shapira - 1991

PART II	Japan: Kohsetsushi	US: Federal-State Programs
• RESEARCH LINKS	Integral Catch-Up	None→Leading Edge
• CENTRAL GOVERNMENT	Committed facilitation	Cautious (1980s)→ Committed demonstration (1990s)
• SYSTEM COORDINATION	Centralized coordination	Decentralized, federal-state system
• EVALUATION	Very limited	Weak→strong
• PROGRAM STATUS	Mature, established	Building, expansion mode
• KEY ISSUES	Lack of flexibility Level of technology Relation to new regional initiatives	System coordination Stability Stimulation of system changes

Source : P. Shapira - 1993

Industrial Modernization Best Practices (1)

- √ **Competent, quality, core staffing is essential**
- √ **Technology should be pragmatic**
- √ **Technology is not enough**
  - **also: training, management, finance, marketing, quality, design**
- √ **Program integration->seamless services to firms**
- √ **Customer-focused:**
  - **to meet firm *not* program needs**
  - **yet, need to *go beyond problem-solving...***
    ...to stimulate firms to pursue strategic upgrade path

Source : P Shapira - 1991

Industrial Modernization Best Practices (2)

√ **Scale, stability, and long-term perspective**

√ **Easy access to program centers and services**

√ **Work at *system-level* as well as individual firm level**
- **strengthen and promote change in...**
  ...public-private relationships
  ...supplier-customer links
  ...SME inter-firm links
  ...trade associations
  ...complementary services (banks, consultants, etc)

√ **Promote *shared/collaborative visions* for "high-road" manufacturing**

√ **Strengthen feedback loops to technology developers**

√ **Quality monitoring, assessment and evaluation are critical**

Source : P. Shapira - 1993

TECHNOLOGY DIFFUSION NETWORKS IN EUROPE:

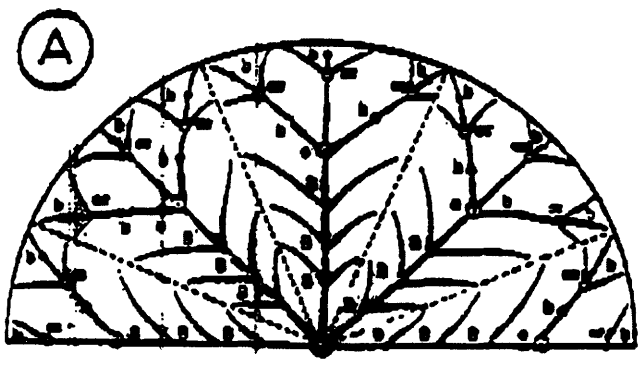
KEY ISSUES

- standardisation vs diversity
- international vs local
- push vs pull
- public vs private

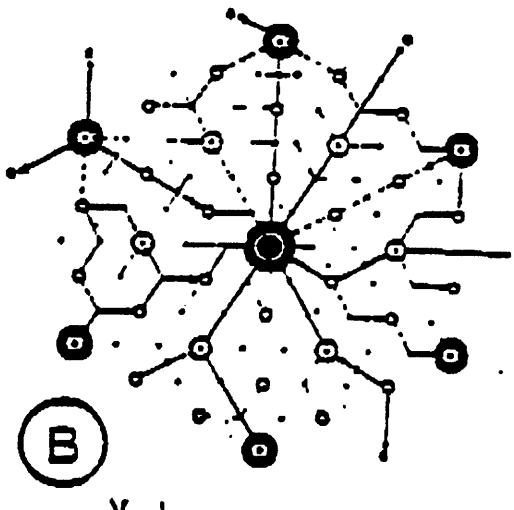
TECHNOLOGY DIFFUSION NETWORKS IN EUROPE

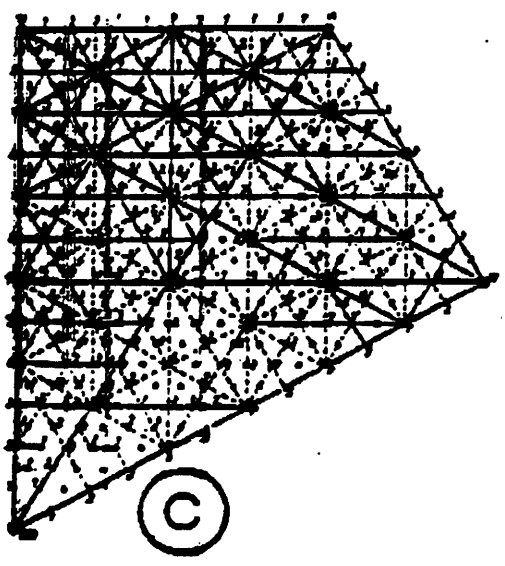
PRESENTATION BY ROBIN MIEGE
STRIDE CONFERENCE METZ 1994

Kohl. 1850

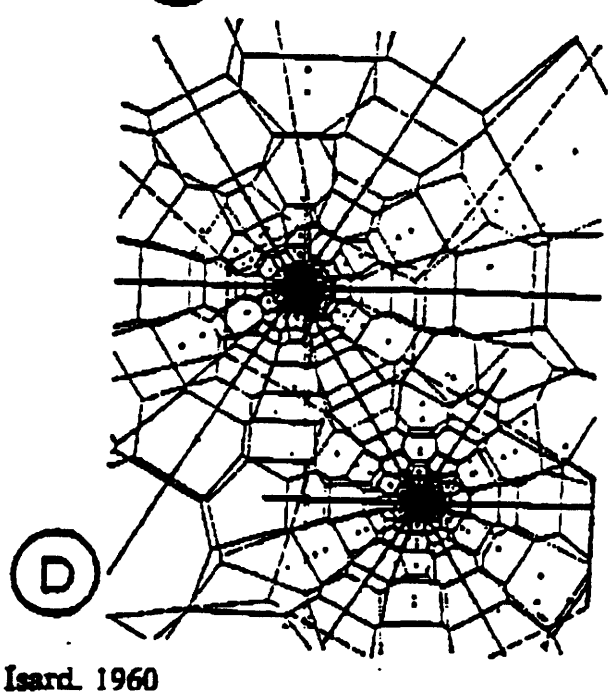


Christaller, 1933





Lösch, 1954



Isard. 1960

Source: H. Bakis: "Les réseaux et leurs enjeux sociaux", Paris 1993

TECHNOLOGY DIFFUSION NETWORKS IN EUROPE : A WORKING DEFINITION

" a deliberate attempt to organise and structure the local delivery of innovation support services and their interlinking to benefit the largest number of SMEs."

Technology diffusion networks in Europe. R. Midgé. Metz 1994

IVe Conférence Stride

Arsenal de Metz (France)
7-8 février 1994

Mardi 8 février 1994 / Tuesday, 8 February 1994
11 h 00 - 12 h 30 / 11:00 - 12:30 a.m.

DOCUMENT DE TRAVAIL

WORKING PAPER

TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Luc BROOS
Programme manager RTP
PROVINCE OF LIMBURG
Taxandrialaan 8 - Postbox 296
NL - 5283 MC BOXTAL
(31) 41 16 78 735

Regional Technology Plan South-Limburg

During the annual STRIDE Conference which in 1994 is being held in France, Metz, the draft for the original technology plan for Limburg will be presented and discussed.
The idea of a Regional Technology Plan (RTP) was first launched by the European Commission to foster a closer coherence between economical development and technological potentions in a region. In this sense the idea of a regional technology plan is familiar to the STRIDE-program. Regional Economical Development and Technology are closely linked. Through innovation and the use of new technologies the industrial structure, being the economic motor of a region will be strengthen. These aspects are as important as the more traditional instruments for a regional policy like the development of infra-structure. Through a Regional Technology Plan a more effective use of Regional Fund related to policing and regional based new technologies is possible. Therefore for the European Commission the regional technology plan might be the basis for granting regional and local projects out of the regional funds as well as from technology funds.

The idea of a Regional Technology Plan has already some history. A couple of years ago the Commission already published some ideas and during the various meetings the ideas behind a Regional Technology Plans were elaborated. By the end of the last year the commission decided to put the idea of a regional technology plan to the test and selected a number of regions who were invited to draft and submit a proposal for a regional technology plan for their region. With the help of DG XII the region of Limburg drafted a proposal which was submitted by the end of this year.

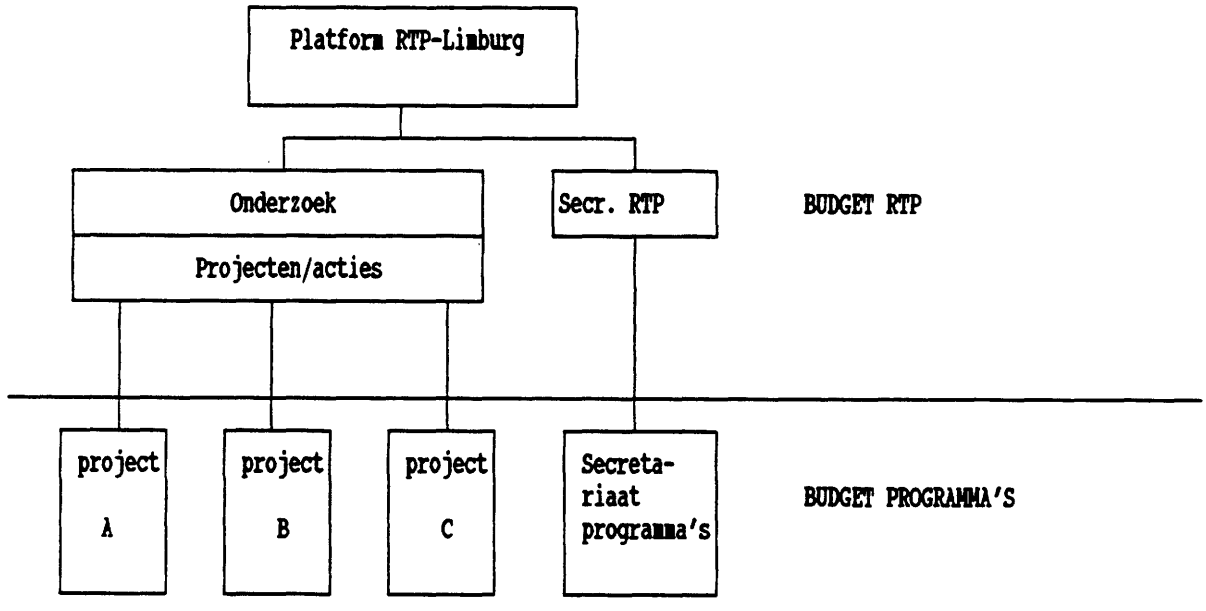
The aim of the plan is to bring technological development into step with regional economic development. The plan is intended to provide an instrument with which to make this possible not only through the use of funds (to be generated later) for its implementation but also by building up a structure and assembling the necessary knowledge to do this.
In general terms, the Regional Technology Plan can concern itself with:

- the available knowledge and technological potential and the strength of the regional economy, together with technological developments for the future and their

impact on the region(the research component);
- the development of a structure and a broad basis of support in order to improve the harmony between technological developments and regional economic development (the management and coordination structure);
- action to prepare for the eventual implementation of technology measures and projects within the regional economy. This does not mean the action already worked out in the plan but rather the activities of a more preparatory nature and projects aimed at eventual implementation. This also includes action in the area of sensitization and of creating a broad basis of support on behalf of the authorities and of the business community with respect to technological developments (elaborating the plan).

In view of the aspects mentioned above, the accent as regards the contents of the RTP for Limburg will be mainly on the last of these three points, given that the necessary knowledge and experience is already available with respect to the first two.

The intention of the plan should therefore be to give its goals the most concrete form possible. This means that the plan will have to include a large number of concrete projects, structures and activities and should also form the foundation for a broad basis of support and eventual effective implementation.
The design and structure of the plan ca be made clear by means of the diagram below.



The RTP consists of the components research, management/basis of support and projects which fit within this framework.

The research outlines the technological potential of the region in both the short and the long term. This is done by confronting the existing technological structure and potential with the expected (international) developments in the field.

- It is of the greatest importance that the results and the strategy and vision, both short-term and long-term, are appreciated by all parties in the region and that they take joint action accordingly. This is the most important task of the "platform", supported by the administrative department. The platform will need to ensure that there is a broad basis of support and can "enforce" this by setting up specific projects (sensitization) in the region.

- At the same time, projects will be set up and measures taken in order to take advantage of economic and technological developments. These activities will be initiated or approved by the platform.
  Implementation of the activities themselves will to large extent take place outside the context of the RTP, but will be carried out via various different regional and technological programs. The development of these activities, in some cases including preparatory studies or short pilot projects, does however fall within the remit of the RTP.

The necessary initial impulses will also need to be given for the implementation of the plan. In view of the fact that a large number of bodies are concerned with implementing projects at the interface between technology and regional economic development, clear agreements will need to be made with respect to the function and nature of their various activities.
It is also important that concrete agreements should be made with the business community and with those providing various technologies as to their involvement in the eventual implementation of the plan.
These agreements will be settled within the platform.

The process of the Regional Technology Plan Limburg is estimated to take a period of 12 to 18 months. During this period a coordinating body will be provided by the provincial administration. This body will act independently.
The total costs of the project for this period are eliminated to be ECU 400.000. Half of this amount is to be requested for of the European Commission.

Given the knowledge available with regard to technological developments in Limburg and the fact that the initial impulse for the above-mentioned platform involving the business community, intermediaries and knowledge institutes is already present, it will be possible to commence the operational phase of

the RTP within the very short term. In fact this could commence immediately after the Commission reaches a positive decision with regards to the design of the RTP presented here and to the associated financial consequences. It is of course assumed that the European Commission (DG XVI and/or DG XIII) will participate actively in the project from this phase on via the above-mentioned platform.

IVe Conférence Stride

Arsenal de Metz (France)
7-8 février 1994

Programme détaillé des ateliers
Detailed programme of the workshops

Organisation des ateliers spécialisés

Trois ateliers simultanés sont envisagés. Ils concerneront trois thèmes précis proposés dans le programme général.

L'organisation de l'atelier, conduit par un animateur et synthèse faite par un rapporteur, sera le suivant :

Il regroupera un nombre de participants tournant autour de 40 personnes.

Il sera possible de passer d'un atelier à l'autre pour favoriser les échanges d'idées.

Chacune des séances en atelier comportera 2 parties :

- Présentation d'expériences correspondant au thème principal de l'atelier (de l'ordre de 3 exposés),

- Discussions sur les présentations et sur le thème, élaboration de propositions et suggestions.

Les rapporteurs élaboreront en temps réel les conclusions qui seront présentées dans la séance plénière terminale.

ATELIER n° 1

LES PME FACE AUX INITIATIVES TECHNOLOGIQUES

OBJET

Dégager des orientations et propositions pour convaincre les Pme de faire un effort technologique cohérent avec leur capacité propre.

Les bases de départ pourraient être la présentation de 10 à 12 résultats d'expériences menées dans les diverses zones en déclin industriel ou en retard d'industrialisation pour sensibiliser les entreprises à l'innovation, former les personnes et promouvoir des technologies modernes.

L'atelier devra conduire à des propositions d'intérêt et d'application immédiat pour les bénéficiaires du programme STRIDE.

Les participants pourront évaluer l'efficacité des méthodes de sensibilisation depuis le mailing en passant par l'argumentaire, le schéma de prospection, la technique de l'entretien et le diagnostic rapide d'entreprise, en analysant les résultats obtenus dans le cadre du programme STRIDE.

Il sera bon de mettre en évidence les nécessités de mise à un niveau moyen européen de la Pme par rapport à sa spécialité, d'évoquer les problèmes normatifs au niveau européen et mondial. Il sera intéressant également d'évoquer les critères socio-économiques permettant de créer un climat favorable au saut technologique.

ORATEURS ET PARTICIPANTS

- Services d'assistance à l'industrie des Chambres de Commerce
- Critt
- Réseaux de diffusion technologique
- Organes de transfert des établissements d'enseignement
- Organes d'information sur les technologies
- Instituts techniques
- Conseils et experts privés
- Agences et organismes d'aide à la technologie.

Atelier n° 1 / *Workshop n° 1*

Les Pme face aux initiatives technologiques
Small businesses and technological initiatives

Président / *Chairman :*

Anne-Marie Straus, directeur général de la technologie, de la recherche et de l'énergie, ministère de la région wallonne, Namur (B)

Rapporteur / *Rapporteur :*

Richard Binfield, director, SRI International, Croydon (UK)

Arsenal – salle de l'Esplanade

Lundi 7 février 1994 / *Monday, 7 February 1994*
14h00 - 17h30 / *2:00 - 5:30 p.m.*

Présentation de l'atelier par le président de séance
Workshop presentation by the Chairman

Iain Grieve, senior business executive, Institute of Technology Management, Edimbourg (UK)

Transformer des managers d'industries de la défense en conseillers technologiques de Pme.
Transforming industrial managers from the Defence Industry into technological advisors for SMEs.

Jean-Jacques Keff, directeur, centre d'études et d'applications technologiques pour l'artisanat lorrain (Ceatlor), Metz (F)

Sensibilisation de très petites entreprises au transfert de technologie.
Sensitizing very small firms to technology transfer.

Vissarion Keramidas, associate professor of soil science, université Aristotle, K&N Efthymiadi, Thessalonique (GR)

Fournir aux entreprises et aux agriculteurs les moyens modernes d'un laboratoire agrotechnique (analyse de sols, eaux, plantes, aliments).
Providing agrobusiness and farmers with the modern means of an agrotechnical laboratory (soil, water, plants, food).

Francis Labbé, consultant, chambre de commerce et d'industrie de Boulogne-sur-Mer (F)

Mobilisation de la région de Boulogne-sur-Mer en faveur de l'innovation dans les Pme.
Mobilization of the Boulogne area for innovation in SMEs.

Discussion / *Discussion*

Simon Bos, manager, **Henk J. Hamberg**, head of the transfer department, Ontwerpcentrum, Enschede (NL)

Intégration de développement de produits dans des Pme par des étudiants ; aspects transfrontaliers.
Product development integration into SMEs by students ; cross-border aspects.

Pr Günther Seliger, Berliner Technologie Agentur, Berlin (D)

Réflexions sur le développement de la technologie dans l'espace berlinois et sur une fondation régionale pour la technologie.
Thoughts on technological development in the Berlin area and on a regional foundation for technology.

Pr Niels Olhoff, Institute of Mechanical Engineering, Aalborg university (DK)

Exemple d'un réseau technologique danois entre l'université et des Pme dans le domaine de la conception de machines.
An example of a Danish Technological Network between University and SMEs in the field of machine design.

Discussion / *Discussion*

Mardi 8 février 1994 / *Tuesday, 8 February 1994*
9h00 - 10h40 / *9:00 - 10:40 a.m.*

Dr Angelo Marino, Ente per le Nuove Tecnologie, l'Energia e l'Ambiente, Santa Maria di Galeria (I)

Le programme Stride en Italie dans les zones d'objectif 1 ; analyse d'une expérience.
The Stride programme in the objective 1 regions of Italy ; analysis of experience.

Philip W. Thomas, director of external affairs, The North East Wales Institute of Higher Education, Wrexham (UK)

Identifier les besoins technologiques des Pme et les compétences technologiques des laboratoires universitaires gallois.
Identifying the technological needs of SMEs and the technical capabilities of High Education Establishments in Wales.

Claude Wehenkel, administrateur délégué, centre de recherche public Henri Tudor, Luxembourg

Former des Pme à travailler avec des centres de recherche.
Training of SMEs for working with Research Centres.

Richard Fitzgerald, director, Aquaculture Development Centre, University College, Cork (IRL)

Centre de développement en aquaculture : exemples d'actions réciproques avec des Pme (recherche, formation, conseils).
Aquaculture Development Centre : examples of interaction with SMEs (research, training, consultancy).

Discussion / *Discussion*

PANEL

ATELIER N° 1

"LES PME FACE

AUX INITIATIVES TECHNOLOGIQUES"

Mr. Iain GRIEVE, Institute of Technology Management, Edimbourg (GB)

Transformer des managers d'industries de la Défense en conseillers de PME technologiques.

Mr. KEFF, Centre d'Etude et d'Application Technologique pour l'Artisanat Lorrain, Metz (F)

Sensibilisation et transfert de technologie vers de très petites entreprises.

Mr. KERAMIDAS, K & N EFTHYMIADI, Thessalonique (GR)

Fournir aux entreprises les moyens modernes d'un laboratoire agrotechnique : analyse de produits agro-alimentaires, plantes, sols, eaux.

Mr. R. FITZGERALD, Aquaculture Centre, University College, Cork (Irl.)

Recherches publiques pilotées par des entreprises aquacoles. Auto-instruction dans des fermes aquacoles.

Mr. Claude WEHENKEL, Centre de Recherche Henri Tudor, Luxembourg (LUX)

Former des PME à travailler avec des Centres de Recherche.

Mr. S.J.B. BOSS, Ontwerpcentrum, Enschede (NL)

Intégration de développement de produits dans des PME par des étudiants. Aspects transfrontaliers.

Pr. Niels OLHOFF, Institude of Mechanical Engineering, Aalborg (DK)

Transfert de technologie vers PME dans le domaine de la conception de machines.

Dr. P.W. THOMAS, North East Wales Institute, Wrexham (GB)

Identifier les besoins technologiques des PME et les compétences technologiques des laboratoires universitaires.

Mr. LABBE, C.C.I. Boulogne sur Mer (F)

Mobilisation de la région de Boulogne en faveur de l'innovation dans les PME.

IVe Conférence Stride

Arsenal de Metz (France)
7-8 février 1994

DOCUMENT DE TRAVAIL

WORKING PAPER

TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Iain GRIEVE
Senior business executive
INSTITUTE OF TECHNOLOGY MANAGEMENT
Heriot-Watt University
Riccarton
UK - EDINBURGH EH14 4AS
(44) 31 451 3192

Institute of Technology Management

0. The Institute of Technology Management is located at Heriot-Watt University, Edinburgh, Scotland. Heriot-Watt University is one of three Universities located in Edinburgh.

1. Description of the region

Scotland comprises of approximately one third of the land area of the United Kingdom (UK), and with a population of just over five million, it accounts for around 9 percent of the UK population. With respect to the European Community (EC), Scotland accounts for of 3 percent of its geographical area and some 1.5 percent of its population. The population is not spread evenly across the land area. While population density is high in the more industrial regions of the central belt, the more rural areas to the North and South are more sparsely populated. In 1990, 30 percent of Scotland's population lived in its four city districts (Glasgow, Edinburgh, Aberdeen and Dundee).

Glasgow is Scotland's largest city, traditionally at the heart of Scotland's industrial centre. Edinburgh is the capital city and administrative centre, with a major concentration of financial and professional institutions. Aberdeen is the oil capital of Europe. Dundee has strong representation in electrical and electronic engineering, printing and publishing.

2. Description of Scottish industry in General

Compared with the EC as a whole, Scotland has a similar share in industry, a lower share in agriculture and a higher share in services. Analysis of Scottish output, excluding oil and gas, shows that in 1989 the service sector accounted for over three-fifths of total output. In terms of structure, the food, drink and tobacco industries are the largest manufacturing sector, accounting for about 20 percent of output. Among other consumer industries, textiles, footwear and clothing were major producers. Engineering and allied industries (electrical and instrument, mechanical, transport and metal goods) accounted for 36 percent of manufacturing output. Scotland's two largest overseas earners were electrical and instrument engineering (over two fifths of total) and whisky (almost one fifth). The EC was the largest overseas market, taking 55 percent Scottish manufacturing exports. In terms of manufacturing exports per employee, recent figures show Scotland well ahead of Japan.

3. Description of Scottish defence industry and Scottish Defence Initiative

The Institute of Technology Management's Stride project has been prepared under the aegis of the Scottish Defence Initiative, which aims to minimise the negative impact of defence expenditure reductions. It is estimated that there are 75,000 employees in Scotland whose job directly depends on defence expenditure. This is 3.2 percent of the work force and is slightly higher than the UK average of 2.9 percent. The top ten defence companies account for 18,000 defence jobs. Government expenditure on defence in Scotland has declined by 12 percent since its peak in 1987. Further reductions in expenditure are planned. Taking into account all direct job losses and their subsequent effect, lower defence expenditure could lead to the loss of between 16,00 - 20,000 jobs over the period 1987 - 95. Manufacturing output is estimated to be between 2 and 7.6 percent lower than it would otherwise have been. Not surprisingly major Scottish defence equipment suppliers have reduced capacity and sought to improve productivity. Between 9,000 and 11,000 of the jobs lost are likely to be in manufacturing industries. Most have substantially reduced their workforce in the recent past and are considering export and diversification opportunities.

The Scottish Defence Initiative is a three year operational programme developed by an integrated team from Scottish Enterprise directorates and the three local enterprise companies in Scotland's most defence dependent areas, namely Fife Enterprise, Glasgow Development Agency, and Lothian and Edinburgh Enterprise Limited. The programme, addresses the needs of companies, communities and individuals through initiatives including: company adjustment and new commercial development; economic development for local communities; and retraining and skills adjustment for individuals.

4. Concept supporting the STRIDE project

It has been recognised that industrial diversification is a high risk strategy requiring considerable resources, a cultural transformation and corporate commitment. This Stride project aims to transfer technology, not through product diversification within defence companies, but by utilising the skills of individuals gained in defence companies to enhance the performance of SMEs.

ITM believes that "people transfer is the most effective method of technology transfer".

4. Concept supporting the STRIDE project (cont)

Our project is based on the concept of achieving technology transfer by applying the skills of individuals from defence and high technologycompanies to Scottish manufacturing SMEs. These key people are enabling SMEs to increase their performance and profitability by complementing their existing entrepreneurial skills with best practice, technology and systems from world-class companies.

The approach is to the mutual benefit of the SME and the Objective II area in which they are located. Retention of high technology skills in the economy of Objective II areas is a key objective as is culture change of both the SME and participating individual. Career development of individuals involved in the project is also a high priority.

5. Implementation of Stride Project

In each year of the two year project ITM appoints eight business executives to act as industrial advisors to SMEs in Objective II areas. An individual remains on the programme for twelve months and undertakes two or more placements with participating SMEs. All the individuals recruited to the project have previously worked in world-class defence or high technology companies and were either: unemployed; likely to face redundancy; or under-employed in their current position in terms of skills and expertise.

The participants in the programme are all high-calibre senior executives with responsibility levels ranging from middle managers to managing directors and chief executives. Their academic backgrounds range from first degrees to higher degrees including Master of Business Administration and Doctor of Philosophy. The participants range in age from 41 years to 55 years.

The Stride project is divided into three main elements: a four week induction and awareness course delivered by ITM prior to the participants being introduced to suitable companies; 40 weeks placement with SMEs with ongoing ITM support and monitoring; and regular group review and project evaluation. This format is repeated in each year of the programme.

To facilitate the effective integration of the participants into SMEs, a formal induction and awareness programme was created by ITM. The aim of the programme was two-fold: firstly, to provide the participants with the professional tools and knowledge relevant to SMEs and secondly, to facilitate the culture shift between a) large defence and high technology companies and companies involved in civilian production and b) between large corporate organisation and SMEs.

5. Implementation of Stride Project (cont)

The one-month programme included modules on supply chain management, technology for small businesses, human resource management, strategic planning for SMEs, culture change and the management of change, financial management, production management control and optimised production technologies.

In establishing placements ITM identified suitable SMEs in Objective II areas. Those taking part in the project are recognised as companies with significant growth potential with senior management committed to realising this potential. Placement projects were clearly defined by the participating SME in agreement with ITM. Included in the project specification were milestones, deliverables and criteria for success. Throughout the placement periods regular two weekly contact was maintained with the ITM advisor and the company. Quarterly programme reviews are held to evaluate progress and are attended by the participants, sponsoring bodies, ITM staff and representatives of the SMEs. As part of the review the participants present the achievements and progress against the project schedule.

6. Benefits and achievements

This programme provides SMEs with the opportunity to gain access to knowledge which would be difficult to source and fund otherwise.

Specific benefits to SMEs involved in this Stride project have included: increased gross margin, increased sales to existing customers, improved customer service, improved production planning and control leading to improved delivery,

Individual case studies will be presented to illustrate the benefits and achievements of the project.

IVe Conférence Stride

Arsenal de Metz (France)
7-8 février 1994

DOCUMENT DE TRAVAIL

WORKING PAPER

TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Jean-Jacques KEFF
Directeur
CENTRE D'ETUDE ET D'APPLICATION TECHNOLOGIQUE LORRAIN
2, rue Augustin Fresnel
F - 57082 METZ Cedex 3
(33) 87 20 36 80

I - PRESENTATION

1 - L'environnement économique et industriel des très petites entreprises lorraines

Marquée par sa structure industrielle, construite sur ses ressources naturelles, la Région Lorraine a engagé dès 1971 une action de conversion et de diversification des très petites entreprises de production et de services.

Cette action, initiée par le Ministère de l'Artisanat et le Commissariat à la Conversion Industrielle de la Lorraine, devait permettre aux très petites entreprises de survivre et de se développer malgré les pertes de marché engendrées par les restructurations de la sidérurgie, des houillères, du textile, de la filière bois et ameublement.

Deux mille entreprises de un à vingt salariés étaient concernées. Le bilan de leurs compétences présentait des atouts et des handicaps sur lesquels il fallait asseoir une nouvelle stratégie.

Les atouts étaient réels, ils alliaient la souplesse, la flexibilité, l'adaptabilité des structures à la présence d'une main-d'oeuvre abondante, formée aux besoins spécifiques du donneur d'ordre.

Les handicaps étaient importants, la capacité manageuriale était anesthésiée par des décennies de dépendance, les structures internes des entreprises étaient inexistantes, toute l'information externe était apportée par le donneur d'ordre unique, la technologie était imposée, l'innovation se faisait chez le donneur d'ordre. La structure financière de l'entreprise faisait apparaître des insuffisances graves au niveau des fonds propres.

2 - La problèmatique

La question existentielle se posait en termes simples, à savoir comment assurer la survie et la pérennité d'entreprises "mono-industrielles", sachant qu'elles ne disposaient ni des moyens humains, ni des moyens financiers, ni des moyens technologiques nécessaires pour engager une démarche de conquête de nouveaux marchés, avec des chances raisonnables de succès. La diversification ne pouvait se faire ni avec les mêmes clients, ni sur les mêmes produits. Les donneurs d'ordres possibles n'étaient pas implantés en Lorraine, mais sur tout le territoire national.

En fait, tous les problèmes se posaient avec le même impératif d'urgence, qu'il s'agisse de mettre en place une nouvelle politique commerciale, une nouvelle politique produit, une nouvelle approche technologique.

3 - Eléments de réponse stratégique

En fait, face à l'impossibilité de laisser les PMI et les très petites entreprises prendre seules leur destin en main et d'assurer leur conversion, l'Etat a décidé, par l'intermédiaire de la Délégation à l'Aménagement du Territoire et à l'Action Régionale, de jouer le rôle d'agent commercial, tout en mettant en place les techniques de transfert, qu'il s'agisse de transfert technologique, de savoir-faire, de formation des hommes.

Concrètement, à l'instigation de la DATAR, de grands groupes industriels ont confié des commandes importantes aux petites entreprises lorraines, en dépêchant des cadres, des techniciens, pour préparer les entreprises, définir les investissements, former le personnel.

4 - Résultats obtenus et situation actuelle

Entre 1978 et 1988, plus de 1.000 emplois ont été créés dans les PMI et les très petites entreprises, dans des secteurs à haute technologique (armement, aéronautique, espace, automobile).

Les transferts technologiques ont été particulièrement efficaces dans les branches mécaniques et électroniques, et ont induit les entreprises à s'engager dans des actions de diversification de mieux en mieux maîtrisées.

Cependant, dans ce constat globalement positif, la position de la très petite entreprise était restée très précaire, car les éléments de fragilité n'avaient pas été maîtrisés et c'est ce qui a conduit CEATLOR a s'engager dans le programme STRIDE.

En effet, les chefs d'entreprises, avaient opéré un transfert technologique, mais celui-ci réalisé, ils se comportaient à nouveau en sous-traitants privilégiés de grands groupes, et se cantonnaient dans une position d'attente de commandes, de conseils, d'information technologique.

II - LE PROJET STRIDE POUR LES TRES PETITES ENTREPRISES

1 - Sensibilisation et préparation au transfert de technologies

A la différence du transfert de technologies réalisé dans les relations donneur d'ordres - sous-traitants, dans lequel la très petite entreprises est totalement dépendante, la volonté exprimée par CEATLOR dans le projet STRIDE est de sensibiliser les entreprises pour les préparer à envisager seules les transferts de technologies nécessaires à court et moyen terme.

L'ambition affichée est de favoriser l'émergence ou le développement des capacités d'anticipation des chefs de petites entreprises.

Cette capacité d'anticipation, si elle existe dans l'entreprise, permettra de mesurer les évolutions prévisibles du marché, et de s'y préparer.

Dans le meilleur des cas, elle pourra faciliter le passage de l'état de sous-traitant à celui de partenaire.

Parfois, elle pourra engager l'entreprise vers la réalisation de produits propres.

Les moyens qui ont été mis en oeuvre ont été très diversifiés, et ont obtenu des résultats très variables :

1 - Information par courrier avec coupon-réponse : toutes les entreprises des zones de conversion ont été destinataires de documents d'information généraux et spécifiques

Résultat : moins de 1 % de demandes d'information complémentaires ou de conseil.

2 - Diffusion d'articles rédactionnels dans les revues professionnelles spécialisées des Chambres de Métiers sur des thèmes divers : machines à commande numérique, robotique, domotique, etc..., avec coupon-réponse

Résultat : taux de réponse quasi-nul.

3 - Organisation de réunions par branche professionnelle : le taux d'accroche entre le nombre d'entreprises contactées et le nombre de présents se situe entre 5 et 20 %.

4 - Visite directe d'entreprises avec ou sans prise de rendez-vous préalable : l'accueil a été favorable et a donné lieu à diagnostic technologique dans 90 % des cas.

Deux ingénieurs ont été affectés à cette tâches à temps plein pendant une année, et ont pu visiter 400 entreprises, soit 20 % du vivier des entreprises des zones de conversion.

Un commentaire peut être fait quant aux techniques d'approche utilisées.

Le chef de la très petite entreprise n'est pas réceptif à l'information qui lui parvient par courrier ou par l'intermédiaire de magazines, sauf si elle répond à un besoin concret qu'il a déjà identifié.

Encore trop souvent, la très petite entreprise n'a pas de tradition ou de culture écrite. L'information est orale, qu'elle soit interne ou externe. C'est ainsi que toute l'information technologique est apportée par les fournisseurs ou les clients, à l'occasion des relations commerciales. Le recours au conseil externe est rare ; de même, les consultants privés ne prospectent pas cette clientèle de très petites entreprises, généralement peu réceptives ou non solvables.

L'efficacité de l'approche directe a été réelle et mesurable. En effet, sur 400 entreprises visitées et qui ont fait l'objet d'un diagnostic technologique léger,

- 28 ont souhaité obtenir une prestation technologique approfondie

- 5 ont demandé une intervention lourde aboutissant à la mise au point de procédés ou de produits

- 19 ont déposé une demande de subvention pour les aider à réaliser un investissement technologique (CNC, DAO, CAO, ...)

- 9 ont introduit un dossier d'embauche de cadre technique (niveau BTS ou ingénieur)

- 21 en ont profité pour engager une action qualité, avec pour ambition de parvenir à une certification aux normes ISO 9000.

Bien qu'il y ait parfois des doubles comptes, on peut considérer que près de 50 entreprises ont exprimé des besoins latents, et qui avaient peu de chance de s'exprimer sans la visite d'un Ingénieur de CEATLOR.

D'autre part, si la première visite a été l'occasion d'une réflexion orientée par l'Ingénieur, elle a aussi permis de rompre l'isolement des chefs d'entreprises.

Volontaire ou non, cet isolement est vraisemblablement une des causes essentielles de la sclérose des capacités manageuriales du chef d'entreprise. La création de liens priviligiés va ainsi être le moteur de l'organisation d'une veille technologique informelle.

2 - Evolution des besoins de formation technologique dans la très petite entreprise

1.500 plaquettes d'offre de formation ont été adressées aux entreprises de mécanique, de domotique, du bois, afin d'évaluer les besoins des entreprises et de répondre à leur attente.

Compte tenu du faible taux de réponse, seulement trois stages regroupant 25 personnes ont pu être organisés.

Il a alors été décidé d'abandonner cette démarche d'offre non adaptée à la réalité de la très petite entreprise.

Ces résultats négatifs sont à rapprocher de la culture personnelle des chefs d'entreprises.

En effet, dans ces entreprises essentiellement à statut personnel, généralement créées par le chef d'entreprise lui-même, le niveau moyen de formation est bas. La moitié des chefs d'entreprises ont un niveau de formation équivalent au Certificat d'Aptitude Professionnelle, dix pour cent seulement ont un niveau BAC ou Brevet de Maîtrise. La majorité des membres du personnel est formée dans l'entreprise, sans faire appel aux structures de formation continue.

Ces publics sont peu demandeurs de formation, considérée non comme un investissement, mais comme une perte de temps. La difficulté est donc d'évaluer les besoins en formation en tenant compte non pas des déclarations du chef d'entreprise, mais de l'équipement existant, des marchés traités ou prévisionnels, des qualifications actuelles du personnel. Il convient donc d'adopter la même démarche que celle adoptée pour l'action de sensibilisation, c'est-à-dire d'engager une visite systématique des entreprises.

3 - Le transfert de technologies par la création d'un partenariat avec une école d'ingénieurs

Traditionnellement, pour les raisons évoquées précédemment, les écoles d'ingénieurs et les très petites entreprises se rencontrent difficilement. Si le chef d'entreprise craint de perturber son entreprise par un apport de matière grise, le jeune ingénieur évite la petite entreprise car il n'y trouve pas de plan de carrière, ni de niveau de rémunération satisfaisant. Selon une étude récente réalisée par l'Institut Supérieur des Métiers, il apparaît que seulement 30 % des petites entreprises de fabrication de produits industriels ou de consommation ont dans leur personnel une personne ayant un niveau de Technicien ou Technicien Supérieur, et que seules ces

entreprises font état d'innovations technologiques. Il est donc vérifié qu'une relation étroite semble exister entre les capacités d'innovation et le niveau de formation du chef d'entreprise et de son personnel.

Ces observations justifient les efforts que nous engageons pour rapprocher les élèves-ingénieurs et les responsables des très petites entreprises. Nous avions fixé un objectif qui consistait à engager cinq actions de partenariat.

A ce jour, les cinq contrats sont signés ; ils se matérialisent par la prise en compte d'un problème technologique identifié dans l'entreprise, par une équipe de deux ou trois ingénieurs encadrés par un professeur de l'Ecole Nationale d'Ingénieurs de Metz.

III - CONCLUSIONS

1 - Compte tenu du caractère spécifique de la très petite entreprise, seule une approche systématique et individuelle est susceptible d'apporter des résultats :

- elle apporte les informations, résultat d'une veille technologique
- elle réalise le diagnostic
- elle préconise des solutions
- elle met en place les propositions de transfert technologique.

2 - La très petite entreprise est un gisement inexploité d'innovations technologiques, 15 % des entreprises diagnostiquées présentent après une rapide analyse, une opportunité de développement technologique.

3 - La faiblesse des structures internes de recherche, de méthodes, peut être compensée par des ressources humaines externes, issues de l'Université et des Ecoles d'Ingénieurs.

4 - L'approche des besoins de formation, la formalisation des offres de formation sont globalement inadaptées.

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TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Vissarion KERAMIDAS
Asso. professor of soil science
K & N EFTHYMIADI SA
ARISTOTELIAN UNIVERSITY
27 P. Karoliou st.
GR - 54453 THESSALONIKI
(30) 31 99 25 93

The demand for a sound soil testing program in Greece is continuously increasing. Farmers, on the one hand, are interested in applying the optimum amount of fertilizer to their crops, thus saving money and effort while maintaining the fertility status of their soils. The public sector, on the other hand, is increasingly concerned about health hazards associated with excessive amounts of toxic substances in foodstuff and the environment.

The existing situation in Greece and particularly in northern areas such as Macedonia and Thrace, with respect to Soil Testing and Plant Analysis and to Residues of Pesticides in water, soil and food products is as follows:

1. There is an ever increasing demand for soil testing and plant analysis.

2. The current and future needs for the above analysis cannot be met by the existing institutions and facilities.

3. Excess fertilization and soil mismanagement are becoming a serious problem to the environment, to the farmer's resources and to the public health.

4. There is a lack of personnel with well established expertise on soil fertility problems. Consequently, proper guidance to the farmers is missing. There is also lack of qualified personnel and modern facilities for conducting investigation on all agrochemicals used in agricultural practices.

5. There is a vital need for studying and monitoring the residues of all kinds of pesticides that might put in danger the water quality of local underground and surface reservoirs. It is worth mentioning at this point that several lakes (Agios Vasilios - Volvi, etc.,) and rivers (such as: Axios, Aliakmon, etc.,) of the area are protected by the International Agreement RAMSAR.

and finally:

6. There is profound need for the development of infrastructure necessary to support environmental and residue studies involving all the new pesticides that apply for registration in Greece.

The undertaken research and development project is intended to contribute to the solution of the aforementioned problems by:

1. Establishing a well organized agrotechnical laboratory in the valley of Thessaloniki, equipped with fully automated instruments and capable of handling 20 - 30.000 soil and plant samples plus up to 10.000 residue analyses per year. The laboratory will operate in close cooperation with scientists and researchers of other Governmental institutions, and with the Aristotelian University of Thesssaloniki. Its activities will include soil and plant analysis, water analysis and residue determination, aiming at:

a. Evaluating and recommending appropriate fertilization strategies under the existing local conditions.

b. Suggesting measures for improvement of "problem" soils.

c. Determining safe levels of pesticide residues in the soil, water and food products.

d. Providing technical data and information to be used as guidelines in the preparation of directives for the control of chemical residues the could be hazardous to the public health.

2. Training personnel and creating a task force capable of confronting with the existing problems efficiently.

3. Adopting techniques and laboratory methods for the assessment of the nutrient status of soils and pesticide residues, compatible with Greek conditions and in harmony with the ones used in other countries. This way, exchange of results and information with similar institutions within the European Union will become feasible and fruitful.

4. Initiating a short - term research project aiming at calibrating three availability indices for Fe, Cu, Zn and Mn using representative soils of Greece and corn as the experimental crop in a greenhouse pot experiment.

5. Initiating a monitoring program aiming at describing the pesticide status of surface and groundwaters of the Thessaloniki valley.

A Greek firm (K+N Efthymiadis, S.A.), involved in the preparation and circulation of pesticides and foliar fertilizers in the Greek and foreign market, undertook the realisation of the above objectives by expanding its activities and by establishing a connection with researchers and scientists of other institutions, namely, the Aristotelian University of Thessaloniki. In addition, the two cooperating teams established a connection with similar laboratories in Europe (France, the Netherlands) and initiated two research projects which are in progress. The buildings for the installation of the equipment are almost complete and the acquisition of modern, automated, fully computerised equipment has been achieved. The K+N Efthymiadis firm has also installed a pilot laboratory and hired personnel with the objective to put the equipment into operation and train the personnel in the various techniques before the AGROLAB is put into full scale performance.

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TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Francis LABBE
Consultant
CHAMBRE DE COMMERCE ET D'INDUSTRIE
98, bd Gambetta
F - 62204 BOULOGNE/MER Cedex
(33) 21 99 62 00

1. LE CONTEXTE BOULONNAIS

- SITUATION GEOGRAPHIQUE : sur la Côte d'Opale, près du Tunnel sous la Manche.
- LES SAVOIR-FAIRE SPECIFIQUES : les industries de la Pêche, l'agro-alimentaire, la logistique, le médical.
- LES PROBLEMES DE RECONVERSION, CONSEQUENCES NEGATIVES DU TUNNEL, DES PROBLEMES DE LA PECHE ET DE L'AGRICULTURE, LE POIDS DES PME.
- LES POTENTIELS A VALORISER.

2. LE PROGRAMME STRIDE BOULONNAIS

- LA CIBLE : les PMI
- L'OBJECTIF : 20 projets accompagnés, lancement d'un mouvement auprès de 150 PMI.
- LES MOYENS : fédération des compétences locales dans un "centre de ressources" animé par le Groupe Innovation de la CCIBM.
- LES ETAPES :
  - sensibilisation
  - information
  - action
- LE POINT D'AVANCEMENT : environ 80 %

3. L'ASPECT OPERATIONNEL

- 4 EXEMPLES VECUS D'ACCOMPAGNEMENT D'INNOVATION DANS LES PMI LOCALES :
  - ⇨ innovation de produit chez un petit fabricant de machines de conditionnement
  - ⇨ innovation de process chez un escaliéteur
  - ⇨ innovation de produit chez un concepteur de systèmes informatiques industriels
  - ⇨ problèmes de mise aux normes européennes chez un fabricant de machines agricoles
- CES EXEMPLES PERMETTENT DE METTRE EN EVIDENCE LE ROLE MOTEUR DU GROUPE INNOVATION STRIDE EN TANT QUE :
  - ⇨ partenaire de réflexion
  - ⇨ apporteur d'informations
  - ⇨ accompagnateur dynamiseur
  - ⇨ développeur de synergies
- MAIS CELA S'ACCOMPAGNE DE QUELQUES REGLES DU JEU :
  - ⇨ des partenaires motivés
  - ⇨ des hommes de terrain
  - ⇨ un bon climat, un état d'esprit positif
  - ⇨ un engagement de confidentialité
  - ⇨ un rôle important de l'ANVAR
  - ⇨ en amont, une démarche cohérente de contacts lors des conférences, de visites programmées qui permettent de gagner la confiance et d'inviter l'innovateur potentiel à entrer dans le groupe
- MAIS IL RESTE ENCORE A LUTTER CONTRE DES OBSTACLES TROP FREQUEMMENT RENCONTRES :
  - ⇨ méconnaissance des PMI des questions de propriété industrielle
  - ⇨ les PMI n'exploitent pas spontanément les possibilités de conseils et d'aides qui leur sont offertes

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TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Simon BOS, Manager
M. Henk J. HAMBERG, Head of the transfer department
ONTWERPCENTRUM
Postbox 545
NL - 7500 AM ENSCHEDE
(31) 53 83 66 27
(31) 53 83 66 26

1. Introduction

'Ontwerpcentrum' Enschede is a consultancy office for industrial productdevelopment. It is founded by Hogeschool Enschede (Poly-technic).
Essentially, it supplies specified plans/ideas for product development projects e.g.:
* a good described product idea
* information about markets/users
* developing product specifications
* product visualisations (fast prototyping)

Furthermore, the OCE carries out small collective innovation projects for small industries (less than 100 employees) which are not so familiar with product development. The office has an intermediary role between education institutes, design & engineering firms and industry espacially in the region of Twente (The Netherlands) and Munster (Germany). The OCE developes a sort Pied à Terre formula by carrying out product development activities for small companies. Students of varying institutes are involved in the projects.

2. Inventarisation of projects/ activities and results

3. Reporting procesfactors to achieve goals

- acquisition
- networking
- successfactors
- failfactors

4. Discussion of results/procesfactors

5. Ingredients for indentifying guidelines to achieve the goals. (Pied à Terre formula)

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ABSTRACT OF THE SPEECH BY :

M. Günther SELIGER
Prof. Dr.-Ing.
TECHNISCHE UNIVERSTAT
Ehrenbergstrasse 29
D - 14155 BERLIN
(49) 30 31 42 20 14

Überlegungen zur Technologieentwicklung im Berliner Raum und zu einer regionalen Technologiestiftung

Ziel regionaler Technologiepolitik muß es sein, dauerhaft wettbewerbsfähige qualifizierte Arbeitsplätze in der Region zu schaffen. Im Berliner Raum gibt es kaum eine technologiepolitische Aufgabe, für die kein Förderprogramm existiert. Auch an Institutionen im Aufgabenfeld mangelt es offenbar nicht. Eine expansive Entwicklung des Berliner Raumes zu einer prosperierenden Technologieregion ist aber leider nur in sehr vagen Ansätzen erkennbar.

Das Management strategischer Zukunftstechnologien nach Portfoliologik über eine regionale Technologiestiftung in "lean management und administration" erscheint als sinnvoller Ansatz zur grundlegenden Verbesserung der Lage.

Die Stiftung Innovationszentrum Berlin kann die Keimzelle dafür sein. Nach MITI - Vorbild wird ein Mindestmaß an Transparenz über regionale Technologiekompetenz unter Moderation der Stiftung geschaffen, um den Wettstreit der Ideen, die Konkurrenz der Projektinitiativen aber auch die Kooperation in gegenseitigem Nutzen der beteiligten Partner zu stimulieren.

Ein interdisziplinärer Technologierat mit anerkannten Vertretern von Wirtschaft, Wissenschaft und Verwaltung wirkt als oberstes Aufsichtsgremium. Unter der Regie kompetenter Moderatoren für unterschiedliche Technologiefelder (Cluster) konkurrieren und kooperieren die Initiatoren aus Wirtschaft und Wissenschaft, um Zukunftsgeschäftsfelder besser für regionale Betriebe zu erschließen.

Als Cluster regionaler Technologieentwicklung in Berlin und Brandenburg werden Arbeit und Technik, Biotechnologie, Energietechnik, Informations- und Kommunikationstechnik, Lasertechnik/Optik, Medizintechnik, Mikroelektronik, Neue Werkstoffe, Produktions- und Fertigungstechnik, Umwelttechnik und Verkehrstechnik genannt. Technologiecluster sind nicht als abgegrenzter disziplinärer Aufgabenrahmen, sondern als offener Prozeß dynamischer und auch fachübergreifender Innovationsentfaltung zu verstehen, der aus regionalen Stiftungsmitteln nach Portfoliomethode unterstützt werden soll.

Regionale Technologiestiftungen wurden in Bayern (Finanzierung über Erträge landeseigener Unternehmen, Haushaltsvolumen 46 Mio DM pro Jahr, je zur Hälfte zur Erhöhung des Stiftungskapitals und zur Projektförderung), Baden-Württemberg (Steinbeis Stiftung für Wirtschaftsförderung, Haushaltsvolumen 1992 92 Mio DM), Schleswig-Holstein (Stiftungsvermögen aus Verkauf landeseigener Unternehmen 60 Mio DM, daraus Zinserträge von 4 bis 5 Mio DM zur Projektförderung) und Thüringen (Anfangskapital 1993 10 Mio DM) gegründet. In Bayern konnten in den vergangenen zwei Jahren mit 57 Mio DM ausgeschütteten Fördermitteln Forschungsprojekte von insgesamt 200 Mio DM initiiert werden, die Industrie hat Gelder dazugegeben.

Die Stifter der Stiftung Innovationszentrum Berlin (ADL, Berliner Bank, Berliner Commerzbank, Deutsche Bank Filiale Berlin, Dresdner Bank in Berlin, Landesbank Berlin, Schering AG, Siemens AG) haben grundsätzliche Bereitschaft signalisiert, ihre Stiftung als einen Beitrag der privaten Wirtschaft in ein neues, in sich schlüssiges und effizientes Technologiekonzept der Region einzubringen. Bei der Verleihung des Innovationspreises für Berlin und Brandenburg spielt die Stiftung bereits heute eine maßgebende Rolle. Mit einem gegenwärtigen Kapitalstock der Stiftung von 1,5 Mio DM liegt das verfügbare Fördervolumen pro Jahr aber nur bei 100 TDM.

Banken, Betriebe aus Industrie und Handwerk, IHKs und HKs, Unternehmensverbände und Gewerkschaften, Universitäten und Forschungseinrichtungen, die Senatsverwaltungen für Finanzen, Stadtentwicklung und Umweltschutz, Verkehr und Betriebe, Wissenschaft und Forschung, Wirtschaft und Technologie sowie die entsprechenden Brandenburger Ministerien sind für ein Netzwerk technologiepolitischer Initiativen der Region Berlin Brandenburg unter Moderation der Stiftung in einem dynamischen Prozeß nach Portfoliomethode zu gewinnen.

Der Senator für Wirtschaft und Technologie des Landes Berlin hat seine grundsätzliche Bereitschaft erklärt, wesentliche Anteile seiner Technologieförderung über ein solches Stiftungsmodell zu realisieren. Der Senator für Wissenschaft und Forschung hat seine Mitwirkung angekündigt. Der Vorstand der Stiftung Innovationszentrum Berlin überlegt eine Satzungsänderung, die eine flexible Abwicklung von Mittelherkunft und Mittelverwendung in Berlin und Brandenburg ermöglichen soll. IHK Berlin, UVB und Gewerkschaften haben die Initiative zu einer regionalen Technologiestiftung begrüßt.

IVe Conférence Stride

Arsenal de Metz (France)
7-8 février 1994

DOCUMENT DE TRAVAIL

WORKING PAPER

TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Niels OLHOFF
Professor
Institute of Mechanical Engineering
AALBORG UNIVERSITY
DK - 9220 AALBORG East
(45) 98 15 85 22

An example of a Danish Technological Network between University and SMEs in the Field of Machine Design

Summary: The research group on Computer Aided Mechanical Engineering Design of the above Institute and University in Northern Jutland, Denmark, in 1993 initiated a joint project in the field of Machine Design with four industrial companies in the same region: Danyard Aalborg A/S, Aalborg Portland A/S, De Smidtske, and Pedershaab Maskinfabrik A/S.

The project is entitled "Rational Design and Optimization" and is carried out under the auspices of EEC's STRIDE programme. The project has been allocated a funding of approximately 0.4 MECU out of a total project cost of 1 MECU for the period 1993-1995 (inclusive).

The scientific interests of the research group span a broad spectrum from fundamental research in methods and problems of optimum design to subjects related to the integration of optimum design facilities into the engineering design environment. During recent years the emphasis of the activities has been on research, development and implementation of new methods and capabilities for analysis, design sensitivity analysis, rational design, synthesis and optimization of mechanical systems and components, and the integration of these methods into standard CAD modelling environments. Development of methods which facilitate efficient use of traditional as well as advanced materials such as composites and FRP materials (Fibre Reinforced Plastics) in the design process, have been integrated into the research.

It is the objective of the network that the results of the research activities be transferred to the industrial partners, and that the research group be inspired for new developments. Thus, the project is a collaborative, two-way technology transfer and exchange of experience which, *inter alia*, encompasses the following types of actions:

- the research group transfers to the participating companies knowledge on rational methods of computer aided mechanical engineering design and initiates the application of these tools in the companies

- the companies transfer to the research group their experience pertaining to the application of the techniques

- in the industrial environment, the research group identifies scientifically interesting problems and areas where further research and development is needed

The network activities of the research group are are carried out in close co-operation with each of the industrial companies, and are based on identification and selection of suitable "cases" in the form of engineering analysis and design problems pertaining to existing or future products whose treatment by the new, rational methods developed by the research group, may prove beneficial for the company.

In turn, the assistance in the work on these "cases" is expected to provide the research group a very useful feed-back in terms of indications of needs for augmentations of the analysis and design tools developed, and identification of problems of a more fundamental scientific nature that need to be solved very soon, or may be included in the plans for future research.

In the talk, the organization of the network activities will be presented, and preliminary experiences, results, and perspectives of the co-operation will be discussed.

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ABSTRACT OF THE SPEECH BY :

M. Philip Watcyn THOMAS
Director of external affairs
THE NORTH EAST WALES INSTITUTE OF HIGHER EDUCATION
Centre for external affairs
101 Box lane
UK - WREXHAM CLWYD LL12 7RB
(44) 978 291355

STRIDE IN WALES

Abstract

A brief description of the economical and industrial situation in Wales in the context of science, technology, education and training will be given. The five STRIDE projects active in Wales provide a co-ordinated infra-structural support for SMEs whose contribution to the economic development of the region is of paramount importance. The networking and ongoing development of the projects, listed below, will be described:

1. Development of a Design and Technology Centre (Carmarthenshire College of Technology).
2. Strengthening Links with SMEs (University of Glamorgan).
3. Technology Audits and Innovation Database (Welsh Development Agency).
4. Technology Links (Welsh Development Agency).
5. Strengthening Links with SMEs (North East Wales Institute of Higher Education, NEWI).

NEWI's STRIDE project, to be discussed in detail, is building on the foundations laid by earlier initiatives. Action has been taken to utilise and foster R and D and specialist expertise of NEWI and its local partners in services to industry. This includes assistance in problem solving, diversification, prototype and technical development, EC program involvement, collaborative research and joint venture projects.

Project management has concentrated on five strands of activity:

1. Identification of principal "products" or "product groups", highlighting key expertise and facilities of the Institute.
2. Production of marketing literature.
3. Internal marketing to develop individual specialists' industrial contacts.
4. External marketing of specific areas of NEWI expertise in appropriate market sectors of the North Wales Objective 2 area.
5. Database development to provide a comprehensive integrated base of professional knowledge, commercial information and qualifications of SMEs.

Products that are now the subject of targeted marketing campaigns to SMEs are as follows:

1. Manufacturing Engineering.
2. Process and Product optimisation through analytical methodology.
3. Materials Technology.
4. *INOVA* -innovation for profit.
5. Quality assurance.
6. Computer systems, software and networks.

Case studies will highlight specific examples of SME-assistance based on a selection of these products.

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ABSTRACT OF THE SPEECH BY :

M. Claude WEHENKEL
Administrateur délégué
CENTRE DE RECHERCHE PUBLIC HENRI TUDOR
6, rue Coudenhove Kalergi
L - 1359 LUXEMBOURG (KIRCHBERG)
(352) 43 62 33

L'action CIME du Centre de Recherche Henri Tudor: une approche pragmatique de coopération avec les PME.

Le contexte régional et industriel

Au Grand-Duché de Luxembourg, le programme d'initiative communautaire STRIDE vise deux cantons limitrophes de la Belgique et de la France, à savoir les cantons d'Esch-sur-Alzette et de Capellen.
Population: 141.000 habitants, soit 40% de la population du Grand-Duché.
Étendue: 442 km2, soit 17% du territoire national.

Cette zone comprend également la partie Luxembourgeoise du Pôle Européen de Développement (PED) de la région d'Athus (B), Longwy (F) et Rodange (L). Les actions entreprises dans le cadre du programme luxembourgeois de l'initiative STRIDE sont par conséquent étroitement liées aux activités du Collège Européen de Technologie (CET) du PED.

Sur le plan industriel, cette zone a connu un bouleversement intersectoriel suite au déclin de la sidérurgie qui fut traditionnellement la principale activité industrielle du Grand-Duché. Au cours de la période 1970-1991, le secteur secondaire a vu le poids de la sidérurgie au plan national se réduire de 65% en 1970 à quelques 30% en 1991. Les autres secteurs industriels secondaires ont pu augmenter pendant la même période leur part de 35% à environ 70%.

L'industrie du secteur secondaire est actuellement caractérisée par une grande diversité de branches industrielles plus ou moins intégrées (transformation de matières plastiques, produits minéraux non métalliques, construction électrique et mécanique, transformation de métaux, agro-alimentaire).

Les entreprises établies dans les deux cantons formant la zone d'objectif n°2, sont, à l'exception de la sidérurgie et de trois autres entreprises, des entreprises de moins de 500 salariés qui possèdent des structures de gestion typiques aux PME/PMI, même si, pour certaines, le critère concernant la participation au capital imposé par la Commission des CE n'est pas rempli. Ce critère n'est d'ailleurs relié d'aucune façon à la capacité d'innovation et de création d'emplois des PME/PMI concernées.

Le programme luxembourgeois

L'envergure du programme luxembourgeois (1991-1993, environ 600 personnes-mois) est relativement importante:

- coût total: 4.849.- kECU
- contribution FEDER: 2.047.- kECU
- contribution nationale: 865.- kECU
- contribution privée: 1.937.- kECU

Pour assurer la bonne gestion du programme, le Gouvernement luxembourgeois a créé l'Agence de Transfert de Technologie STRIDE ("Agence STRIDE") qui s'est établie à Rodange dans l'immeuble luxembourgeois du PED. La gestion de cette agence a été confiée conjointement à deux centres de recherche publics (CRP):

- le CRP du Centre Universitaire et
- le CRP Henri Tudor.

Les ressources du programme luxembourgeois ont été consacrées à trois types d'activités:

- gestion et animation de l'Agence STRIDE;
- actions de sensibilisation;
- projets d'assistance scientifique et technologique.

Les activités de sensibilisation et d'assistance scientifique et technologique sont essentiellement consacrées à deux domaines:

- analyse et traitement des surfaces de matériaux, pour environ 1/3 du programme;
- production et ingénierie assistée par ordinateur (Computer Integrated Manufacturing and Engineering, CIME), pour environ 2/3 du programme.

A cause du retard des décisions de la Commission (fin 1992), les activités n'ont commencé que très progressivement à partir de février 1991. Ce n'est qu'en 1993 que les actions ont pu atteindre toute l'envergure souhaitée, l'Agence STRIDE ne voulant pas engager des moyens trop importants avant l'acceptation définitive par la Commission du programme proposé. Cependant, l'ensemble des moyens prévus pour le programme sera définitivement engagé avant le 31 décembre 1993, mais les projets continueront jusqu'à la fin de 1994.

L'action CIME du Centre Henri Tudor

Principal opérateur de l'action CIME, le CRP Henri Tudor a pu mettre au service de l'Agence STRIDE, ses structures de diffusion et ses réseaux de partenariat industriel, à savoir:

- son *Centre de Ressources Computer Integrated Manufacturing (CR-CIM).* Mis en place dès 1989, le CR-CIM est guidé par un Comité d'accompagnement qui réunit les partenaires industriels et institutionnels du domaine concerné, et notamment certaines entreprises partenaires de l'initiative STRIDE. Il dispose d'une infrastructure unique au plan régional (Atelier flexible CIM) et qui correspond à un investissement en matériel de 1 MECU et un investissement en ressources humaines d'environ 150 personnes-mois. Depuis 1991, les actions de sensibilisation et de création de nouvelles compétences ont été menées à partir de cette plate-forme de démonstration et de recherche;
- son *Centre de Ressources Multimédia (CR-MM)* disposant d'un réseau de partenaires de ce nouveau secteur industriel;
- l'organisation de diffusion des connaissances *SITec* déjà active au plan interrégional et transfrontalier, notamment dans le cadre du PED et de projets COMETT.

Les activités STRIDE auront mobilisé jusqu'à une vingtaine de collaborateurs du CRP Henri Tudor, dont quatre personnes à temps plein.

Lors de la définition initiale du programme luxembourgeois en 1990-1991 - dans un contexte industriel et technologique fort différent de celui de 1993-1994 - l'accent fut mis sur la production manufacturière et ses aspects techniques. Sous l'effet des premières actions de sensibilisation avec des partenaires industriels, la nécessité d'une interprétation moins restrictive fut établie. Les actions spécifiques du CRP Henri Tudor sont donc du domaine de *l'intégration des processus industriels et professionnels par les technologies de l'information.* Les technologies avancées de l'information sont en effet arrivées au stade où elles peuvent potentiellement modifier l'organisation générale de l'entreprise, ses procédés de production et ses produits. Actuellement, la pénétration des technologies de l'information reste encore souvent confinée aux tâches administratives, à la conception assistée par ordinateur et à l'automatisation et au contrôle du processus. Il n'existe pas encore de méthodologie ayant apporté ses preuves pour l'intégration progressive de l'ensemble des processus de gestion et de production avec les technologies déjà partiellement disponibles que sont le multimédia intégré par ordinateur et les systèmes de traitement répartis. Il existe donc un grand besoin à la fois d'informer, de sensibiliser et aussi d'acquérir avec les entreprises le savoir-faire concret de l'application in situ. Les activités entreprises par l'Agence STRIDE ont été conçues pour couvrir un spectre aussi large que possible d'aspects caractéristiques du domaine concerné avec un certain nombre d'entreprises représentatives de la grande diversité industrielle rencontrée dans les deux cantons mentionnés plus haut.

Premiers résultats

Lors de la campagne d'information initiale, environ 100 entreprises furent contactées. Ces entreprises représentent l'ensemble du secteur secondaire de la zone visée, qu'elles soient de type plutôt industriel ou plutôt artisanal. A la suite de cette action, des activités de sensibilisation ont été menées avec 15 entreprises, dont 14 entreprises du type PME/PMI (voir plus haut) et une entreprise sidérurgique. Les entreprises partenaires correspondent à un échantillon représentatif de la zone visée par le programme STRIDE:

- les secteurs d'activités sont très variés;
- leur localisation est dispersée géographiquement sur les deux cantons;
- leur taille est très variable: de quelques salariés à quelques centaines de salariés.

Les secteurs d'activités représentés correspondent à la fois aux secteurs traditionnels (mécanique, chauffage, ventilation et climatisation, sidérurgie, agro-alimentaire, matériaux non métalliques, transformation de métaux) et aux secteurs plus récents ou nouveaux (informatique, électronique, multimédia, recyclage de matières plastiques).

L'envergure des activités de sensibilisation menées par l'Agence STRIDE est très variable:

- visite en entreprise et discussions technologiques avec les spécialistes du CRP Henri Tudor;
- inventaire des problèmes CIME au niveau global de l'entreprise (dans une entreprise, plus de quinze possibilités de projets technologiques furent identifiés);
- pré-études de certains problèmes technologiques identifiés;
- stimulation pour la création de nouvelles compétences et de nouvelles activités dans les entreprises partenaires;
- développement et mise à la disposition des entreprises de capacités de démonstration CIME;
- développement d'un réseau télématique spécifique (CIMTEL ®) pour les partenaires de recherche de l'action CIME;
- étude de marché et évaluation de produits CAD/CAM pour un groupe d'entreprises artisanales.

Les activités d'information et de sensibilisation ont finalement débouché sur 8 projets très concrets d'assistance scientifique et technologique. Ces projets réalisés sur la période 1992-1994 ne sont pas encore terminés en majorité, mais dans l'ensemble leur issue semble très prometteuse.

Cinq projets portent sur l'amélioration et l'intégration par ordinateur de procédés industriels et trois projets concernent des produits intégrables dans un concept CIME. Les sept entreprises partenaires pour ces projets sont toutes de type PME/PMI ou de type artisanal.

Principaux enseignements

(1) *Patience et confiance* sont les mots-clés de la coopération en matière d'innovation et de développement technologique (IDT). Cela signifie d'abord que le processus de coopération ne s'improvise pas, mais est le fruit d'une longue expérience sur le terrain et que cela s'apprend avec tous les partenaires. Cette phase préliminaire doit déboucher sur des relations de confiance mutuelle, la méfiance étant humaine et naturelle dans ce domaine. De ce point de vue, l'action STRIDE du CRP Henri Tudor a été jusqu'à maintenant très positive. La graduation des activités IDT y était certes pour beaucoup: sensibilisation préliminaire par les centres de ressources déjà existants disposant d'un bon réseau de partenaires, premières entrevues exploratoires entre nouveaux partenaires, envoi d'un *ingénieur de technologie* dans les entreprises ainsi sensibilisées, inventaire commun des problèmes à résoudre sur le plan des technologies, analyse des problèmes les plus prioritaires et définition progressive des solutions technologiques en terme de projets R&D en coopération.
(2) Pour la plupart des entreprises partenaires, l'action STRIDE a fourni la *première occasion* de collaboration avec des laboratoires publics ou universitaires.
(3) On a pu constater que le principal frein à l'IDT dans les PME n'est pas d'ordre *stratégique* ou *psychologique*, mais est tout simplement la *rareté des moyens financiers.* L'aide financière publique, qu'elle soit nationale ou européenne, mais qu'elle soit surtout substantielle, est pratiquement une condition nécessaire pour toute action d'envergure. A ce propos, il faut espérer que le *principe de subsidiarité* continuera à être bien compris par le gouvernement. Il s'agit de résoudre les problèmes d'IDT au meilleur niveau possible, qui n'est pas seulement le niveau européen, mais qui est en l'occurrence *aussi* le niveau national sans limitation aux seuls cantons du sud.
(4) Pour sa mission de centre d'IDT, le CRP Henri Tudor considère l'initiative STRIDE comme une *politique d'investissement* pour amorcer la coopération avec de nouveaux partenaires industriels de type PME dans une optique à long terme. La consolidation du partenariat sera assurée par les réseaux des partenaires que constituent les centres de ressources sectoriels du CRP Henri Tudor.
(5) Pour la presque totalité des activités et actions décrites ci-dessus, l'initiative communautaire STRIDE a constitué une stimulation indispensable. L'exécution du programme luxembourgeois a été accompagnée d'une augmentation substantielle des effectifs disponibles pour la coopération avec les entreprises industrielles. Dans l'ensemble, le *principe d'additionnalité* a été parfaitement bien respecté.

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ABSTRACT OF THE SPEECH BY :

M. Richard FITZGERALD
Director
UNIVERSITY COLLEGE
Aquaculture development centre
Department of Zoology
Lee Maltings - Prospect row
IRL - CORK
(353) 21 27 68 71

AQUACULTURE DEVELOPMENT CENTRE: Examples of interactions with SMEs (Research, consultancy and training)

STRIDE in Ireland

The theme selected for the STRIDE Operational Programme for Ireland (1991-1993) was the natural resources area (i.e. agriculture, fisheries, forestry, tourism and aquaculture) as these resources comprise a very significant element of the Irish economy.

The Operational Programme was divided into four sub-programmes with National and EU contributions as follows:

Table 1. Allocation of STRIDE Funds in Ireland

	National (MECU)	EU (MECU)	Total (MECU)
Marine	2.65	7.98	10.63
Environment	1.25	3.2	4.45
Forestry	0.33	1.0	1.33
Food	0.22	0.66	0.88

These funds were used primarily to up-grade and equip designated research facilities in these key sectors, thereby augmenting and enhancing the services available to resource-based industries which, in turn, would promote further development, employment, efficiency and competitiveness. Within the STRIDE Marine sub-programme, the Aquaculture Development Centre was one of the designated projects and it received a total subvention of MECU 0.591

The Aquaculture industry in Europe and Ireland

Globally, the consumption of both fish and shellfish products is steadily increasing. Production from wild fisheries is virtually static, therefore, the deficit can only be supplied by a growing aquaculture industry.

Within the EU, aquaculture annually accounts for 0.8 million tonnes (11%) out of a total fish production of 7.0 million tonnes (1988 figures). The aquaculture sector yields products of a high value and quality which comprise 16% of the total value of the EU fish production (1.3 BECU of 8 BECU). At the same time, it should be highlighted that, even in 1988, the total value of fish imports into the Union still amounted to some 5.7 BECU.

The aquaculture sector is, thus, perceived by the EU as a means of complementing internal fish supplies and providing exports without the constraints of quotas and conservation measures associated with wild stocks. To this end, the EU is actively supporting the industry through its research programmes and with development grant aid. As a consequence, aquaculture is a rapidly developing and growing industry across Europe and is emerging as an integral constituent of the socio-economic profile, most particularly, of coastal areas and peripheral regions. The sector is also typified by a preponderance of small and medium-sized enterprises.

In Ireland, the contribution of the aquaculture industry to the economy has increased significantly, in recent years, when measured in terms of output, employment and value of exports. The Irish Government has rightly identified aquaculture as a major growth sector and in a recent document produced by Bord Iascaigh Mhara (Irish Sea Fisheries Board), for the Minister for the Marine, the scale of development for 1993-1997 was outlined (see Table 2). A major commitment to research and development is essential to ensure that this potential is fully realised.

Table 2. Summary Statistics for the Aquaculture Industry in Ireland

	1991 (est.)	1993 (projected)
Total production (tonnes)	27,700	64,200
Total value (IR£ million)	39.5	102.4
Total jobs	2,600	3,700

Aquaculture Development Centre

The Aquaculture Development Centre is located beside its parent unit, the Zoology Department, in University College Cork. For over 20 years, research in the Zoology Dept. has focused on the areas of fish biology, aquatic ecology and aquaculture. In 1987, the Aquaculture Development Centre was established to provide a formal structure in which to utilise the existing collective expertise and to co-ordinate activities in the field.

Thus, the University recognised the national need for a committed and focused multi-disciplinary approach and has provided in the Aquaculture Development Centre a critical mass of human and physical resources dedicated to this area. The strategic role of this Centre has been acknowledged by the granting of significant financial support from State and EU for research initiatives/programmes and for extensive structural developments (including STRIDE).

There is a small core group of managerial, scientific and administrative staff with further scientific personnel being recruited on a short- to medium-term basis for specific projects as they arise. In addition, associate researchers are drawn as required from other units (e.g. Marine Engineering, Nutrition, Food Chemistry, Food Economics, Marketing), within the University, to participate in certain projects and provide complementary skills.

The physical structures of the Centre include general laboratories, workspace, offices and two dedicated aquaculture facilities, namely, a large experimental water recirculation unit with fish rearing tanks (on campus) and a marine pump-ashore facility with extensive tank farm (off campus). The work activities of the Centre can be grouped into a number of broad themes on the basis of existing expertise and past projects. These include:

- Optimization of existing cultured species: new production strategies
- Evaluation of new species for cultivation: site selection; growth and feeding sturdies
- Health and disease: monitoring service; histopathology; immuno-diagnostics
- Genetics: stock discrimination; broodstock development and enhancement
- Novel technologies: artificial reefs; recirculation systems
- Supporting initiatives: training methodologies; distance learning; image analysis

In keeping with one of the underlying strategies of the Programme, the STRIDE funding to the ADC was used to augment the existing infrastructural facilities by :

- purchasing new equipment
- extending/refurbishing labspace
- employing trained (core) staff to implement the programme objectives

When integrated with existing facilities, they now combine to provide a greater technical support base with extensive capabilities which has enabled the ADC to play a more significant role in research, consultancy and training services to the aquaculture industry.

Research

It is possible to loosely define three categories of research, i.e. basic, strategic and applied, and the ADC is active in all three areas. Efforts are concentrated both on the Irish industry directly and on participation in EU research programmes with transnational linkages.

For example, one of the major problems associated with the salmon farming industry across Europe is the sea louse parasite. In conjunction with laboratories in Norway and Scotland, and funded by the EU AIR programme since 1992, the ADC is participating in two complementary research projects relating to this problem:

- Development of a vaccine for salmon against sea lice
- Investigation of the fish mucosal immune system: this project aims to elucidate the fate in the intestine of vaccines delivered orally

Many people believe that the only viable, environmentally-friendly, solution to the sea louse problem is a vaccine and the outputs from basic/strategic research, as in these two projects, could have significant economic and environmental benefits for the entire salmon farming industry in Northern Europe, not just Ireland. Another EU AIR-funded, transnational, project examines the epidemiology of PKX disease in salmonids. This disease, which primarily affects rainbow trout in culture, causes serious ongoing economic losses.

There have also been significant direct benefits for Irish SMEs through more applied research undertaken by the ADC. Until recently, the Irish aquaculture industry relied on a small number of species (e.g. salmon, trout, mussel and oysters) as is the case in many European countries. It was recognised that there were inherent risks and instabilities in such a situation and, as a priority, these risks would have to be reduced by diversification into, and development of, new species. In Ireland, a number of initiatives with this objective are currently underway and foremost amongst these are the developments in turbot farming.

When turbot farming was first mooted in 1991, the ADC was asked, and agreed, to participate in a proposed concerted approach in conjunction with State development agencies and commercial enterprises. The primary objective in 1991 was to determine the biological and economic feasibility of turbot farming in Ireland. In the intervening years, the ADC has provided a complete range of technical support services (environmental and disease monitoring) to this emerging industry and, more importantly, has undertaken applied research to optimise production and growth in the Irish environment. The ADC has investigated through a series of interrelated ongoing experiments:

- Growth rates of farmed turbot under ambient and enhanced temperatures
- Comparative performance of farmed turbot using various commercial feeds
- The impact of husbandry practices (e.g. feeding strategies) on growth of turbot
- The proximate composition of farmed as compared to wild turbot
- The genetic composition of the cultivated turbot stocks

This work contributes to the overall knowledge base and will hopefully facilitate the optimisation of turbot farming in Ireland as the findings and recommendations can be implemented and tested in the practical sense in the associated commercial farms. A project to start in 1994 is probably the most ambitious to date as it focusses on the development of a dedicated moist diet to maximise growth rates.

Consultancy Services

The ADC has provided a broad range of consultancy services to the Public and Private sectors at both an national and international level.

These services are provided as a result of formal commercial enquiry or through the competitive tender process. All of these are normally targetted at the ADC's known areas of specialisation as indicated earlier. In 1993, the ADC received a total of 21 formal enquiries, resulting in 10 (48%) consultancy assignments, and submitted 5 competitive tenders of which 2 (40%) were successful. The staff of the Centre also provided non-specific advice and general information to a further 28 casual enquiries: this is considered an integral part of the ADC's service as often it facilitates new entrants into the sector.

The tender contracts are typically for multinational commercial groups, involving projects with broad application, whereas formal enquiries come from aquaculture SMEs established in Ireland or those comtemplating establishing in the country. The latter consultancies are normally concerned with filling information gaps, resolving specific short-term problems, carrying out ongoing monitoring programmes and, very ocassionally, assisting with strategic development. In addition, the state agencies may devolve certain duties to the ADC on a temporary contractual basis.

One of the more applied developmental projects carried out in 1993 involved the evaluation of the genetic composition of the broodstock in use by a large Irish salmon farming company. Having investigated the genetic profile of the stocks, the ADC were in a position to formulate a long-term breeding programme for the company which would ensure a viable gene pool with high heterozygosity.

Training Initiatives

University College Cork has a long tradition of training in the aquaculture sector with the aim raising technological competence and meeting labour-market demands. The Zoology Dept delivers a Higher Diploma and M.Sc. course in Aquaculture while the ADC specialises in continuing-vocational training and advanced training workshops.

The advanced training workshops are targeted at the technical staff of SMEs and include such topical issues as:

- Nutrition in Fish Farming
- Aquacultural Engineering
- Hatchery Techniques for Shellfish Farmers and
- Turbot Farming

In the area of continuing vocational training the ADC is a partner in a EU FORCE pilot project with other participants from Scotland and Greece The outputs from this project include a Training Needs Analysis for the industry as well as distance learning materials and test multimedia training packages for use on the farms.

In 1991, the ADC prepared and submitted, on behalf of an Irish consortium, an application to the EU COMETT programme to establish a sectoral UETP for the Aquaculture industry in Europe. This proposal was approved and AQUA TT UETP Ltd was established. This network co-ordinates training and technology transfer under the COMETT programme. AQUA TT, presently, has some 230 members (SMEs, Universities and trade organisations) in EU and EFTA countries with affiliates in Eastern Europe. The UETP is also involved in projects in the LINGUA, TEMPUS and FORCE programmes.

CONCLUSIONS

In the ADC it is intended that the overall objectives of STRIDE can be realised, as evidenced, above:

- participation in National and EU research programmes
- providing enhanced technical support services to both Public and Private sectors
- targetted industry initiatives

However, it is most important that the functional role of units, such as the ADC, will have to be dynamic and will be market-driven serving the changing needs and solving the specific problems of potential partners and clients

Atelier n° 2 / *Workshop n° 2*

Développer les coopérations technologiques
Developing technological cooperation

Président / *Chairman :*

Hugh Logue, head of sector, DG XII, CCE, Bruxelles (B)

Rapporteur / *Rapporteur :*

Gilles Copin, consultant, CCR associés Ernst et Young, Villeurbanne (F)

Arsenal - salle du Gouverneur

ATELIER n° 2

DEVELOPPER LES COOPERATIONS TECHNOLOGIQUES

OBJET

Dégager les orientations, les propositions ou même les règles pratiques favorisant la coopération technologique entre les différents acteurs d'une zone, d'un pôle, d'une région soit vers l'intérieur, soit vers l'extérieur en visant l'interrégional ou l'international.

La coopération Pme/enseignement efficace sera mise en évidence en faisant ressortir la nécessité d'une cohérence de niveau technologique entre les établissements et les entreprises et en lançant l'idée du développement de transfert technique et humain (de type lycées techniques ou entités de niveau équivalent).

L'atelier devra faire également émerger les critères d'une collaboration efficace et réussie en proposant des niveaux de diagnostic et d'intervention.

Cet atelier concerne des actions qui s'inscrivent dans la continuité de la sensibilisation et de la conviction pour les Pme de faire un effort technologique.

Au cours des deux premières parties de séances seront présentés 3 à exemples de coopérations technologiques en bonne voie faisant intervenir une grande diversité d'acteurs.

ORATEURS ET PARTICIPANTS

- Etablissements d'enseignement
- Critt
- Lycées techniques, écoles spécialisées
- Conseils privés
- Clubs d'entreprises
- Associations technologiques
- Organes de transferts technologiques dans les établissements d'enseignement secondaire ou supérieur
- Sociétés de transfert de technologies.

Lundi 7 février 1994 / *Monday, 7 February 1994*
14h00 - 17h30 / *2:00 - 5:30 p.m.*

Présentation de l'atelier par le président de séance
Workshop presentation by the Chairman

Josef Gochermann, manager, Optikzentrum NRW, Bochum (D)

Faire croître les compétences technologiques des petites et moyennes entreprises en leur faisant connaître les techniques de mesures optiques de précision.
Enhancing the technological capabilities of small and medium size companies by introducing precise optical measuring techniques and systems.

Juan Manuel Vieites Baptista de Sousa, secrétaire général, Asociacion Nacional de Fabricantes de Conservas de Pescados Y Mariscos, Vigo (E)

Développement d'un centre de recherches pour les industries de conservation de produits de la pêche en Galice (Espagne).
Development of a research centre on fishing product preservation in Galicia (Spain).

Jean-Claude Ettinger, administrateur délégué, Optimum Management, Nivelles (B)

Former les responsables de centres de recherche publics à coopérer avec les Pme et à gérer l'innovation.
Training the leaders of public research centres to cooperate with SMEs and to manage innovation.

John Mellor, director of teamwork, University of Durham (UK)

NETS : un réseau de réseaux dans le Nord-Est de l'Angleterre.
NETS : a network of networks in the North-East of England.

Discussion / *Discussion*

Arthur Hunter, head of food process technology, The National Food Centre, Dublin (IRL)

Soutien du programme Stride à l'industrie agro-alimentaire irlandaise.
Stride support for the Irish food processing industry.

Claude Barlier, directeur, centre d'ingénierie de recherche et de transfert de l'ESSTIN, Saint-Dié-des-Vosges (F)

Introduction du prototypage rapide et de la CFAO dans les Pme.
Introducing rapid prototyping and CAD-CAM in SMEs.

Rafael Ferre, professeur, Universidad Politecnica, Barcelona (E)

Coopération technologique entre un centre CIM de l'université et les Pme de Catalogne.
Technological cooperation between a University CIM centre and SMEs in Catalonia.

Discussion / *Discussion*

Mardi 8 février 1994 / *Tuesday, 8 February 1994*
9h00 - 10h40 / *9:00 - 10:40 a.m.*

Pierre Vanesse, président, chambre syndicale des entrepreneurs du bâtiment et des travaux publics, Valenciennes (F)

Sensibilisation et partenariat technologique entre organisations professionnelles, entreprises du BTP et université.
Fostering greater awareness and technological partnerships between professional bodies, construction firms and the University.

Pr Lambert Stals, general manager, Institute for Materials Research, Limburg University, Diepenbeek (B)

Les projets Stride de la province belge du Limbourg.
The Stride projects of the Belgian Province of Limburg.

Pr Erick Granum, Laboratory of Image Analysis, Aalborg University (DK)

Norbit : un réseau de Pme dans le domaine de la vision artificielle (contrôle-qualité, contrôle de fabrication).
Norbit : a SMEs network in the field of artificial vision (quality control, process monitoring and control).

Dr Ralf Grassow, managing director, Centre for Research and Development in Microtherapy, Bochum (D)

TT en médecine et en technologie médicale dans la région de la Ruhr.
TT in medicine and medical technology in the Ruhr area.

Discussion / *Discussion*

PANEL

ATELIER N° 2

"DEVELOPPER LES COOPERATIONS TECHNOLOGIQUES"

Mr. Jeff MARTINUSSEN, Danish Technologic Institute, Taastrup (DK)

Les réseaux de PME technologiques : exemples italiens, danois, britanniques.

Mr. Jean-Claude ETTINGER, Optimum Management, Nivelles (B)

Former les directeurs de Centres de Recherche Publics à coopérer avec les PME et à manager l'innovation.

Mr. Juan VIEITES BAPTISTA, Asociacion Nacional Fabricantes de Pescado, Vigo (E)

Création d'un centre de recherches pour les industries de conservation de produits de la pêche en Galice.

Mr. C. BARLIER, Centre d'Ingénierie de Recherche et de Transfert, Saint-Dié (F)

Introduction du prototypage rapide et de la CFAO dans les PME.

Mr. A. HUNTER, National Food Centre, Dunsinea, Dublin (Irl)

R&D, conseils, atelier-pilote, utilisés par les PME du secteur agro-alimentaire.

Mr. R. FERRE MASIP, Universidad Politecnica, Barcelona (E)

Coopération entre un centre C.I.M. de l'Université et les PME de Catalogne.

Pr. L. STALS, Instituut voor Material Onderzoek, Diepenbeek (B)

Transfert de technologie dans plusieurs domaines techniques : déposition en phase vapeur, contrôle non destructif, conception de produits et fiabilité.

Mr. VANDENBULKE, Chambre de Commerce et d'Industrie, Peronne (F)

Création d'un pôle technologique dans l'hydraulique et l'hydromécanique.

Pr. Erick GRANUM, Institute of Electronic Systems, Aalborg (DK)

Réseau de PME concernées par la vision industrielle (découpe, contrôle de qualité,...)

IVe Conférence Stride

Arsenal de Metz (France)
7-8 février 1994

DOCUMENT DE TRAVAIL

WORKING PAPER

TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Josef GOCHERMANN
Manager
OPTIKZENTRUM NRW
Universitätsstrasse 142
D - 44799 BOCHUM
(49) 234 97070

Kurzfassung

Das OPTIKZENTRUM Nordrhein-Westfalen - Steigerung der technologischen Qualifikation kleiner und mittlerer Unternehmen durch Einführung präziser optischer Meßmethoden und -systeme

(The OPTIKZENTRUM Nordrhein-Westfalen - Enhancing the Technological Capabilities of Small and Medium Size Companies by Introducing Precise Optical Measuring Techniques and Systems.)

Im Industrieraum Ruhrgebiet finden sich die unterschiedlichsten produzierenden Gewerbe. Allen gemeinsam ist die Notwendigkeit, durch technologisch innovative Verfahren und Entwicklungen qualitätskontrollierender und -optimierender zu produzieren. Eine Kerntechnologie hierzu ist die Optik, mit deren Hilfe berührungslos und ohne Einfluß auf den Prozeß gemessen, geprüft und beobachtet werden kann. Die extrem hohen Genauigkeitsanforderungen und die oft ungünstigen Umgebungsbedingungen erfordern die Entwicklung und Implementierung komplexer optischer Systeme, wozu viele Unternehmen derzeit noch nicht in der Lage sind.

Während der Bedarf an Optik in der Region groß ist, finden sich die meisten Entwickler und Anbieter jedoch in entfernten Gebieten. Gleichwohl ist das wissenschaftlich-technische Potential in NRW durch die große Hochschuldichte beachtlich.

Das OPTIKZENTRUM Nordrhein-Westfalen will diese Lücke schließen. Gemeinsam mit Unternehmen der Region, gestützt durch das Universitäts-Know-how, sollen potentielle Anwender optischer Meßtechnik und optischer Systeme in die Lage versetzt werden, sich innovativ weiterzuentwickeln. Diesem Zweck dienen gemeinsame F+E-Vorhaben, Analyse und Systementwicklungen vor Ort, Informationen und Technologietransfer, sowie die Qualifikation von Mitarbeitern.

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TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. J.M. VIEITES BAPTISTA DE SOUSA
Secretaire generale
ASOCIACION NACIONAL DE FABRICANTES
DE CONSERVAS DE PESCADOS Y MARISCOS
Areal, 144-1°
E - 36201 VIGO (PONTEVEDRA)
(34) 86 433351

Asociación Nacional
de Fabricantes de
CONSERVAS DE PESCADOS
Y MARISCOS
(ANFACO)

Monsieur le Président, Mesdames et Messieurs:

Messieurs les industriels spagnoles de l'Asociación Nacional de Fabricantes de Conservas de Pescados y Mariscos, ANFACO, m'ont donné la possibilité et le grand honneur de vous exprimer en leur nom les plus chalereux rémerciements pour l'invitation à exposer le rôle d'ANFACO dans le cadre du STRIDE.

L'Asociación Nacional de Fabricantes de Conservas de Pescados et Mariscos, ANFACO, a eté créé á l'année 1977. Cette Association, reprend le travaux de l'áncienne "UNION DE FABRICANTES DE CONSERVAS DE GALICIA", crée a 1904 en faissant de la défense integral des intèrets profesionels du Secteur transformateur des produits de la peche sa raison d'existance.

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Les petites et les moyennes enterprises ne peuvent pas restées indifférents au process de montant concurrence survenú comme consécuence de l'internationalization du marché lequel suppose le défi le plus important à repondre à notres jours. Ceci c'est dehors question pour l'Association que je répresent, et dans cet sense les efforts qu'ont eté faits dirigés à la amélioration continue du niveau concurrencial des enterprises du secteur transformateur des produits de la pêche peuvent être considerés comme pionniers.

Dès l'origine, cette industrie, qui est devenúe etre charatéristique du littoral spagnol, s'est placée préférablement à la region galicienne, surtout à la province de Pontevedra. Deux circonstances ont produit cet movement precurseur: L'émigration de les Catalans vers la Galice dans la premiere dizaine du siècle XVIII, en quete de la sardine, disparue alors du Méditerranen, et trés abondant au litorel galicien et le naufrage d'un vessel français a la baie de Vigo lequel emportait, divers préparations en conserve qui revellait, tout de suite, le désir d'émulation.

Pour donner quelques reseignements de la Region galicienne on peut dire q'il est 29.434 km² vaste, ça fait le 5,83 % sur le total national. Sa population a 1975 representait le 7,5 % sur l'ensamble, mais aujourd'hui il existe certaine tendence vers la díminution. Pourtant, la densité de population, environ 90 habitants/km² il est superieure la moyenne nationale.

Les charactéristiques les plus typiques de la économie galicienne, comme sa forte dépendence du secteur primaire, la manque d'integration dans les differents étapes productives, unís les relativement hautes taux de population ont amené, à l'incapacité de la región pour assimiler touts les ressources humaines.

Dans cet cadre, l'industrie de transformation des produits de la péche a supposé hier et de même aujourd'hui un trés important facteur de dynamisme sur l'ensamble du faible tisú industriel de la Galice.

Dés le début de ses activities, "l'UNION" et aprés ANFACO a donné soutènement à l'áctivité des industries des conserves qui offrent des charactéristiques bien diferentes par rapport a celles du début du siècle. A ce moment, il éxistait une fourniture trés en dependence de la peche cotière, au litorel galicienne, une exploitation centrée à la sardine, une man d'ouvre abondante et pas chere dont le côut ne represent qu'un petit pourcentaje au produit fini, une location préferente, pour des raisons historiques, des usines à la Galice par rapport au marché spagnol et une certaine independence de celui-ci des facteurs internationales, surtout en considerant un marche soit national soit international moins saturé qui celui de notres jours.

Maintenent, pourtant, le situation est trés different et on pourrait dire tout à fait opossée. Les nouvelles sources de approvisionament des matières premières plus diversifiées ont fait changer les raisons historiques d'avantage de la Galice, et en plus, ont produit l'augmentation de la production. Celá a supposée une indubitable difficulté, au même temps qu'il a fallú de faire front à des défis comme des besoins montants d'investissements des enterprises unies au accès aux marchés beaucoup plus concurrantes, et diversifies. Mais surtout, aujourd'hui on peut rémarquer, la forte depéndence des facteurs internationels comme la de plus en plus forte concurrance des marchés plus vastes, parfois saturés

avec des prix à la baisse, qui suposse des problémes de face à réussir la capitalisation necessaire du secteur.

Voici, vue d'une façon genérale la problematique des industries de la conserve, on verrá suivant comme l'Association a structuré ses ressources humaines et materièlles et comme a collaboré avec le Secteur à fin de donner des réponses, à chaque moment, aux défis les plus importants.

L'Association est conformée dans différents départaments, qui travaillent dans une continue collaboration en dépendance du Secrétariat Genérale, à savoir:

1.- Dept. Technique et de la Recherche.
2.- Dept. du Commerce Extérieur et Intérieur.
3.- Dept. Economique-Financiere.
4.- Formation.
5.- Assistance Juridique.
6.- Service de Documentation et Information.

1.- Le Département Technique et de la Recherche.

Le 6 Octobre 1949, le Joint Rectrice de "l'Unión" prend la décision d'installer dans ses dependances le Département Technique et de la Recherche, dediqué spécifiquement aux problèmes techniques et scientifiques liés aux procèsses industriels. L'idée vient meme du comencement de la Union, mais à cet momment-la il n'y eu des possibilites d'en demarrer l'idée. Pendant les années trente on demande conseil du technique française Mr. Cheftel pour l'installation d'un laboratoire, mais n'est pas jusqu'à, aprés la guerre mondial, avec le début d'une cértaine activité exportateusse vers l'Inglaterre, que s'on posse la questión du control du produit. Alors la fabrication des conserves été fait d'une façón à peu pres artisanal. Pour mieux supporter les frais des analyses et pour aller a peu plus loin en commencent à faire le control de la qualité, est que s'est crée le Departament Technique et de la Recherche. Depuis sa fondation, on a fait au meme temp, du assesorament des enterprises sur des méthodes de fabrication, formation et amélioramente du niveau techinique du personnel. Les travaux se sont articulés sur deux champs: D'une coté l'étude et propose des méthodes d'ánalyse et des normes de qualité et d'une autre coté des différents travaux de la recherche appliquée à

échelle industriel.

Pour faire un résume assez vite des activites menées à bien pendant les 44 annés d'existence du "Departement" on pourrait signaler la participation à la reunion convoquée pour la OCDE á Paris en 1961 où on a traité le redation d'un document sur des normes sanitaires pour le poisson et produits de la peche. On a participé dans le programme "Fish Code" de la FAO/OMS, à Bergen (Norwege) plusieurs fois pour discuter les normes de la anchovie sardine, thon.

Dans le domaine de la normalization international des boîtes métalliques nous sommes allées à plusieurs reunions de la ISO (International Standard Organization), à London, Sevilla Manchester, et Stockholm. A Vigo, et au endroit d'ANFACO on a eté organisé, à 1985 une reunion international sur plusieurs matières de la normalization internationale.

Aujourd'hui, les moyens et installations ont augmenté d'une façon extraordinaire, et on dispose de laboratoires de bactériologie chimie, instrumentel, On a fait un trés grand travail d'ásistance téchnique aux associes et meme comme colaborateurs de la Administration, avec l'assistance à congrés, publications, formation du personnel, mise au point de téchniques etc. Au mois de Octobre 1966, la Direction Géneral du Commerce, du Ministére du Commerce compte tenú le travail déroulé et sa speciallization prend l'accord de reconetre le Laboratoire de l'Association por la réalisation des analyses et péritages.

Entre l'equipement de professionels en travaillant à L'Association, et liés au Departement Technique et de la Recherche, il y a des docteurs et licenciés dans sciences chimiques, licenciés en sciences veterinaires et techniciens de laboratoire, en travaillant toujours avec complète coordination les autres Departements.

Dedans les fonctions du département il est necessaire remarquer les suivantes:

a) Controle et amélioration de la qualité.

Services analytiques, sutenue par la réalisation des analyses rutinaires et speciales des matierés premières, proccés de

fabrication et des produits finis.

- Diagnostique, planification et implementation des plans du control de la qualité.

Systèmes de control.
Control de la contamination et du milieu ambiance.
Surveillance et control des fraudes.
Homologation des matières premières.

b) Informes techniques.

c) Déplacementes à les enterprises.

d) Département de la recherche.

Leur propres fonctions sont les suivantes:

- Faire de la recherche sur problemes sectoriel posses par les enterprises elles-memes.
- Egalement sur des problèmes d'interet particulier.
- Prévision des problèmes à l'avenir.
- Collaborations avec d'autres intitutions de récherche nationales et internationales.
- Recherche sur l'optimisation et reciclage des produits finis et déchets.
- Des autres.

A cet momment il faut dire quelques mots sur la proyection de futur de l'Association. A ce respect, la apportation des fonds du Programme STRIDE a été décisives de face à reussir, bientot, unne vieille aspiration de l'Association comme elle était de dispposer des nouvelles installations, pour mieux s'adapter les besoins croissants des associés et d'en demarrer des nouveaux projects.

Le dessein des nouvelles installationes, beaucoup plus vastes par rapport les anciennes, permettra, sans doute, d'ammeliorer l'operativitité du travaille. Le laboratoire il aurá des areas parfaitement définis et separées meme quand le filosophie de la coordination et du travaille en équipement, resterá tout à fait égale. Le fonctionnement il va demarrer cette année-la, et il aurá trois grandes areas:

- Laboratoire de biochimique, transformation biotechnologique et profit des déchets et produits de la transformation:

- Laboratoires des nouvelles techniques et méthodologies analitiques et déroulement des nouveaux produits.

- Laboratoire d'instrumentation.

AUTRES DEPARTAMENTS D'ANFACO

Egalement important, compte tenú l'esprit de défense integrale des intérets du secteur son les autres Départements, par exemple:

Départemente du Commerce Extérieur et Intérieur:

Dans notres jours les produits sont conçus aprés évaluation des besoins à satisfier. Pour ça faire, il faut disposser d'information à peu pres sur les caracteristiques du marché, (captation des clients, stratégies de concurrence etc.) et du autour économique, technologique et culturelle.

Le but des activités il est liée a l'adquisition des études de marche qui vont soutenir la pris des décisiones comme evolution du marché, habitudes du consommateur, déroulement des nouveaux produits, cherche des nouvelles cannaux de commersialization, champagnes d'image, presentation des nouveaux produits, et en géneral tout ce qui concerne à des travaux socioculturelles, economiques et tecnologiques liés au secteur.

Departement Juridique:

Dirigé par avocats, s'est ocuppe de l'assistance pas seulement pour des problèmes individuels meme pour des affaires sectoriales qui ataint l'ensemble du Secteur.

Departement de Documentation, et Information:

En dépendant directement du Sécretariat Géneral et selon le cas assesoré par tous les autres departements déjá cités, il prend en charge les fonctions de entretien et actualization de la bibliothèque, laquelle possait des publications sur diverses matières scientifique-techniques economiques et legales d'interet pour le Secteur. L'information ci-joint citée il est difusée par moyen des circulaires; bulletines; téléphoniquement à instances de quelque departement ou à demande des associés.

D'une façon régulière on publique un magazine qui contienent des matières propres du secteur et d'áctualité. Tous les nouvelles d'ínteret et des repportages sur diverses affaires (politiques, juridiques, économiques, laborales, etc).

Departement de Formation:

Le personel il est consideré aujourd'hui comme l'actif le plus important des enterprises, au meme temp, un personnel avec un très bon niveau de formation permet pas seulement de répondre le défis d'aujourd'hui aussi de s'adapter mieux aux continus changes des façons à produire, lequels s'on impossés par la évolution des procedures industrielles.

Pour tout çá, ce Département organise régulièrement activités telles comme courses et séminaires, conférences et colloques. Il y a dejá fait plussieurs activités sur les suivantes metieres:

Techniques scientifiques
Fiscaux
laborales
Economique-financiéres
Marketing
Aprovisionaments
Production
Resources humaines et gestion du personel.
Direction génerale
Commerce exterieur.
Control et gestion de la qualité.

Pour mieux dérouler cettes activites ANFACO à côté de

leur propre personnel contacté avec de profesionnels du mond patronal, universitaire et administrative.

Collaborations.

ANFACO n'a pas voulú rester isolée. Compte tenú l'importance de mantenir un flux d'information le plus vaste possible l'Asociation a ouvert ses portes à la collaboration avec d'autres centres privées et publiques. Entre-eux on peut citer:

Nationales:

"Instituto del frio", "Instituto de la Grasa de Sevilla", "Instituto de Investigaciones Marinas", "Instituto Español de Oceanografía".

Internationales:

Institute Portugais des Conserves et du Poisson, Institute Pasteur (France); Centre Experimentel de la Conserve de Parma (Italia), IFREMER (Francia) TNO, Holland, et d'autres Centres et Universités nationales et étrangères.

Monsieur le Président, Mesdames, Messieurs:

Pour finir, il faut remercier vottre amable invitation pour participer à le IVe Conference STRIDE. Je voudrait vous faire savoir, encore une fois plus, l'importance qui l'aide du STRIDE, suppose pour tout l'ensamble du secteur de la conserve. En plus, je vous remeciez de avoir bien voulú m'écouter, et je reste a votre disposition s'il vous desirez de posser quelque question.

IVe Conférence Stride

Arsenal de Metz (France)
7-8 février 1994

DOCUMENT DE TRAVAIL

WORKING PAPER

TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Jean-Claude ETTINGER
Administrateur délégué
OPTIMUM MANAGEMENT
Rue de l'Industrie, 20
B - 1400 NIVELLES
(32) 2 650 41 61

FORMER LES RESPONSABLES DE CENTRES DE RECHERCHE PUBLICS A COOPERER AVEC LES PME ET A GERER L'INNOVATION

1. LA PROBLEMATIQUE

D'une manière générale, les centres de recherche ont un rôle essentiel à jouer dans la diffusion locale des compétences technologiques. En particulier, cette diffusion doit être dirigée de manière privilégiée vers les PME compte tenu de ce qu'il est maintenant établi que ces entreprises constituent un vecteur efficace de développement économique via notamment l'innovation technologique.

En Région Wallonne, il est apparu que les centres de recherche publics, en raison de leurs modes de financement et de fonctionnement, n'étaient pas suffisamment engagés dans la voie de la coopération avec les PME locales, en particulier dans le domaine du développement et de la mise en oeuvre d'innovations technologiques.

Les facteurs expliquant cette situation dans les centres de recherche et devant être pris en compte dans toute approche d'amélioration, tant quantitative que qualitative, de leur coopération avec les PME sont multiples :

- des orientations stratégiques insuffisamment définies, résultant de contraintes en sens divers auxquelles ces centres sont soumis
- des modes de financement ne stimulant pas toujours l'ouverture aux PME
- la méconnaissance des PME en général et de leurs attentes en termes de coopération en particulier
- des savoir-faire en gestion de projets innovants insuffisamment pénétrés des contraintes économiques
- une absence de démarche "commerciale" tournée vers l'entreprise de taille réduite.

2. LA FORMATION, OUTIL DE DEVELOPPEMENT DE LA COOPERATION C.R.P. - PME

Parmi les mesures devant conduire à une intensification de la coopération recherchée, la formation des responsables de centre de recherche constitue le moyen par excellence d'assurer une amélioration à moyen et long terme.

Pour répondre à cette attente, cette action de formation doit répondre aux caractéristiques suivantes :

a) avoir pour objectifs opérationnels la correction des facteurs mis en évidence plus haut, à savoir le développement
   - de comportements managériaux nouveaux en matière de
     . réflexion et formulation stratégique
     . mise en oeuvre d'une politique générale cohérente au travers des ressources humaines existantes
     . orientation "client PME" de l'approche des utilisateurs du centre
     . valorisation des ressources en fonction des attentes des PME

   - de savoir-faire tournés vers
     . les dimensions et contraintes économiques des projets d'innovation
     . le contrôle de la gestion d'un centre qui intègre l'objectif de coopération avec les PME

   - de la connaissance des techniques juridiques et autres de coopération technologique

b) compte tenu de l'ampleur et du niveau comportemental des changements à opérer, s'étaler sur une période sufisamment longue pour que les évolutions puissent se déclencher et être accompagnées

c) être prolongée, au niveau de chaque centre concerné, par un accompagnement de la mise en oeuvre individualisée des changements suscités par la formation collective

d) être accompagnée par d'autres mesures aux objectifs convergents.

3. LA FORMATION EN COURS DE REALISATION

a). Contenu

Les 8 modules qui structurent ce contenu sont orientés vers les objectifs opérationnels décrits plus haut :

1. la stratégie d'un centre de recherche
2. l'approche des utilisateurs du centre
3. la faisabilité commerciale d'une innovation
4. la coopération technologique
5. la faisabilité financière d'une innovation
6. le contrôle de gestion d'un centre de recherche
7. la gestion des ressources humaines
8. la fourniture d'informations traitées et de conseil

b) Processus

L'ensemble du contenu dispensé ci-avant est dispensé
- en un cycle long (octobre-juin) de formation collective en 2 groupes limités à 10 participants

- en 8 modules de 5 demi-journées

- selon un rythme varié
  . 3 modules en séminaires résidentiels
  . 25 séances d'une matinée prolongée par un déjeuner
  . interruption pour les congés scolaires

- en interaction avec des dirigeants de PME en formation parallèle : déjeuners et un séminaire résidentiel communs

- selon diverses méthodes pédagogiques : exposés participatifs, étude de cas réels, jeux de rôles, ...

- avec un prolongement en interventions individualisées d'assistance à la mise en oeuvre des acquis de formation au sein de chaque centre, à raison d'un budget de 32 heures.

c) Promotion de l'action

- campagne de presse
- envoi d'un dossier à toute la population de la cible, avec une lettre de persuasion de la part de l'autorité subsidiante
- visite personnelle de chaque centre visé pour recrutement des participants.

4. ETAT D'AVANCEMENT

La formation est en cours depuis début octobre 1993 : les 3 premiers modules sont terminés.

* * *

IVe Conférence Stride

Arsenal de Metz (France)
7-8 février 1994

DOCUMENT DE TRAVAIL

WORKING PAPER

TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. John MELLOR
Director of teamwork
UNIVERSITY OF DURHAM
Shool of Engineering and Computer Science
South road
UK - DURHAM DH1 3LE
(44) 91 374 3923

draft paper for presentation in METZ

NETS: A network of networks in the north east of England

Introduction

The British government made a call for projects under the community initiative concerning regional capacities for research, technology and innovation. Four separate proposals from the North East of England were successful in securing a grant from EC structural funds, administered by the regional DTI. Each project targeted different perceived needs of small scale manufacturing companies and was organised in a different way. There was, however, a significant common aim.

Small firms in the manufacturing sector are not aware of, or taking full advantage of, the assistance that is available to them. In some cases the technological support requires development and refinement to satisfy their requirements. Each of the projects draws together expertise in a network arrangement to maximise the delivery of practical help, advice and support at the local level. This idea of networking was revolutionary for some of the existing service organisations. It meant looking beyond the pressures of competition to the global benefits of co-operation.

Background

Britain has been through a biting recession which has seen the decline and loss of much of its manufacturing capacity. A characteristic of the larger firms that have survived the recession is that they have adopted new working practices and made efficient use of new technologies. Some of the smaller firms have also adapted and changed to meet the challenge of the competition from an international market. Many however have managed to survive the recession through hard work, painful cutting of excess capacity and waste and reduction of margins. There are still tremendous inefficiencies in their organisation due to the legacy of existing practices and equipment, and the lack of investment in people or plant. Use of appropriate technologies could put them into a better position to compete on price, delivery and quality.

Earlier work to investigate this situation revealed some factors. Firms are highly pressured for time and money. They perceive either
a. no provision for their need
b. no local provision for their need
c. a bewildering multiplicity of provision
They receive too much paper through the post to be able to select what is good or useful.

The need for local networks

Most companies prefer to build up local contacts for the supply of services and materials. They would prefer to deal with a small number of trusted suppliers.

Technology and expertise is available from many sources, often in an inappropriate form. A particular source will rarely be able to meet the different needs of a company.

A spirit of competition has developed between the technology suppliers. The colleges, universities and technology support agencies are all seeking to provide services to industry. The service agencies tend to concentrate on the larger companies who have money to invest, and hence they neglect the smaller companies where the returns are much smaller.

NETS

The four STRIDE projects and a project funded under RTSG have agreed to work collectively as part of an overall regional network called North East Technology Support (NETS). The network brings together all the region's main technology support organisations to co-ordinate and rationalise provision.

The network has agreed to act together on certain issues. Projects will share best practice about the use of marketing devices such as mailshots and advertising. There will be an exchange of information about the needs of the small manufacturing industries and how the project can be improved to increase the technology transfer. The projects will work together to provide a co-ordinated response to British government, regional and European initiatives.

Perhaps most importantly in the short term the projects have decided to share data about company contacts and visits. Use of a common company questionnaire by all projects will simplify data collection and profiling of companies. This will be used to better target companies with services that they are likely to need and reduce the amount of irrelevant or redundant information that a manager receives.

The people involved in each of the projects are already seeing benefits from the sharing of 'best practice' in such areas as marketing, industrial visits, workshop organisation, questionnaire design, visit reporting and data collection.

TEAMwork

Each project has a distinct identity resulting from location, number of partners, technologies supported, approach, and existing contact base. Their precise relationship to NETS may differ slightly but in general all projects participate fully in the activities of NETS. One of the projects will be used to illustrate an approach to reaching the smaller manufacturing companies and developing the technology so that it is appropriate to their needs. TEAMwork, the Transfer of Existing and Appropriate technology to the Manufacturing workplace, a consortium of five further education colleges and two universities, is the largest of the five projects.

TEAMwork is making firms aware of what technology is available and how it can benefit them. It is helping firms to decide what is appropriate for their particular needs and assisting them with the application of the technology and it is providing a structure for the further development of the technology where required. All the

partners are academic institutions with huge resources of expertise, research capacity and support for innovation, but small companies require confidence that a particular technology works in a commercial environment. By drawing together large and small firms in participatory forums TEAMwork demonstrates how proven technology can work.

Technology transfer takes place between the companies within the enabling environment of a workshop or technology transfer club.

Reaching smaller companies is a universal problem. The time and financial pressures mentioned earlier are barriers to their participation in workshops and even their openness to a site visit. Larger firms are keen to see their suppliers, many of whom are small companies, make the best use of technology and people. TEAMwork is working alongside larger firms to develop their supplier chain. Some of the workshops are hosted by the larger companies with input from the company and the academic institution partner.

Through the visit and workshop program TEAMwork is opening up a dialogue between the larger companies, service providers and smaller manufacturers

'Datashare'

An early result from the collaboration of the five projects has been agreement over the need to share data. The commercial value of data has previously resulted in a strong reluctance for one service agency to reveal to another such information as its contact database, visit program, or information about individual companies..

..

..

..

Conclusions

The networking of resources means that firms can access the full range of skills and expertise through local points of contact.

The sharing of data has resulted in a far more consistent, and hence professional, approach to the small companies.

Each of the projects, like TEAMwork, is working together to meet the challenge of restoring the regions industrial strength by making proven technology available to the smaller companies.

North East Technology Support (NETS)

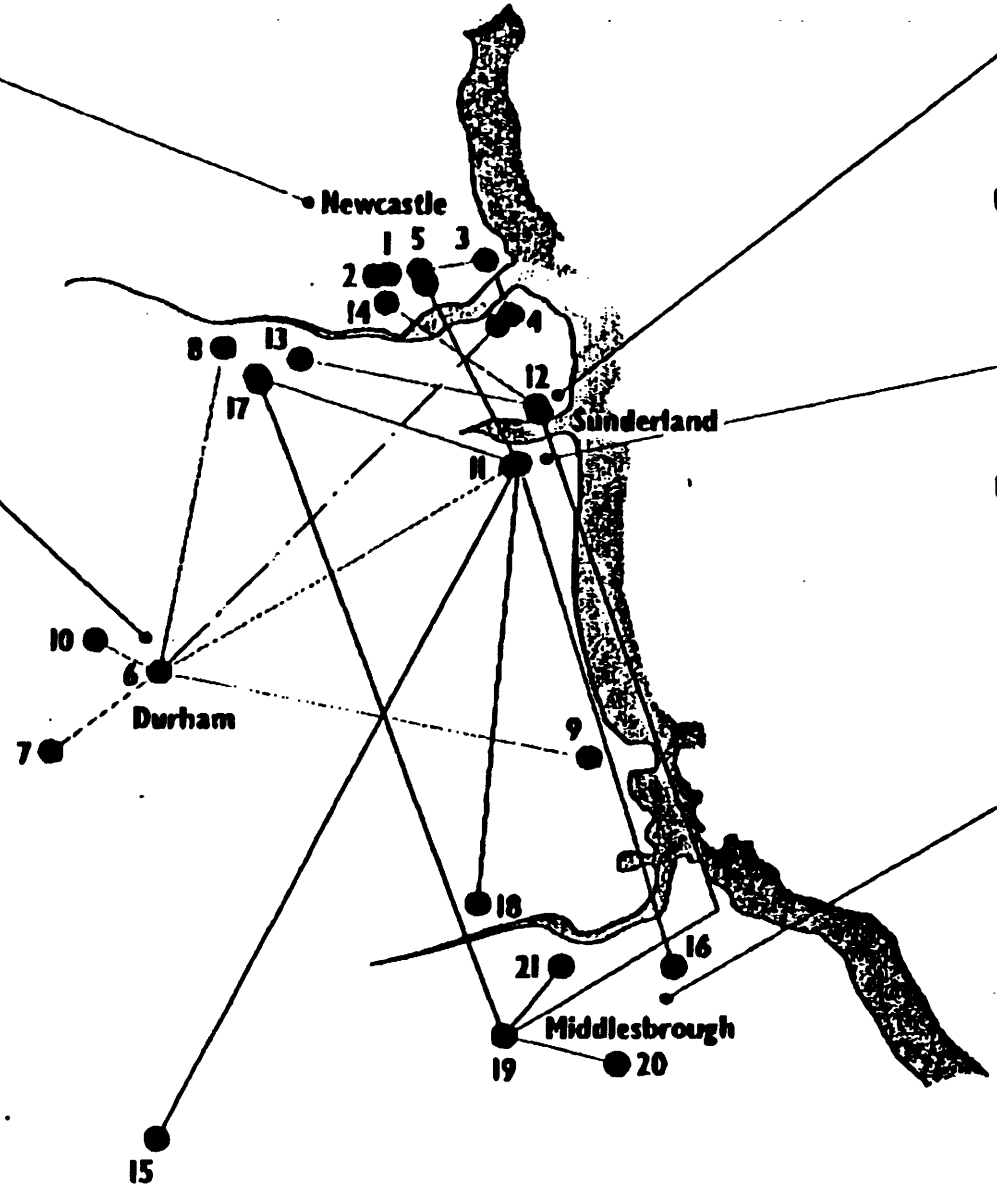
Detect
Design Technology Transfer

- ❑ University of Newcastle 1
- Newcastle College 2
- North Tyneside College 3
- South Tyneside College 4
- University of Northumbria 5

Teamwork
Transfer of Existing and Available Technology to the Manufacturing Workplace

- ❑ University of Durham 6
- Bishop Auckland College 7
- Gateshead College 8
- Hartlepool College 9
- New College Durham 10
- South Tyneside College 4
- University of Sunderland 11

❑ = Coordinators



Distance
Development of Independent Sources of Technology and Networking of Consultancy Expertise

- ❑ Regional Technology Centre 12
- MARI 13
- Merz & McLellan 14

Eurostan
European Standards Technical Advice Network

- ❑ University of Sunderland 11
- Darlington College 15
- Longlands College 16
- North East Innovation Centre 17
- Stockton/Billingham College 18
- University of Northumbria 5

After
Affordable Technology for SME's

- ❑ Cadcam Centre 19
- North East Innovation Centre 17
- Regional Technology Centre 12
- Teesside University 20
- The Welding Institute 21

dti

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IVe Conférence Stride

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DOCUMENT DE TRAVAIL

WORKING PAPER

TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Arthur HUNTER
Head of food process technology
THE NATIONAL FOOD CENTRE
Dunsinea, Castleknock
IRL - DUBLIN 15
(353) 1 383222

Teagasc
Agriculture and Food Development Authority

The National Food Centre
Dunsinea, Castleknock, Dublin 15, Ireland.
Telephone (01) 383222
Telex 31947 EI
Fax (01) 383684

STRIDE SUPPORT FOR THE IRISH FOOD PROCESSING INDUSTRY

INTRODUCTION

1. The Irish Food Industry

Ireland is traditionally a producer of agricultural commodities. Vast quantities of raw materials have always been exported to be processed and packaged elsewhere.

The Irish Government's present National Development plan involves a major change in direction for the food industry. Processed foods is one of the areas where significant development is targeted and expected. The aim is to exploit more of the country's natural resources and hopefully increase employment.

Output from the processed food sector has indeed been rising, as have exports. This increased output, however, has only slowed down the rate at which jobs are lost due to rationalisation and automation.

The food processing sector employs around 37,000. Much of the industry is small and is in rural areas. (75% of industrial establishments employ less than 50 people).

Added value is low at 28% and in meat (Ireland's largest sector) added value is only 13%.

2. <u>The National Food Centre (NFC) - Dublin</u>
<u>The Dairy Products Centre (DPC) - Fermoy, Co. Cork.</u>

NFC and DPC are semi-State organisations which carry out research and provide consultancy and testing services to the food processing sector.

These two centres are part of the Irish Agriculture and Food Authority (Teagasc) which was largely devoted to servicing the farming community.

The DPC, dealing as it does with dairy products (the most highly developed sector of Ireland's food industry) has been in existence since 1965.

The NFC was formed only 5 years ago to stimulate downstream development in other (non-dairy) sectors.

The division of services between the two centres is no longer so clearly defined, due to the fact that the dairy cooperatives (who are DPC's customers) are diversifying into other areas and into manufacture of milk derived ingredients for use in other (non dairy) industries. The dairies are, therefore, seeking technical facilities and expertise in bakery, confectionery and meat product manufacture and DPC has been forced to invest in these new areas.

NFC on the other hand was formed only five years ago to stimulate downstream product manufacture in the less developed non dairy foods sector. The NFC is based on a site previously dedicated to meat research and equipped only with process facilities for slaughter and immediate post slaughter treatments. It was necessary here to build a new multipurpose pilot plant for processed foods. This new 900 sq. m. building came into service only in 1991.

It was against this scenario that STRIDE came to the rescue with funding

(i) for non-dairy process equipment at DPC

(ii) for some basic pieces of equipment for the new pilot plant at NFC.

STRIDE FUNDING

STRIDE funding supported the following purchases:

DPC		NFC	
Confectionery Equipment	108	Extrusion/cooking	130
Meat Products	70	Autoclave (pilot scale)	47
Bakery Products	82	Food Processor (pilot scale)	47
(Training & Miscellaneous)	20	Temperature measuring	11
		Cold Stores	29
		Mass spectrometer	135
	280		399

PROJECT EXAMPLES

The pilot plant facilities at DPC and NFC are for use in commercial development projects which are carried out by DPC/NFC staff in close collaboration with industrial clients and entrepreneurs.

Examples of projects are listed below.

DPC

Client	Project	Processes
Dairy Research Programme	Development of cheese/meat combination products e.g. burgers, salami etc.	Meat Processing
Dairy Research Programme	Effect of dried milk protein blends on the texture of yogurt	UHT Rheology
Dairy Co-op	Evaluation of lactose use in processed meat products	Meat Processing
Dairy Co-op	Development of long-life ice-cream mixes for soft-serve distribution outlets	UHT Packaging Ice-cream making

NFC

Meat Company	Canned comminuted meat products for catering markets	Formulation Thermal processing Heat penetration studies
Entrepreneur	Vegetable burgers	Formulation Chopping/mixing/forming Freezing
Ingredients manufacturer	Range of extruded vegetable proteins	Formulation Blending Extrusion cooking

Client	Project	Processes
Manufacturer of spreads (expanding range as result of links with Belgian Co.)	New range sauces	Formulation Blending Homogenisation
Pet food manufacturer	Wide range new pet foods in cans and autoclavable plastics	Formulation Thermal processing Heat penetration studies
Meat Industry	Detection of veterinary drugs in meat	Analysis

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TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Claude BARLIER
Directeur
CENTRE D'INGENIERIE DE RECHERCHE ET DE TRANSFERT DE L'ESSTIN
2, rue de Foucharupt
F - 88100 SAINT-DIE-DES-VOSGES
(33) 29 55 11 71

CENTRE D'INGENIERIE de RECHERCHE
et de TRANSFERT EUROPEEN de l'ESSTIN
à Saint-Dié-des-Vosges
Centre Européen de Prototypage Rapide

Claude Barlier
Directeur

CIRTES/ESSTIN
- Groupe Darmois - rue de Foucharupt - 88 100 Saint-Dié-des-Vosges - tel : 29 55 11 71 - Fax : 29 55 10 45 -

La création du CIRTES, une initiative

Le CIRTES est créé en partenariat entre l'**ESSTIN** (Ecole Supérieure des Sciences et Technologies de l'Ingénieur de Nancy - Université de NANCY1.), l'Agence Régionale de Développement Industriel, Economique et Social, de la ville de Saint-Dié-des-Vosges, la Chambre de Commerce et d'Industrie de Saint-Dié-des-Vosges, le PPE (Pôle de Plasturgie de l'EST) et les industriels du bassin de Saint-Dié-des-Vosges.
Cette création s'inscrit dans le cadre de la procédure européenne **STRIDE.** (DATAR/ANVAR)
Avec le soutien

- du Ministère de l'Enseignement Supérieur et de la Recherche
- de la Direction Régionale de l'Industrie, de la Recherche et de l'Environnement,
- de la Région Lorraine.

Présentation du CIRTES

Aujourd'hui, le centre regroupe principalement:

1) Une plate-forme de Prototypage Rapide, véritable structure de transfert en CFAO, unité de simulation et de réalisation de produits nouveaux...

La plate-forme est équipée actuellement:
- de stations de travail CFAO, CATIA et MTEL
- d'une cellule de prototypage rapide par Stratoconception®
- d'une cellule de digitalisation laser à 3 dimensions LD 500 de Laser Design

et dans quelques semaines, d'un centre d'usinage 5 axes REALMECA (en UGV).

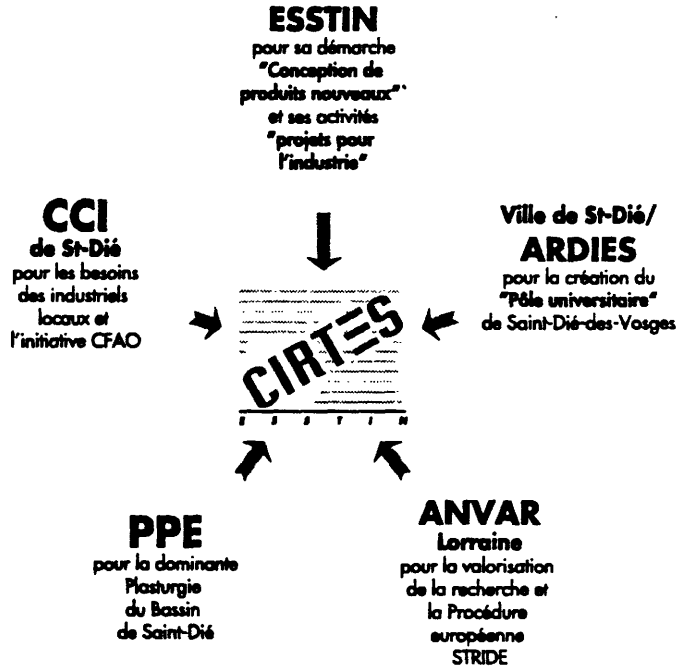
Le centre travaille en partenariat avec la société LASER 3D pour la réalisation de pièces par le procédé de Stéréolithographie.
Le centre est par conséquent équipé des principaux procédés de P.R., actuellement industrialisés ainsi que de son propre procédé, la Stratoconception ®, développé par l'équipe de recherche ERIN .mp.

2) Un serveur d'ingénierie
Il est mis en place en collaboration avec la cellule ESSTIN-INDUSTRIE (Cellule d'Etude et Développement de Projets pour l'Industrie). C'est un outil d'échange et de transfert de données (fichiers CFAO, services d'assistance du CIRTES ...), assisté par ingénieur. Il utilise le réseau NUMERIS et a pour but principal de faciliter les échanges de coopération CIRTES/Entreprises/Laboratoires.

3) L'équipe de recherche ERIN .mp

l'équipe *"mécanique et production"* du laboratoire ERIN (Equipes de Recherche en Interfaces Numériques) de l'ESSTIN est implantée en appui sur le CIRTES. Elle développe ses travaux de recherche, en particulier selon deux axes:

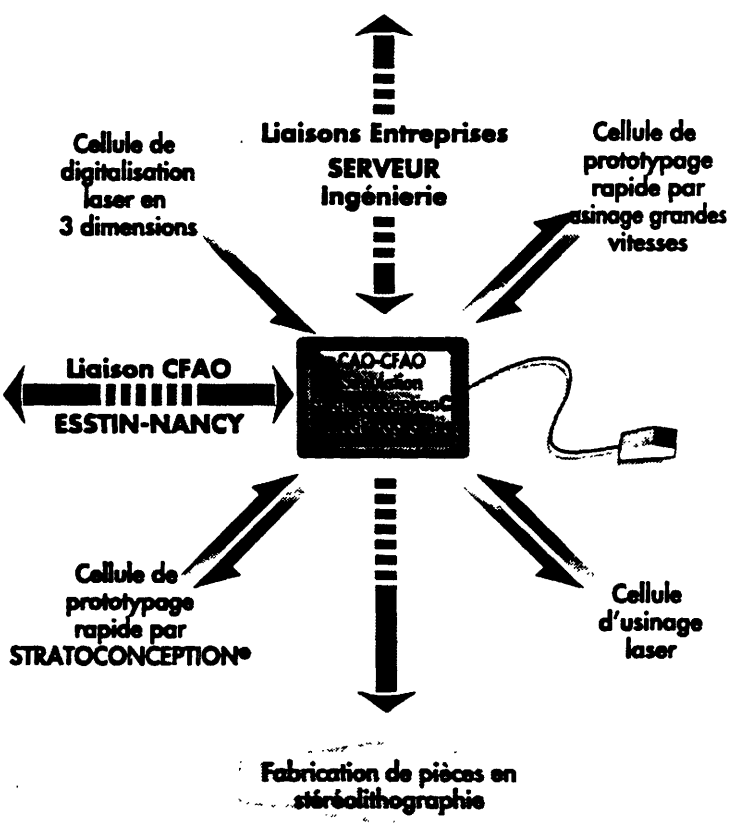
- Etude des températures à l'interface pièce/outil en usinage dans le cadre de la surveillance automatique de l'usinage (SAO)
- Recherche de procédés et développement d'interfaces numériques pour la conception de pièces par le procédé de Stratoconception ®



Une convergence ...

A partir d'un besoin clairement identifié par l'équipe, l'implantation du centre, dans le bassin industriel de Saint Dié, a fait l'objet d'un travail de partenariat.

Aujourd'hui les partenaires sont étroitement associés à la mise en place et au développement du centre, en particulier par l'intermédiaire du conseil d'administration et du conseil scientifique du CIRTES.
Dans le C.A., sont présents :
- 6 membres ESSTIN
Ecole d'ingénieur et laboratoires
- 6 représentants des collectivités
- 8 industriels Lorrains.
- 2 personnalités extérieures



La plate-forme de prototypage rapide, installée au CIRTES à Saint-Dié

Elle est conçue pour devenir un véritable outil de conception et simulation de produits nouveaux, dans les domaines de la mécanique et de la plasturgie.

Missions du CIRTES

L'ESTIN a toujours été à l'avant-garde dans le domaine des relations université/entreprises. La création du CIRTES lui permet d'aller encore plus directement sur le terrain, au devant des PMI. Les missions du centre sont orientées, vers l'ingénierie, la recherche, le transfert de technologie et la formation.

Ingénierie

En conception de produits ou de systèmes, à dominante mécanique, et intégrant les notions de design et de plasturgie.

Recherche

Fondamentale et appliquée en mécanique&production selon 2 axes de recherche (équipe erin. mp).

Transfert de technologie

Dans un premier sens, à partir des travaux de nos laboratoires de recherche (principalement les équipes de l'ERIN, en mécanique), vers les entreprises, et dans le sens inverse, à partir des besoins identifiés dans les PMI, vers de nouvelles recherches spécifiques.
Le CIRTES oriente ses actions :
- dans le bouclage CFAO/MO et le transfert des données informatiques
- en Prototypage Rapide, par Stratoconception®, par usinage 5 axes en UGV, par Stéréolithographie ...
- en simulation d'usinage
- en digitalisation laser à 3 dimensions.

Formation

- En formation initiale, pour les élèves-ingénieurs de l'ESSTIN, pour les techniciens supérieurs du Lycée BAUMONT de Saint-Dié et du Lycée Henri LORITZ de Nancy. Cette formation est prévue en projets industriels, en conception de produit et en CFAO.

- En formation pour les entreprises de la Région de Lorraine. Cette formation est prévue en digitalisation 3D, en prototypage rapide, en simulation d'usinage et en usinage à grandes vitesses sur M.O. cinq axes.

Ces échanges et actions sont facilités par la mise en place du serveur d'ingénierie assisté par ingénieur.

Plan d'action - contribution au développement économique de la Lorraine et particulièrement du bassin de Saint Dié.

Ces derniers mois, notre plan d'action s'est orienté principalement suivant trois axes:

- Sensibilisation aux technologies nouvelles

• sous forme de conférences industrielles, en Lorraine (Saint Dié, Epinal, Nancy, Bar Le Duc...),
• sous forme de conférences universitaires (Micronora à Besançon, assises du prototypage à l'école Polytechnique de PALAISEAU, au 11ème congrès de mécanique de LILLE, à VALENCIENNES ...)
• par la mise en place d'une journée rencontre Université/Entreprises organisée spécialement à Saint-Dié le 29/1/93
• par la publication d'articles de sensibilisation et de présentation dans la presse locale (E.R. et L.E.) et surtout dans la presse technique française (TEP, Ind.&Tech., CAO mag. ...)
• par la diffusion d'une plaquette de présentation des activités du centre
• par de nombreuses visites et réunions de travail organisées au centre depuis mars 93.

- Mise en place de contrats de transfert de technologie

• à partir de nos propres travaux et résultats de recherche (surveillance automatique de l'usinage

et procédé de prototypage par Stratoconception®
• à partir des besoins identifiés dans les entreprises lorraines. Actuellement, quatre contrats de ce type sont en cours d'élaboration. Il prévoient un partenariat CIRTES/laboratoires/entreprises sur une durée de trois ans et font appel à l'embauche de jeunes ingénieurs-chercheurs.
Ce type de contrat de transfert fait intervenir également, en appui, des partenaires industriels européens, dans le domaine des hautes technologies.

- Réalisations de prestations industrielles de transfert en conception de produits nouveaux par simulation et Protypage Rapide
Actuellement, une quarantaine de contacts industriels débouchent sur une prestation de transfert de ce type. Il s'agit soit :
• de prestations isolées, réalisée sur un des moyens technologiques de notre centre (CFAO, digitalisation 3D laser ...), pour l'entreprise commanditaire, et qui par conséquent valorise sa propre prestation
• de prestations globales de Recherche & Développement, en conception de produits nouveaux, qui font intervenir un travail de groupe et les moyens de notre centre en CFAO et PR
• de prestation de qualification de procédés ou de méthodes, pour des entreprises qui souhaitent investir dans ces technologies

Nous pouvons aujourd'hui présenter un bilan des difficultés que nous avons rencontrées, en particulier, selon le type de travaux, la structure et la taille de l'entreprise concernée. Nous proposons une réflexion sur le financement de ces assistances technologiques pour les PMI.

En conclusion

Les missions du centre sont orientées, vers l'ingénierie, la recherche, le transfert et la sensibilisation aux nouvelles technologies en conception de produit, en CFAO et en Prototypage Rapide.

Des procédures de transfert de technologie sont déjà en place, à partir de nos travaux de recherche, dans le cas des configurations du procédé de prototypage par Stratoconception®.
Dans l'autre sens, nous mettons actuellement en place quatre contrats importants de Recherche-Transfert, à partir de besoins identifiés dans des PMI lorraines. Ces travaux nécessitent des conventions CIFRE.
Il s'agit d'un triple partenariat PMI/ CIRTES/Laboratoire ERIN, qui s'appuient également sur la compétence d'autres entreprises partenaires européennes, directement impliquées dans ces actions de transfert.

D'autre part, nos actions de sensibilisation aux technologies, en matière de conception de produits nouveaux et prototypage rapide, se traduisent depuis mars 93, par une quarantaine de contacts industriels qui débouchent sur de véritables prestations, à partir desquelles nous pouvons effectuer un premier bilan.

En conclusion, les retombées et résultats attendus sont multiples:
- sur le plan local
. un centre de compétences et de ressources, en réponse au besoin des industriels du bassin de Saint-Dié, dans le domaine de la plasturgie et de la mécanique
. une dynamique en synergie avec les partenaires
- sur le plan régional
. un centre de ressources lorrain, en complémentarité avec les centres existants (AMIFOP, METAL 2T...)
. une opportunité d'excellence pour la Lorraine...
- sur le plan national et européen
. un centre de Prototypage Rapide européen original et innovant.

Le CIRTES devrait rapidement devenir un véritable partenaire technologique, outil de la compétitivité industrielle, pour les PMI.

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TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Rafael FERRE
Director
INSTITUT CATALA DE TECNOLOGIA
UNIVERSITAT POLITECNICA DE CATALUNYA
C/Adolf Florensa s/n
E - 08028 BARCELONA
(34) 3 4017171

Technological cooperation between the POLITECHNICAL UNIVERSITY OF CATALONIA and the SMEs of surrounding industrial areas.

SUMMARY

- Context of CATALAN REGION:

  Main indicators
  Economic activities
  Production and employement
  Industrial occupation
  Technological level
  Characteristics of SMEs

- Politechnical University of Catalonia - UPC
  Teaching and research activities
  Student by areas
  Transport centers

- CATALAN INSTITUT OF TECHNOLOGY - ICT

  Objectives and activities
  Local technologic transfer centers

- CENTRE CIM - UPC/ICT is founded in 1990 by UPC and ICT for diffusion and promotion of the advanced production technologies to by the industry entreprises of the sourrounding area of Barcelona qualified as objective 2.

- From 1991 to 1993 the CENTRE CIM has implemented a STRIDE project, subprogram 2 action 212 for technological transfer in the area of automatic inspection and quality assesment.

- STRIDE PROJECT results.

  Equipement: Installation of:
  Automatic meusuring machine for dimension inspection.
  Computer-vision facilities for qualitative inspection

  Activities: Seminars workshop
  In Company -training
  Demostration shows
  Diagnostics and quality studies for SMEs
  Inspection systems applications

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TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Pierre VANESSE
Président
CHAMBRE SYNDICALE DU BATIMENT
ET DES TRAVAUX PUBLICS
Sambre-Hainaut-Cambrésis
F - 59326 VALENCIENNES Cedex
(33) 27 30 05 62

SENSIBILISATION

ET

PARTENARIATS TECHNOLOGIQUES

entre Organisations Professionnelles,
Entreprises du Bâtiment et
Université

ENVIRONNEMENT GEOGRAPHIQUE

Le programme STRIDE CONSTRUCTION est mis en oeuvre sur une région Nord de la France : Sambre-Hainaut-Cambrésis.

Les professionnels du bâtiment en France sont, à plus de 80 %, des petites entreprises artisanales d'une taille inférieure à 10 personnes et réalisent 50 % du chiffre d'affaires du BTP ;

Cela se vérifie aussi pour cette région mais il faut dire que ces deux dernières années n'ont pas été des plus propices, le bâtiment subit de plein fouet la crise économique et nos entreprises réagissent au plus pressé pour leur sauvegarde.

Les trois partenaires :

CSEBTP : Chambre Syndicales des Entreprises du Bâtiment et Travaux Publics.

CAPEB 59 : Emanation départementale de la Confédération des Artisans et des Petites Entreprises du Bâtiment.

UVHC : Université de Valenciennes et du Hainaut-Cambrésis.

se sont associés dans un programme qui a pour but de :

OBJECTIFS :

- Renforcer l'environnement et la compétitivité des artisans et PME du bâtiment,

- Rescenser ou faire découvrir les besoins pour le développement de l'innovation,

- **Favoriser la diffusion et l'utilisation du potentiel technologique,**

- **Favoriser l'adéquation des formations aux besoins du terrain par des stages en entreprise.**

SENSIBILISATION :

Ses actions ont été menées, dans un premier temps, par une sensibilisation croisée afin d'assurer les motivations et besoins réels du terrain.

Avec un appui sérieux de la **presse professionnelle**, nous avons organisé **deux journées d'information** qui ont réuni les Organisations Professionnelles, les Entreprises, Maîtres d'ouvrage, Maîtres d'oeuvre, etc...

Pour ce faire, **3000 et 4000 mailings** ont été envoyés et, dans le même temps, **une enquête** menée auprès d'entreprises par un Cabinet extérieur nous donnait les indications générales les plus sensibles sur les attentes et besoins technologiques du monde Bâtiment.

Ces deux journées ont réuni respectivement 57 et 80 participants, ceci malgré de nombreuses **relances téléphoniques**.

CONSTATS :

Ces réunions ont fait ressortir :

- Le besoin crucial d'avoir la meilleure appréciation des coûts et une maîtrise parfaite des prix de revient,

- Une attente de qualification des entreprises au travers des moyens technologiques employés qui, en finalité, doivent parfaire les communications entre les partenaires de l'acte de construire.

Les entreprises sont désireuses, d'une part, que l'enseignement Universitaire soit plus proche des réalités du terrain et, d'autre part, que l'Université puisse répondre à des développements technologiques pointus nécessaires à leurs professions.

Le pari est donc difficile à gagner.

VISITES DES ENTREPRISES :

Deux Délégués affectés aux Organisations Professionnelles visitent les entreprises (environ 600 à ce jour) et analysent, avec leurs responsables, leurs attentes en terme d'organisation, d'outil de dévelopement, de formation, etc...

En effet, ces entreprises, qui n'ont pas matériellement le temps de nous faire état de leurs préoccupations et d'analyser, elles-mêmes, les solutions, évolutions ou développements nécessaires et envisageables, sont sensibles et très participantes à ce full contact, d'autant plus qu'elles sont, bien souvent, isolées.

STAGES ET PROJETS EN ENTREPRISES :

Là où l'on pensait, la première année, que l'Université pouvait proposer des sujets de stages et de projets opérés par ses étudiants ingénieurs dans les entreprises (soit 18 stages et 19 projets la première année), il s'avère qu'il est plus judicieux que les Délégués Conseils des Organisations Professionnelles rapportent, par leurs contacts, des thèmes de stages et projets plus pointilleux et mieux adaptés.

L'Université peut donc affiner et développer ceux-ci avec les tuteurs d'entreprises (37 projets - 23 stages cette deuxième année).

CONSTAT :

Ces actions corroborent les besoins :

- Pour les petites entreprises, une participation ponctuelle à une analyse plus fouillée de leur développement.

- Pour les étudiants ingénieurs, une pratique sur le terrain qui, de plus, peut déboucher sur des emplois.

D'une manière plus générale, contribuer à un archivage des activités et réalisations qui constituent, en quelque sorte, le fond de commerce de ces entreprises du bâtiment.

INFORMATISATION

Les contacts des Délégués Conseils des Organisations Professionnelles font apparaître une informatisation faible : 25 % environ et 25 % désireuses de s'informatiser à court terme. celles-ci sont soucieuses essentiellement de la démarche ad hoc.

SEMINAIRES DIRECTIFS

Afin de répondre à ces attentes, le Centre de Formation Continue de la CAPEB et l'Université organisent des séminaires de 8 jours, spécifiques aux logiciels professionnels du bâtiment.

Un Centre de Ressource a été créé afin de permettre aux professionnels de venir appréhender les solutions idoines.

Comme d'autres séminaires, plus techniques bâtiment (économie construction, nouveaux produits, nouveaux marchés et commercialisation, gestion énergie climatisation, Groupement d'entreprises, etc...), il s sont entendus être dispensés par des animateurs ayant un vécu du terrain professionnel.

Ces séminaires sont promus par la presse et mailings envoyés à chaque entreprise, relancés téléphoniquement, au vu des souhaits recueillis lors des visites des délégués conseils Organisations Professionnelles.

CENTRE DE RESSOURCE

L'expérience montre que le Centre de Ressource doit avoir une vocation de show room et de conseils sur des solutions professionnelles reconnues et élaborées par les Confédérations du bâtiment qui travaillent en relation directe avec d'autres organismes tels que le CSTB.

Les entreprises sont accueillies, conseillées et peuvent avoir toute démonstration par un ingénieur permanent dans ce centre. Outre les visites permanentes, une journée portes ouvertes, en Octobre 93 a accueilli 25 entreprises.

Les Organisations Professionnelles, fortes de leur expérience, veillent à ce que les solutions proposées aux entreprises ne soient pas hétérogènes, mal adaptées ou ponctuelles ce qui, en finalité, pourrait avoir un résultat contraire sur une progression technologique des Entreprises.

Ce Centre de Ressource trouve sa pleine vocation dans l'avènement technologique de projets ambitieux qui peuvent être développés et adaptés par le pool des équipes universitaires et de recherche.

La promotion de ce Centre se fait par la presse, une plaquette, les séminaires et surtout par les Délégués Conseils des Organisations Professionnelles.

CENTRE DE COMPETENCE AIDE AUX ENTREPRISES

Enfin, les services de la CAPEB départementale adaptent une banque de données d'ouvrages régionale pour tous les corps d'état afin d'éviter un travail fastidieux de l'exploitation informatique des entreprises artisanales du bâtiment. Chaque ouvrage est analysé et corrigé par des Commissions réunissant les professionnels concernés. Ce travail fastidieux terminé devrait être le détonnateur de l'informatisation de bon nombre d'entreprises de bâtiment.

Aujourd'hui, nous devons constater qu'au travers de ces actions, les relations Organisations Professionnelles et Université pour les entreprises en sont encore au stade de l'apprentissage.

En quelque sorte, le monde économique du Bâtiment avec ses Organisations Professionnelles attend que l'Université facilite l'approche et le recours à ses services en terme de nouveaux développements ; les contacts permanents contribuent à faire progresser nos entreprises technologiquement.

IVe Conférence Stride

Arsenal de Metz (France)
7-8 février 1994

DOCUMENT DE TRAVAIL

WORKING PAPER

TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Lambert STALS
Prof. Dr, General manager
LIMBURG UNIVERSITY
Institute for materials research
University campus
B - 3590 DIEPENBEEK
(32) 11 26 88 26

1. INTRODUCTION : Socio-economical aspects of the Belgian Province of Limburg[1]

The Belgian Province of Limburg was up to the end of 1993 considered by the European Union as an objective II region as a consequence of the closing down of its total coal mining acitivity. For the coming period Limburg will, unfortunately, only partially be recognized as objective II region, although its economic activity is declining and as a consequence the unemployement rate is steadily increasing.

According to recent data from the National Institute for Statistics the province of Limburg counted in 1993 about 760,000 inhabitants, which is about 7.5 % of th total population of Begium.

In the very recent history, Limburg has been confronted with the closing down of all its coal mines - all mining activity was in fact discontinued on September 30th, 1992 - which resulted in a direct reduction of the industrial activity in a few years time with about 20,000 employees. This figure has to be compared with the total number of wage earners in Limburg which amounted to about 220,000 in 1992. This means that in a few years time an extra 10 % of the Limburg employees were loosing their job. Therefore, in order to avoid social problems a ***Future Contract Limburg*** has been concluded in April 1987 with as main objective the reduction of the high unemployment rate in Limburg during the period 1987-1997 to the mean level of the unemployement rate of Flanders. The partners who signed the contract are the European Commission, the Belgian Government, the Flemish Government and the Province of Limburg.

Figure 1 shows the surplus of unemployed people with respect to the rest of Flanders in the period April 1987 to September 1993. By surplus is meant the number of extra jobs to be created in order to bring the unemployment rate to the mean level of Flanders. Not shown on the figure is that in comparison with the situation in April 1987, the surplus number of unemployed people has initially increased to about 19,000 in February 1988. This high number rapidly decreased, however, to about 11.000 in 1990 but then increased again to about 13.300 surplus unemployed people, of which the majority - about 11,000 - are women. At the date of September 30th, 1993, the unemployment rate in Limburg was 19.2 % (20.1 % of unemployed people younger than 25 years), for men this figure amounts to 10.3 % and for women to 31.6 %. For Flanders, without Limburg, the figures are respectively 12.8 %, 8.9 % and 18.3 %. For the totality of Flanders these figures are respectively 13.6 %, 9.1 % and 20.0 %. For Belgium the figures are 16.7 %, 12.5 % and 22.3 % respectively. This means that as far as the unemployment rate is concerned, the inital objective of the Future Contract Limburg is far from being reached. If one looks at figure 1, one can see that if the initial decrease of the surplus number of unemployed people would have continued, we would maybe have reached our initial objective by 1997. Unfortunately the economic crisis has clearly interfered in a negative way with the original planning of the Future Contract. In fact, at the end of 1993, we are approaching again the starting situation in 1987. However, if one compares the surplus figures of August 1993 with those of September 1993, one can observe some leveling-off, which might indicate an improvement of the situation. This small hope is

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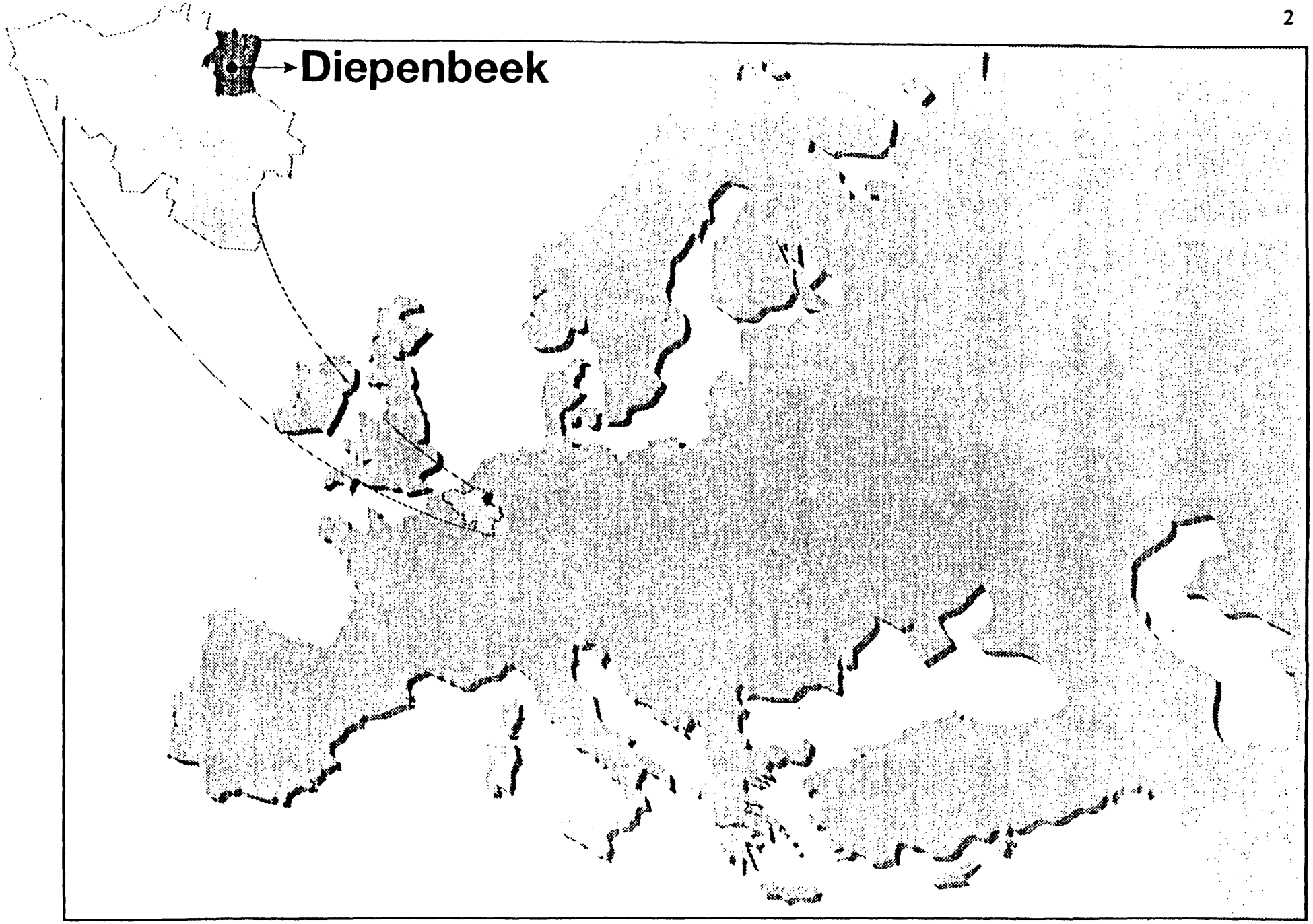
[1] Based on the monthly economical reports of the Regional Development Authority of Limburg



The geographical situation of the Belgian Province of Limburg

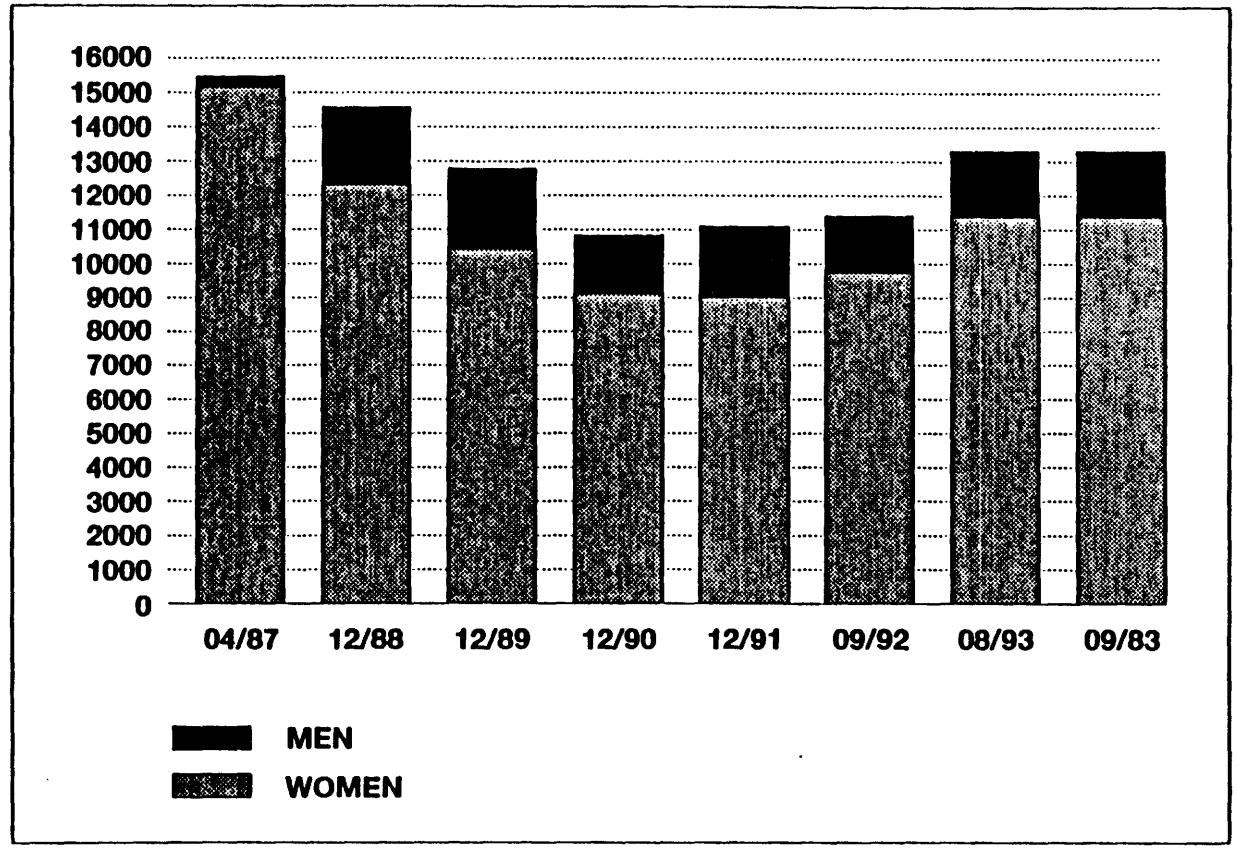


Figure 1
The surplus of unemployed people in Limburg as compared to the rest of Flanders : the evolution between April 1987 and September 1993

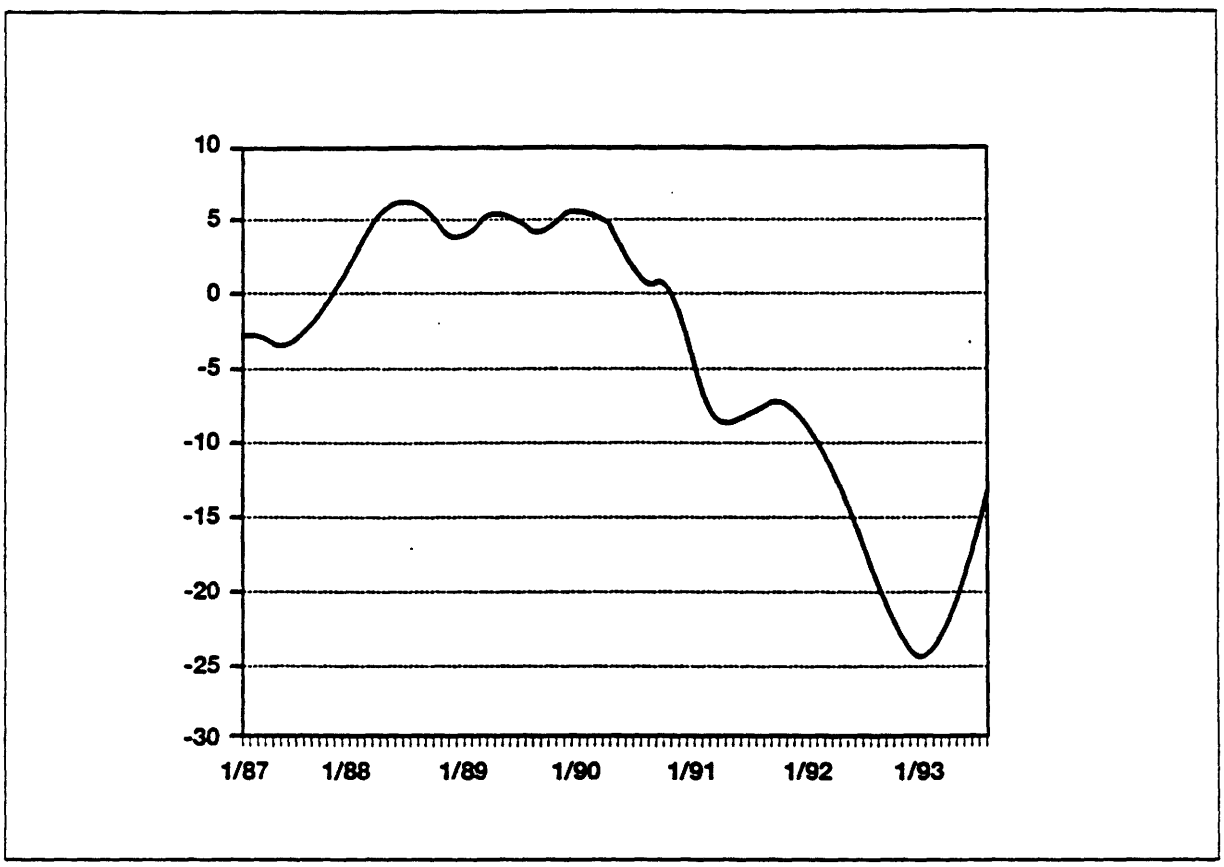


Figure 2
The evolution of the Limburgian Gross Economic Indicator according to the National Bank of Belgium

also slightly justified by the evolution of the Limburgian Gross Economic Indicator, as given by the National Bank of Belgium, and which is based on NBB's trend-inquiries. The evolution of this indicator is shown in figure 2. The trend is clearly upwards in 1993. Together with the leveling-off of the surplus unemployment, this upward trend might be interpreted as a positive sign for an improvement of the overall economic situation in Limburg.

Since the Stride projects in the various countries of Europe are aimed at the strengthening mainly of the industrial acitivity, it is interesting to notice that in Limburg as per June 30th, 1992 about 30 % of the total economic activity was related tot the industrial activity, nearly 60 % to the tertiary sector, and the remaining 10 % to agriculture, energy and construction (see table I). Although in the period June 1991 - June 1992 a slight increase can be noticed for the total industrial employment (+ 0.3 %), this figure is masking a decrease in the important subsectors metal and plastic working industry and electronics (- 0.4 %) (with the exception of the sector of transport means), the chemical industry (- 1.3 %) and the metallurgy sector (- 2.2 %). These are the sectors where large companies are active. It are clearly the SME's who could realize an important employment increase.

Economic Sector	30.06.1991		30.06.1992		Evolution
	total	%	total	%	%
Agriculture	1,439	0.66	1,580	0.72	+ 9.8
Energy	4,000	1.84	3,594	1.64	- 10.2
Industry	66,016	30.32	66,211	30.23	+ 0.3
Construction	17,284	7.94	17,567	8.02	+ 1.6
Tertiary sector	129,009	59.24	130,077	59.39	+ 0.8
TOTAL	217,748	100.00	219,029	100.00	0.6

Table I
RSZ (National Social Security) Employment in Limburg

2. THE STRIDE PROJECTS IN LIMBURG

2.1 NON R & D PROJECTS

PROJECT 1 : Technology cell of the RDA-Limburg

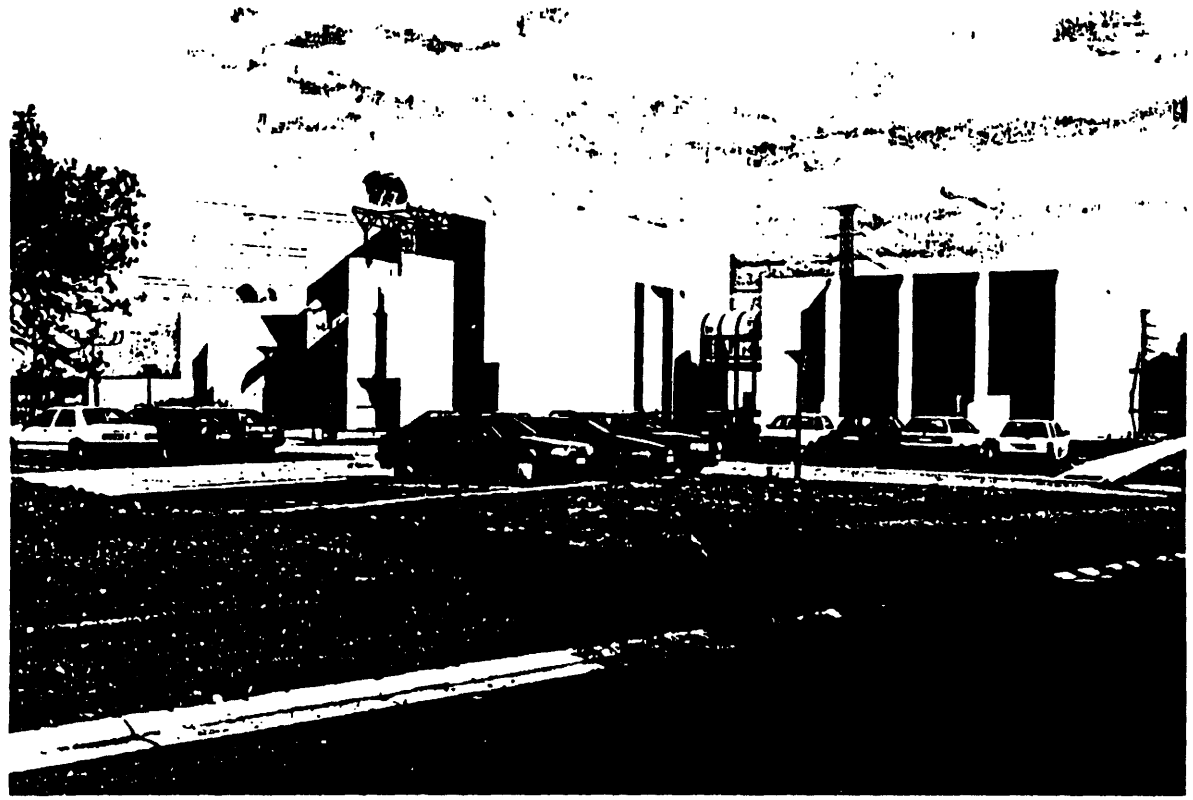
This STRIDE project is aimed at the reinforcement of an already operating technology cell within the framework of the Regional Development Authority (RDA) of Limburg. The general structure of the majority of the Limburg industrial companies is such that they can only acquire the necessary technology for innovation through agreements with third parties. In house development of new technology or implementing in company developed technology is mostly only possible within large companies or within multinationals. Therefore, the main objective of the RDA technology cell are to assist the Limburg companies in order

- to find the right R & D laboratories for conducting appropriate technology implementation programmes
- to find the right industrial partner for joint venture activities
- to find their way in the numerous national and international research and technology programmes
- to find their way in the numerous regulations for obtaining the necessary financial support for conducting their technology projects

PROJECT 2 : Promotion and management of the Science Park Limburg

This project deals with a supplementary effort to enlarge the action domain of an EFRO funded programme "Interface Science Park Limburg".

On the Limburg University Campus a Science Park has been established in the period 1990-1992. This Park covers an area of about 10 ha, i.e. about 20 plots of 1/2 ha. At the entrance of the park the "Science Park Company Ltd" has constructed an incubator building in which eight offices and ten laboratory rooms are available for hi-tech starting companies. The starting companies are supported by a management and secretary team. The main objective of this STRIDE project is to promote the Science Park and Incubator building locally and abroad. On January 1th, 1994 - this is about 13 months after the official inauguration - about 60 % of the available space in the Incubator building is occupied by six companies whose activities are related to the R & D activities on the university campus or which are genuine spin-offs of the R & D of the Limburg University.



The Incubator building of the Science Park and the Institute for Materials Research of the Limburg University

2.2 STRIDE PROJECTS IN DIRECT COOPERATION WITH INDUSTRY

Under the scientific and administrative responsability of the Institute for Materials Research of the Limburg University four STRIDE projects are being conducted in cooperation with the Limburg Industry.

PROJECT 3 : Implementation of the hard coating technology in the metal and plastic working industry

This project is a continuation of a demonstration project, which was funded by the EEC and conducted in the period 1989-1991, and was aimed at the introduction of hard ceramic coatings in the plastic and metal working industry. In that demonstration project nine companies and three research laboratories (The Institute for Materials Research of LUC, WTCM-Surface Treatment, Metallurgy and Materials Engineering Department of KULeuven) participated. The majority of the participating companies are now using coated tools in daily production. In the STRIDE project the same research laboratories are participating together with about 15 companies, a few of which were also involved in the Demonstration project. In the various applications a substantial increase in tool life could be obtained which in general resulted in an increased productivity. Both actions, the Demonstration Project and the Stride Project, have directly resulted in the establishment in Limburg of the Benelux branch of a major job coating company. A number of Limburg companies are now participating in regional and international R & D programmes in the field of hard coatings.

PROJECT 4 : Implementation of the know-how of the organic chemistry laboratory in the Limburg industry

The objective of this project is to transfer the know-how of the organic chemistry laboratory of the Institute for Materials Research to the Limburg Industry, especially the know-how and use of the highly sophisticated analytical techniques for polymer research. Through this activity a number of Limburg companies could be interested for participation in government funded R & D programmes

PROJECT 5 : Implementation of the know-how of the inorganic chemistry laboratory in the Limburg industry

In the inorganic chemistry laboratory of the Institute for Materials Research a number of analytical techniques are available which are of great importance for the controlling of production processes and for waste handling and recycling. The aim of this STRIDE project is to bring the local industry in contact with these techniques.

PROJECT 6 : Implementation of a new approach of reliability testing in advanced electrical an electronics applications

In the Electronic Materials Section of the Materials Physics Division of the Institute for Materials Research an original and new technique has been developed for reliability testing of advanced electronic and electrical material systems. This technique is based on the in-situ measuring method which reduces testing times from usually 1000 hours to about one day. In the framework of this STRIDE-project a spin-off company has been established in the Incubator building of the Science Park to commercialize this technology. During the start-up phase the acitivities of the spin-off are supported and a number of other Limburg companies are evaluating the technology for testing the reliability of in house developed new material systems.

Under the scientific and administrative responsability of the School for Industrial Engineers (KIHL), a STRIDE-project in the field of Tele- and datacommunication is being conducted in collaboration with the Limburgian Industry

PROJECT 7 : Tele- and data-communication

The KIH-Limburg has been the first to implement the Profibus system in Belgium. In the framework of this Stride-project development work is performed around fieldbus en Profibus for Tele- and datacommunication applications. Applications aimed at are the coupling of networks in office and production environment.

3. CONCLUDING REMARKS

The Limburg STRIDE-projects are conducted in the framework of a global action programme for technology and know-how transfer to the Limburg Industry in order to increase the mean technological level of this industry, especially of the SME's. Apart from the STRIDE projects and supported by the ESF, the EFRD and the local industry we are introducing training programmes in industry based on the CDI-technology, we are organizing special seminars dealing with advanced topics related to the STRIDE projects and we are introducing advanced NDT-techniques for supporting the industrial partner during the development phase of new products and for improved quality control of finished products. In total nearly 100 companies, the majority of which are SME's, have participated/are participating in the various actions. We therefore believe that the STRIDE-action for Limburg, although only finished at the end of 1994, is already now succesful. The main reasons for this believe can be summarized as follows

1. First, during the execution of the STRIDE-programme, and of the accompanying ESF and EFRD supported actions, a number of SME's were brought into contact for the first time with university research laboratories. This is a positive development, of which the long term effect can hardly be overestimated. Indeed if we carefully analyze the global industrial employment in the period September 1992 to September 1993 we can observe a decrease by - 3.7 %, but the employment by SME's with less than 50 employees increased in the same period. The export survey of september 1992 indicates that the Limburg companies are very export minded : nearly 75 % of the production is sold abroad. Export is however dominated by large companies and by a few industrial sectors. Transport means and chemical industry account for 57 % of global exports. Companies employing less than 100 people concentrate on the Belgian market and limit their exports, if any, to neighbouring Germany and the Netherlands. More R & D support and guidance in export oriented activities, as provided to the SME's in the framework of the STRIDE action, will stimulate the SME's to become more active abroad.
2. Second, due to the STRIDE action the promotion and management of the Science Park could be optimized. As a result the Incubator building reaches and occupation level of about 60 % after about 1 year. Based on our inquiries we expect an occupation level of about 80 % by the middle of 1994.
3. Third, as a direct result of the STRIDE action we should mention the introduction of highly sophisticated coatings, as TiN and N-TiN, in the local plastic and metalworking industry. A number of companies, amongst which very small ones, are using coated tools in daily production. As a side effect of this action we could interest the world leader in coating technology to set-up a branch for the Benelux in the province of Limburg.
4. Fourth, we should mention the start-up of a first spin-off in the field of Reliability Engineering of the Electronic Materials Research.
5. Fifth, the number of Limburg Companies, especially SME's, which are taking part in regional and international R & D programmes is steadily increasing. The majority of these programmes are conducted in cooperation with the Institute for Materials Research of the LUC.

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WORKING PAPER

TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Erik GRANUM
Professor
AALBORG UNIVERSITY
Laboratory of Image Analysis
Fredrik Bajers Vej 7, Bldg. D-1
DK - 9220 AALBORG EAST
(45) 98 15 85 22

NORBIT,
an SME Network in the Field of Artificial Vision
(quality control, process monitoring and control)

Abstract. The network reported on operates in a small region with a majority of rather small industrial enterprises.

A special and costly effort was required to establish an operative interest. A particular structure of network activities which guides the participants from basic and general familiarity with the technology and step-by-step through specialising study groups to prototype development.

After 9 months of operation the network has: 8 ordinary industrial members and 5 associated members. Six study groups are in action, a company may be formed and 3 prototype developments are about to start. The network is functioning well, but suffers from a relative over-investment of expert time necessary to get started.

REGION CHARACTERISTICS

"NORBIT", the North Jutland Network for Industrial Application of Image Technology operates in the northern part of continental Denmark. The region of concern comprises 6 small communities including and surrounding the city of Aalborg. The area is about 1,500 square kilometres with a population of about 210,000 inhabitants. Traditional occupations dominated by agriculture and fishing. The unemployment rate is about 14.5% and partly due to the closing of a relatively large shipyard in 1988. The area is characterized by relatively large low income groups, and further to various service and consulting companies the majority of industrial activity is organised in small and very small enterprises (less than 10-15 employees) as is customary in Denmark.

The region also has a young university (20 years) with a relatively strong Faculty of Engineering. The university has built up a tradition for frequent interaction with the local industry, in particular through student projects. The implementation of STRIDE in the region is in particular focusing on exploiting the university as a knowledge source for stimulating local industry. The realisation is mainly networks for collaboration between university and industry.

This network is initiated and coordinated by a university laboratory with 4 permanent scientific staff and 4-6 Ph.D.-students and research assistants funded by external sources; e.g., ESPRIT Basic Research.

MOTIVATION & ASSUMPTIONS

The motivation for the NORBIT-network proposal was based on the following assumptions:

1. Image Processing and Artificial Vision Technology (AVT) is by now available at a cost which makes it a relevant alternative for automation, even in the small enterprises of our region.
2. The enterprises of the region had hardly any awareness of the new potential of AVT, and a determined search would be required to "hunt up" the relevant companies and convince them about their potential benefit of AVT.
3. Given (2), a sufficient membership would be possible for operation of a STRIDE network and for reaching the general objectives of STRIDE.
4. The initiative was expected to rely entirely on the "technology source" (TS), and on the TS at our institution had to plan on the basis that all effort of the network would be run by employing the equivalent of the required amount of manpower (no "free" resources were available).

PROPOSED ACTIVITY STRUCTURE OF THE NETWORK

An application was submitted on the basis of the following concepts of activity:

a) Find from all possible sources the relevant information on companies in the region, which potentially could benefit from the technology, and circulate information and agitative material.

b) On the basis of responses and a selective evaluation, arrange for explorative visits by experts to the companies to explain about the general potential of AVT and discuss the specific possibilities for the company in question. These visits would be valuable in their own right as an effort of knowledge transfer, but they should in particular recruit members for the network.

c) AVT-seminars for a wide audience of industrial delegates from the region. Information about the technology, and the network, talks on exemplifying cases, exhibitions, and demonstrations in the laboratories. To be repeated on a regular basis.

d) Arrange "basic study groups" to provide the members with a basic and general understanding of the technology. This includes training and exercises in the laboratory and addresses all interested members of the network.

e) Form "application study groups" for participants with similar interests, to study problems and solutions to a well-defined range of applications of AVT.

f) Offer small groups of participants each a "selective methological study" with a rather focused activity concerning technological problems in connection with a specific application.

f) "Prototype development" where support in terms of consultancy or placements could be directly concerned with explicit development of new products.

The proposal was addressing three categories of enterprises characterised by the following:

(i) Manufacturers, who could use AVT for improvement of the quality of their products or the efficiency of their production processes.

(ii) Manufacturers of automated production machinery, who could include AVT in their machines and hence improve the performance.

(iii) Manufacturers of CVT systems and consulting engineers, who design, install, and maintain automation facilities.

An expected off-spin would be that these enterprises of different categories could operate together in network activities on the same application; e.g., a manufacturer would like to learn about what AVT could do to improve quality of his specific products, and a consulting engineer would like to learn how.

GETTING STARTED

It was painful to come to the point of having grants officially allocated. Faithful to the basic requirements for STRIDE-projects, the local STRIDE-committee required the network to be in place with clear plans for specific activities prior to start.

There was no provision for special support in an explorative phase for uncovering the needs of potential network members. Such a phase was a hard load on the TS and it had a relatively little effort on the part of the industrial people involved. The combination of the technology of this network and the characteristics of the region did require this phase, and a special grant would correspondingly be required for this explorative type of effort.

Another problem was the requirement for explicit committing statements on effort dedicated to network activities over several years. The rather small enterprises of the region were typically very worried about how to make time available for the network activities, and the requirement for committing statements could scare them away.

Eventually, the network was initiated in April 1993, with 3 ordinary industrial members and 5 associated (non-committed) members.

ACTIVITIES AND RESULTS

The TS of the network arranged initially a basic study group, where 5 half-day meetings provided 10 participants from 6 different companies with a foundation in AVT.

Following this 4 application study groups or selective methological studies were initiated, on topics like:

(1) "Quality Control of Surface Structures"
(2) "AVT for Surveillance"
(3) "AVT for Video Production"
(4) "Automation of Food Production"

Each of these activities involved from one to four companies, and they have had from one meeting (one company went bankrupt) to 13 meetings. In one case a consulting engineer became able to design and plan a dedicated QC-system, which he has offered to develop for a factory. If this is accepted, he can be supported by the network through the scheme for "prototype development".

The video production group also produced a NORBIT-video, which explains about the network and the potential of AVT for SME's.

A half-day AVT-seminar has been arranged to stimulate further the awareness in the region of the technology. Twelve industrial delegated participated together with a number of other people interested in the field. The local news media took an interest and helped spreading "the good news". Six explorative site visits and the seminar have brought several new members to the network.

The current status of NORBIT is 8 ordinary industrial members and 5 associates. One of the first study groups is still running, one has split into 2 which are more specialised, and with the potential of a new small company being formed. Three other new study groups have been started, and 3 prototype developments are expected to start very shortly.

COMMENTS ON STATUS

The preliminary result after 9 months of operation is an active and sound network for technology transfer working well to meet the objectives of STRIDE.

However, it has been a costly investment in the sense that it has taken more expert time in relation to time invested by industrial companies than assumed by the scheme for financial support from the STRIDE-programme. The industrial participants need very much expert support individually, and it takes time to help them pass the threshold where they realise what AVT can do for them, and that it is worth investing in knowledge.

Our experience is a mixture of excitement, because of the basically positive interest we meet and the results achieved, and a frustration, because it has taken so much effort to get this far.

The expected significant increase in "less-dependent" industrial involvement has to happen for the network to survive.

Major short-term effects have been very hard to achieve.

SUMMARY OF OBSERVATIONS, PROBLEMS, AND SUGGESTIONS

The observations one can make from the network described above, relate closely to the very specific conditions for the its operation:

A. This is a minor network initiative.

B. The region mainly has rather small industrial enterprises which may be "struggling to survive", and in any case have little to spare for new investments.

C. The technology offered is advanced, but only very simple and dedicated versions of it are relevant for most of the industrial participants.

If such conditions are also found in other regions of the community some of the observations, problems, and suggestions below may have a wider interest.

(i) The financially supported push to university departments to get into close encounter with the local industry is very inspiring for the university staff and brings about a very valuable mutual understanding between academia and industry. The long-term effect of this is expected to be significant.

(ii) A searching effort on the part of the technology source with explorative visits on site to a large number of companies is required to establish a necessary awareness about the potential of the technology. A corresponding special support scheme is required at least for an introductory period.

(iii) A positive attitude of interest has usually been the reaction we meet, but most often without the necessary resources being available in the companies for a follow-up.

(iv) The degree of prior commitments required by the small industrial enterprises should be very flexible. In particular in the first phases of such a network's activity. As to planning of activities a flexibility in timing is also required for (very) small enterprises. A typical response when discussing membership was: "We are very interested, but presently very busy on other commitments"

(v) Small enterprises, which could benefit from the technology, would typically not require advanced but dedicated guidance.

(vi) The strict geographical constraints on participation can be a serious obstruction for many activities. It could often be of great benefit for small enterprises in the region to collaborate with companies outside (neighbouring) the region.

IVe Conférence Stride

Arsenal de Metz (France)
7-8 février 1994

DOCUMENT DE TRAVAIL

WORKING PAPER

TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Ralf GRASSOW
Managing director
CENTER FOR DEVELOPMENT AND
RESEARCH IN MICROTHERAPY
Universitätsstrasse 142
D - 44799 BOCHUM
(49) 23419 78 00

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"Minimal invasive surgery" and "interventional radiology" are terms that have created sensations in medicine and the media. Extremely small instruments and high resolution imaging techniques have made minimal invasive operations possible. Surgical scars are hardly visible. Yet almost all parts of the human body can be reached for therapeutic procedures. For these procedures the term "Key-Hole-Operation" has been coined.

The traditional content of professional work in medicine is changing: previously large-scale operations are being substituted by miniaturized procedures. Endoscopic treatments such as gallbladder or stone resections, as well as appendectomies, discectomies and arthroscopies are being performed by teams of mainly young physicians.

The individual patient as well as society as a whole benefit. For the patient on the one hand, the stress during therapy is much less, for instance in patients suffering from a herniated disc, who can be discharged home as early as a few hours after the operation. On the other hand there is a significant reduction of hospital stay and operations can be shifted to an outpatient setting. Side effects and complications are less, promoting healing and reintegration into working life.

The consistent development of this therapeutic approach will drastically reduce the costs of medical care. These low stress therapies depend on the specific use of intelligent technologies. It is going to be more and more difficult for the industrialized nations to finance the health care costs of society. The need for suitable, cost reducing alternatives, and therefore technical innovations will become greater. New opportunities will open up for many branches of industry.

The EFMT*, a Center for Interdisciplinary Research and Development in Microtherapy, was founded on the basis of these fundamental considerations. It is currently being established on the premises of the Technology Center at the University of Bochum, Germany.

History and Methods of the "Key-Hole-Operation"

Various radiological and surgical methods have led to the development of the "Key-Hole-Operation". One of these methods is so called "Interventional Radiology", which was derived from angiographic techniques. Angiography is used for the visualization of vessels of the human body by means of injecting contrast dye through a small catheter into a vein or artery. The position of the catheter is checked with fluoroscopy.

Prof. Charles Dotter was the first to use these techniques not only for diagnostic purposes, but also to treat narrowing and occlusion of vessels. He stated that "Interventional Radiology is image-guided non invasive surgery". In 1964 these two important terms were already in use: "image-guided" and "non invasive surgery".

At that time "image-guided" simply meant to use fluoroscopy. This method allowed images only in one plane, unless the patient or the X-ray machine was rotated.

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* EFMT: Entwicklungs- und Forschungszentrum für MikroTherapie

Nowadays technical improvements make it possible to produce images in all planes without moving the patient. The physician however, who needs to check the position of his instruments inside the patient's body, can still only see two planes at a time.

New imaging techniques, such as CT (Computed Tomography), MRI (Magnetic Resonance Imaging) and US (Ultrasound), make it possible to visualize cross-sections of the human body in all planes. The precise localization of diseased tissue is possible. In the early 1960's CT-Scans were first used in a clinical setting. The first machine was designed by Dr. Hounsfield, a British physician, in cooperation with EMI-industries - better known today as a music label. The first images produced were very blurred. Today CT is a standard diagnostic technique in many hospitals and private practices. In Germany today about 1100 machines are in operation.

In the late 70's and early 80's the arrival of Magnetic Resonance Imaging made three dimensional cross-sections of the human body possible. Without the use of X-rays, images can be displayed and spectroscopic analysis performed. Spectroscopy for example allows a non invasive analysis of a patients metabolism. Apart from MRI, magnetic field technologies have been recently developed and employed. Biomagnetic analysis is a technique that records the extremely weak magnetic fields produced by the electric excitation of the heart or brain, fields which are much weaker than the earth's magnetic field. These signals can be superimposed on CT or MRI images and allow non invasive localization of pathological functional activity.

Charles Dotter anticipated the term "Minimal Invasive Surgery or Therapy" when he used the expression "Non invasive Surgery". The former is used today to describe procedures which require only the smallest of incisions and therefore represent the a quantum jump in operative medicine today.

Dotter's term "Interventional Radiology" describes only a part of today's procedures. These include all methods in which catheters or needles are used without larger incisions and requiring only local anesthesia: dilatation of narrowed or occluded vessels, closure of tumor-vessels or bleedings, thrombolysis, drainage of bile, artificial vessel prosthesis and the drainage of pathological fluid accumulations as well as placing feeding tubes in the gastrointestinal tract.

The gynecologist Professor Dr. Semm introduced endoscopic techniques to the surgical fields. In the late 1960's he began to perform gynecological operations with an endoscope. Eleven years later he performed the first successful endoscopic appendectomy, now a standard procedure of modern surgery. Dr. Ludwig Demmling and Dr. Meinhard Classen, professors for Internal Medicine (not surgeons) were the first ones to perform a papillotomy, the dilatation of the bile duct, with an endoscope.

The term "Minimal-Invasive Surgery" was coined by Professor Wickham, a Urologist from London who is presently president of the "Society of Minimal Invasive Therapy". The aim of the Society is to integrate the different therapeutic approaches.

Nowadays gallbladders and appendices are operated endoscopically with incisions only 1 cm wide. Likewise gallstones and kidney-stones are extirpated, gynecological operations performed and joints examined. Recently larger operations, such as kidney-operations, even nephrectomies are performed with minimal invasive techniques. A nephrectomy was recently successfully performed by an American team of physicians. Prof. Bauer and his team of the University of Marburg as well as another group from the University of Mainz carry out endoscopic operations on intervertebral discs and the brain.

Up to the present CT and MRI scans have only been used for diagnostic purposes, although they offer great advantages in the development of minimal invasive procedures. The second quantum-jump is currently taking place.

With CT and MRI scans it is possible to visualize the human body in cross-sections without any superimposition. Organs that lie in front of or behind the visualized structure no longer interfere with the image. Motion related artifacts can now be reduced using Ultrafast CT scanning. Furthermore at scan times of 50ms per image ciné films of up to 20 images per second are possible. The Ultrafast CT scan can visualize moving organs such as the heart, lungs, gut and vessels in all plane cross-sections. As a result of the extremely high resolution very small structures become visible: calcification of the coronary arteries or small vessels in the vicinity of nerves. Delicate needles and instruments ranging from 0.2 to 1 mm in diameter can be safely placed with a microscopic accuracy of 1 mm at the site of the illness. For this reason we refer to these procedures as "microtherapy". Procedures can be performed in immediate proximity of vital organs with little pain and few side-effects.

Furthermore three-dimensional images can be produced by integrating cross-sections in different planes on a monitor. Thus, after the patient has been examined, the organs or regions of interest can again be viewed from different perspectives.

At the Radiological Institute in Mühlheim (MRI) we have performed more than 40,000 CT-guided procedures in recent years. Among these procedures were biopsies, dilatations of vessels such as treatment of peripheral vascular disease, discectomies, local cancer therapy and the treatment of pain related to chronic disease. About 90% of all treatments were done on an outpatient basis.

In addition we have taken first steps in using magnetic resonance imaging not just for diagnostic purposes but also for the treatment of patients under image control. At present the only MRI system in Germany which is accessible from all sides is located at the Institute in Mühlheim. A second one is being installed at the EFMT in Bochum. The open structure of this system has a number of advantages: fear or apprehension due to claustrophobia on the part of the patient is greatly reduced, relatives or accompanying persons can be within sight. For the physician access to the patient is vastly improved, therapeutic interventions are possible, medical support staff are close at hand. This represents a great advantage when compared to the ring-structure of a CT system or the tube-structure of conventional MRI system

A general advantage of MRI-Scans is the absence of X-rays, i.e. no radiation exposure for patient or physician. Furthermore this technique offers exceptional images in all three planes. However, medical instruments made of magnetic material are attracted by the strong magnetic fields and produce image artifacts. On

the other hand such effects are reduced in the above mentioned open, low-field MRI system. Nonetheless suitable instruments have yet to be developed

Operations performed under CT or MR image control have a decisive advantage over endoscopic procedures: the site of disease can be localized with greater accuracy. Using endoscopes one can only see the structures that lie ahead of the endoscope, such as the inner wall of a vessel: orientation is very. With the aid of the CT or MRI scan the physician can see what lies behind a wall of a vessel, he can see all necessary structures from vessels to nerves, from front to back. Miniaturized operations thus become possible. The instruments used in our institute, such as catheters, scalpels, scissors, drainage-systems and sensors have a diameter of 1 mm and less. Our micro-endoscopes range from 0.29 to 0.90 mm in diameter, the laser-systems from 0.20 and 0.40 mm.

The third and next quantum-jump will be a result of the combination of image guided interventional radiology and operative, endoscopic approaches in surgery. An interdisciplinary center such as the EFMT in Bochum focuses on these techniques and can act as a catalyst for the fundamental advancement of medical microstructural techniques, imaging and operational procedures.

The EFMT and the future of minimal invasive procedures

Micromedical systems theory

Comprehensive and complex projects such as the development of a whole branch of medicine including therapeutic techniques can only be realized within a conceptual network. For this reason structure and function of the EFMT is based on a systems theory approach. Solutions to single problems are thus coordinated from a holistic point of view and placed within an overall micromedical and technical context. In order to achieve our goal - research and development tailored to the user - we are proceeding along the following lines.

The problems and questions arising within a medical, micro-operative context with respect to imaging and apparative techniques must be identified and solutions formulated, e.g. for system design and construction, imaging, development of instruments and material testing. Isolated approaches to solutions are avoided through cooperation and coordination of R&D right from the start. Partners from the natural sciences, engineering, medicine and industry design and construct prototypes which are then tested in simulations, on dummies and finally in the medical setting.

This interaction leads to modifications and changes until the product is finally passed on to industrial partners. Ideally these partners should have an office in the vicinity of the EFMT. This guarantees that the time needed for development and production is shorter and optimal marketing strategies can be applied.

In this way, patients not only reap the benefits of newly developed low stress treatment sooner, but two important economic advantages are also gained:

1. The creation of new markets and capital for the area of medical technology and microstructural technology.

2. Costs are cut drastically as a result of shorter hospital stays and the shift of operational procedures to an outpatient setting. The number of inpatient beds can be reduced.

It is the aim of the EFMT to develop low-stress procedures and microtechnical approaches in the following fields:
- medical diagnosis and therapy
- biomedical microtechnology and microstructural- technology
- rehabilitation and sports medicine
- information and communication services.

Integrated approaches in the above named fields should be applicable in in- and outpatient settings all over the world. It is most important to combine medical experience with R&D as well as an active knowledge transfer with the natural sciences, engineering, the humanities and industry.

The treatment of common diseases

Central to the EFMT's activities is the development of microtechnology, therapeutic systems and concepts in order to integrate new technologies in medicine. As a non-profit organization it focuses on medical innovations to combat common diseases, such as spinal afflictions, cardiac and vascular disorders, joint disorders and cancer. These new technologies, which should be patient-oriented, are studied at the EFMT under the following premises:
- Hospital stays can be reduced or even avoided completely. The need for professional nursing can be reduced considerably. More time will be available for the individual patient.
- Operations can be performed under local anesthesia; patients will be less affected by general anesthesia.
- The patient's environment will be more patient-oriented and technical systems will be less obvious.
- Less traumatizing procedures mean faster recovery with less complications and less psychological stress.

Medical Microtechnology

Beyond designing large diagnostic devices or the construction of small endoscopes and surgical instruments, the EFMT plans to explore innovative technical areas such as microtechnology have to be opened. Tiny machines and pumps with "intelligent" sensors, with scales ranging from nano- to micrometers, will be needed for vascular surgery, vertebral disc operations and cancer-therapy. These devices will combine the ability to mechanically remove and to sense blockades as well as to perform biochemical analysis.

The EFMT and other institutions in Germany that do research in this area are in direct competition with Japan. The Japanese Ministry of Industry and Trade (MITI) has succeeded in acquiring the cooperation of university researchers and industry for an ambitious project. The aim is to design within ten years microrobots that are able to operate within the human body, performing examinations, analyzing and treating certain illnesses. Approximately $200 million has been set aside for this program which includes the development of an experimental "micro intelligent

catheter". More than 100 companies and research institutes have joined for the MITI project. The VDI (Federation of the German Industry)- Newsletter reported last November that many companies increased their funding for microresearch in order to participate in this project.

The idea of setting up an institute for R&D in microtherapy occurred to us while writing on the subject of Interventional Radiology. We realized that such an institute could participate in the huge upcoming market in medical microtechnology.

The Massachusetts Institute of Technology (MIT) initiated research in microtechnology. Techniques developed there and elsewhere not only make it possible to construct mechanical, electronic and sensory devices in the range of micrometers, but also to combine these devices with each other. Several centers focusing on micromechanical techniques were founded in North Rhine-Westfalia. One of them is the Research Institute for Micro-Structural Techniques (FMT) at the University of Wuppertal headed by Prof. Dr. Engemann. In the Technology Center in Dortmund a so-called Delta-Ring is being constructed. The Delta-Ring is a particle accelerator that allows the production of very small mechanical devices in metal, ceramics or plastic. The Micro-Parts Company, privately held by leading German companies such as the STEAG, has also decided to move to the Technology Park in Dortmund. It is to be expected that microtechnology will not only explore medical markets but also a fair number of jobs will be created.

An overview of new technology applicable to micromedicine

Technology	Application
Microelectronics	Ultrafast computer on the basis of molecular and atomic memory
Optical systems	Production of precision instruments for ultraviolet and X-ray optics, optimizing of optical properties
Engineering	Improvement of durability of instruments through precise surface modeling
Chemistry and Biochemistry	Direct manipulation of molecules, custom made catalyser, new filter techniques
Pharmacy	New drugs which become active at the disease site
Medical technology	Surgical micro-instruments, chemical sensors, micro-perfusors with several nanometers in diameter, which are controlled by acoustic waves, bio-compatible vascular prosthesis
Solar technology	Production of granular layers with custom-made optical qualities and new ultra-thin layering systems
Laser technology	Intelligent senso-opto-laser systems for operations, highly efficient semiconductor laser systems
Communication technology	Low-noise amplifiers for satellite receivers or broad band communication
Material technology	plastic ceramics, plastics with custom-made optical and magnetic properties, anti-magnetic surgical instruments

Imaging systems

Safe and reliable movement and placement of miniaturized instruments or mini-motors must be performed under visual control using high resolution CT- or MRI-Scans. Imaging systems such as MR, Ultrafast CT, digital X-ray and Ultrasound have to be optimized towards higher image resolution and faster image refresh rates. Up to now these systems have been primarily designed for diagnostic procedures. This is why CT and MR systems are constructed with a tube or ring structure. Not only do patients dislike this design because of the narrowness, they also make therapeutic intervention difficult. The design needs to be changed and the software needs to be improved towards real-time imaging, three dimensionality and higher resolution. Furthermore the surrounding infrastructure has to be adjusted as well: new patient tables, improved patient-management, advanced monitors and workstations.

Worldwide there is a need for surgical instruments, devices or certain probes designed specifically for MR use. In cooperation with the Cook International Company and the Micromed Company in Bochum we have developed a number of innovative products over the past few years. These include anti-magnetic titanium surgical instruments (which reduce image artifacts). Furthermore beside micro-surgical instruments, we have also designed a special interventional CT-Scan for the Siemens Company. Similar developments were realized with the Toshiba Company with respect to MRI. Future projects include the development of software and hardware for computer-, transputer- and network-technology. Preliminary results were presented at the Hannover fair: a transputer-motherboard that increases image refresh rates for an open MRI-system. This technology enables for the first time the observation of all procedures during an micro-operation in real-time.

Health-care costs and rehabilitation research

In order to set up effective medical strategies in the treatment of common diseases and thereby optimize the microtherapeutic approach, the integration of preventive medicine and rehabilitation in the EFMT concept is of high importance. This stance is supported among other things by recent statistics on the financial loss for the economy caused by diseases of the spine.

A study of the German Agency for Employment has shown that the health insurance companies had registered 191 million disability days in 1989 because of diseases of the spine. The study surveyed 24 million members of all health-insurance companies. The German Agency of Employment calculated that the average loss for a company for one day of inability amounts to 800 DM in direct and indirect costs. Taking all these figures into account the financial loss to companies in Germany secondary to spinal diseases was 152,8 billion DM in 1989. Diseases of the spine alone accounted for 94 billion DM. Provided there are 220 regular working days per year, 191 million disability days mean 868,182 working years of disability. Spinal diseases account for 533,930 working years.

Spinal diseases are mainly caused by physical labor. The statistics of the health insurance companies, which go back 15 years, show that spinal diseases are more

common in the following trades: steel and metal industries, construction, public-transportation and administration. Further high risk groups are bakers, bookbinders, roofers and tile-layers.

The German net national product in 1989 was 1745 billion DM. There would have been an additional 54.5 billion DM more, taking all the days of absence caused by spinal diseases into account. The estimated cost of out-patient care for this disease group are about 25 billion DM. This figure does not include operations, early retirements and other medical treatment.

Prevention and rehabilitation of diseases of the musculo-skeletal system

High costs as well as complex and partly stressful therapies make it necessary to develop strategies for prevention, treatment and rehabilitation. These strategies need to be applied in industry, if economic losses are to be reduced. The Federal Agency for Workers Protection in Germany collected the following data for 1989

- about 4.8 million workers carry or lift heavy weights
- about 3.1 million persons work in a stooping, kneeling, squatting or lying position
- about 9.7 million persons work under uniform conditions.

We see potential for prevention and rehabilitation in the following areas:

1. workplace design, medical assessment of the workplace and work process, counseling in occupational medicine.
2. Occupationally oriented physiotherapy.
   New programs must be developed and existing programs reviewed. Special projects in physiotherapy are:
   - Gymnastics and sport for healthy employees
   - Treatment of company specific diseases with specific methods
   - Physical therapy and counseling according to the working profile and the ergonomic needs
   - Development of spine and joint training programs which meet the needs of the specific job type: depending on the workplace and work process special programs must be developed which convey adequate behavior to avoid back injuries. One can therefore differentiate between primary prevention for the healthy and secondary prevention for persons with spinal or joint afflictions.
   - Development and implementation of low stress treatment methods: step by step therapeutic plans, beginning with conventional therapy and out-patient operations (key-hole-operations) and continuing with in-patient operations and rehabilitation measures. Cost reduction in the health care system and early job reintegration by the means of out-patient operations play an important role.
   Lastly, key-hole-operations however make it necessary to design new and highly advanced
   - Rehabilitation concepts suited for the specific workplace.

It is now possible to verify the success or failure of general and specific methods in physiotherapy. CT-and MRI-Scans can document the increase in muscle-mass with the help of their high resolution imaging. Existing training- and physiotherapy programs can be reviewed and easily improved. With this in mind a research group was founded six months ago by Prof. Baumann, Sport-University, Cologne and EFMT/MRI.

New approaches in the prevention of arteriosclerotic disease

Arteriosclerosis (calcification) of the human arteries is not only related to the most common cause of death, myocardial infarction, but also to high morbidity in the form of peripheral vascular disease and occlusion of the carotid arteries. The Institute for Social Medicine of the University of Lübeck has estimated that the incidence of arteriosclerotic diseases will increase by 33% for men and 8% for women by the year 2005. Figures from the 1990 Health Report of the Federal State of North Rhine-Westfalia show that 31% of all cases of early retirement are secondary to cardiovascular diseases (mainly myocardial infarction and apoplexy), 27% are secondary to diseases of the musculo-skeletal system.

The progression of arteriosclerosis can only be slowed or halted in early stages of the disease. In advanced stages the disease is often unaffected by treatment. Bypass operations for example do improve quality of life, but do not always prolong life. In Germany the number of deaths caused by myocardial infarction could only be reduced marginally. Even after successful vascular surgery only every second and, after heart surgery, every third patient of working age could be reintegrated into his job.

The American Heart Association has accordingly declared the early diagnosis of arteriosclerosis as the main challenge of the 1990's. The non-invasive imaging of coronary arteries with Ultrafast CT, a field being developed by the EFMT, opens up new possibilities. Preventive measures can be evaluated in their effectivity on an out-patient basis, avoiding coronary angiographies and the concomitant hospital stays.

Non-invasive follow up of preventive measures in arteriosclerosis

In the USA programs initiated to change smoking and dietary habits have led to a marked decrease of myocardial infarction. On the other hand, the German Cardio-Vascular Prevention Study documents in its interim report that the risk factor constellation has become worse rather than better. Apparently the approach used so far for counseling of high-risk patients have not been very effective.

In particular preventive measures at the workplace need to be emphasized. At the Sport-University in Cologne, different training programs have been designed, such as sport for "coronary patients" or for "vascular patients" and have proved to be successful.

Non-invasive evaluation of training programs is possible with the methods being developed and available at the EFMT:
- Ultrafast CT scanning
- Flow measurements with the help of the MRI scanning
- MRI spectroscopy of energy metabolism
- Modern ultrasound systems

Not only can the efficacy of certain measures be evaluated in this way, but also motivation can be improved in the individual case. There is substantial evidence that early arteriosclerotic changes can be modified through alterations of life style habits and thereby the number of risk factors reduced.

Transfer of research and development in medicine and medical technology

The EFMT cooperates in the development and implementation of microsurgical treatment and innovative medical techniques with regional universities, hospitals and other federal and private institutions, as well as physicians in private practice, who are interested in research. The staff and the equipment of the EFMT are made available to researchers who are not members of the institute. Cooperating researchers add their personnel and equipment. Application for government or private funding may be done by the partner or in conjunction with the EFMT. The work of these cooperating researchers is coordinated by a special the EFMT department A scientific board supports this department in its work.

Furthermore the EFMT offers theoretical and practical training inn all systems for medical and scientific personnel. Under certain conditions cooperating partners may play a role in the organization and management of the EFMT departments.

The changing market and transfer of technology to regional industries

Over recent years medical engineering has become an important and expanding branch of the industry worldwide. In particular with respect to endoscopes the Japanese company Olympus Optical Co. has profited: it. controls 80% of the worldwide market, their sales amounted to 3.2 billion DM in 1990/91. Flexible endoscopes built by the Olympus Optical Co. are used mainly for examinations of the gastro-intestinal tract and the intravascular system. Almost 47% of their turnover in Europe was based on the sale of endoscopes.

In certain areas however, German companies excel. With respect to rigid endoscopes two German companies, the Richard Wolf GmbH, Knittlingen and the Karl Storz GmbH, Tuttlingen produce high quality instruments. And the market is expanding rapidly. According to an analysis of the market research group Frost & Sullivan, the international demand for endoscopes will double in 1994.

Worldwide, about 44 billion DM is spent annually on medical equipment. Of this about 60% is for diagnostic systems, such as X-ray equipment, CT, MRI and Ultrasound systems. The demand for diagnostic systems in the Federal Republic of Germany is considerable. Compared to the USA and Japan, the number of MRI systems is very small: about 300 are in operation in Germany, 2100 in the USA and

800 in Japan. In this field we are as much a developing country as the other European and Asian countries. So far the market is controlled by three companies: General Electrics, Siemens and Philips. The Japanese companies, Toshiba, Hitachi, Shimadzu etc. are expanding their efforts to dominate this branch of medical technology. Nevertheless, there is room for development in this open market.

Accordingly, with its special emphasis on medical and mircomedical technology, the EFMT takes its place within the government program of economic restructuring of the Ruhr area. The EFMT is part of this development and is supported by state funding. The Ruhr area with its traditional metal and manufacturing industries offers an excellent infra-structure as well as other prerequisites for a successful participation in the medical equipment market.

Establishing the EFMT on the campus of the Ruhr University in Bochum, the country's largest university with its preexisting scientific and industrial network, offers a framework which is conducive to the settlement of new high-tech companies. Small and medium sized companies are suited to cooperate with the EFMT in the development and production of medical equipment. They have the resources for finding and implementing flexible solutions in adapting existing medical systems and developing innovative technical concepts. A number companies have already settled in the vicinity of the EFMT. They are involved in endoscopy, measurement and automatic control technology, metabolic analysis, laser technology, microelectronics as well as custom furniture. These firms include Micromed GmbH, Dr. Sennewald-Medizintechnik GmbH, Oxymed GmbH, INFAI GmbH and Laser-Chem GmbH.

In cooperation with ManGo-publishers in Bochum it is planned to design and market teaching material for microtherapy. The Media Consulting Team Company does the consulting on public relations and publishing design. The William Cook Company, an international producer of medical equipment on three continents, and the Blackwell Publishers from Oxford plan to open offices close to the EFMT. All in all about 40 to 50 new jobs for highly qualified employees will be created in the vicinity.

Organizational structure of the EFMT

The EFMT is a non-profit organization. Apart from the authors, the shareholders include Entwicklungsgesellschaft Ruhr-Bochum GmbH (EGR: Development Company Ruhr-Bochum Ltd. owned by the City of Bochum), the Augusta-Krankenanstalten GmbH (Augusta Hospital Ltd. in Bochum) and as an industrial partner Theodor Wüllenkemper, Zeppelinbauhaus in Mülheim. The EFMT has been supported by the Initiativkreis Ruhrgebiet since 1990. The managing directors are Thorsten Schütz and Berthold Cremer. A board of trustees including well known personalities advises the management. Currently the EFMT employs 30 full-time staff and 10 persons on an honorary basis. Following departments exist at the moment:

- Administration
- Research and Development Coordination
- Medical Physics and Computer Science
- Construction and Material Testing
- Image controlled Microtherapy
- Interventional Angiology
- MR Imaging
- Computed Tomography and Ultrafast Computed Tomography
- Biomagnetism

The Center for Research and Development in Micro-Therapy - EFMT - is a non-profit organization. As such, all profit is reinvested into the institute. Furthermore the services and resources of the EFMT are placed at the disposal of institutions interested in research, including those of the state, of regional industry as well as physicians in private practice. All partners are offered the opportunity to participate in the exploitation of the institute's research potential and to play a role in project design and realization. On the basis of this cooperation, all those involved can help make the Ruhr area a center for innovative, low cost and low stress therapeutic methods.

Atelier n° 3 / *Workshop n° 3*

La participation du secteur privé au développement technologique local
Private sector participation in local technological development

Président / *Chairman :*

Dr E.-N. Spithas, director, General Secretariat of Research and Technology, Athènes (GR)

Rapporteur / *Rapporteur :*

Joâo Barbedo, assistant, DG XVI, CCE, Bruxelles (B)

Arsenal - Galerie d'exposition

ATELIER n° 3

LA PARTICIPATION DU SECTEUR PRIVE AU DEVELOPPEMENT TECHNOLOGIQUE LOCAL

OBJET

Analyser les initiatives du secteur privé dans le développemen technologique local, afin de faire ressortir les points positifs de c type d'intervention mais aussi les limites. Il s'agira également d faire émerger les types d'organisations et de structures efficaces e fonction des contextes locaux.

L'atelier évaluera aussi l'action directe ou indirecte des grande entreprises en restructuration dans les différentes zones en fort déclii industriel. De même, il sera bon de dégager les typologies d groupements ou d'associations privés adéquats pour le développemen technologique local ainsi que l'intérêt de la mise en place d structures de reconversion.

L'atelier essaiera enfin de délimiter les blocages limitant o ralentissant les initiatives locales tant administratifs que technique ou socio-économiques.

Pour illustrer et lancer la discussion, 5 à 6 expériences seron présentées au cours de chacune des deux séances correspondant aux diver aspects des problèmes évoqués.

ORATEURS ET PARTICIPANTS

- Entreprises privées petites et moyennes
- Grandes entreprises en restructuration
- Associations technologiques locales spécialisées
- Conseils et experts privés
- Collectivités territoriales
- Administrations et agences locales
- Associations d'entreprises

Lundi 7 février 1994 / *Monday, 7 February 1994*
14h00 - 17h30 / 2:00 - 5:30 p.m.

Présentation de l'atelier par le président de séance
Workshop presentation by the Chairman

Dr Mike G.-W. de Leeuw, managing director, Biotechnology Research and Consultancy Centre, Groningen (NL)

L'introduction des procédés biotechnologiques dans les Pme.
Introducing biotechnological processing into SMEs.

Paola-Sophia Seremetis, consultant, Danish Technological Institute, Taastrup (DK)

Les réseaux de Pme technologiques : exemples italiens, danois, britanniques.
Technological networks of SMEs : Italian, Danish and British examples.

Jean-Marc Vandenbulke, chambre de commerce et d'industrie, Péronne (F)

Création d'un pôle technologique dans l'hydraulique et la mécanique.
Creation of a technological pole in hydraulic and mechanical engineering.

Isabel Matalonga, head of division, Direcçao Geral do Desenvolvimento Regional, Lisbonne (P) et **Pr Paulo Tavares de Castro**, Junta nacional de Investigaçâo Cientifica e Tecnologica, Porto (P)

La promotion de la R&D dans les entreprises : l'expérience portugaise dans le cadre de Stride.
Promotion of research and development activities in firms : Portuguese experience with Stride.

Discussion / *Discussion*

Wilson Mc Garel, head of bonding and treatments group, Short Brothers Plc, Belfast (UK)

Coopération technologique régionale : la formule du succès.
Regional technology collaboration : the formula for success.

Gino Ravagnan, presidente, Consorzio Ecologia e Acquacoltura Costiera , Padoue (I)

Valorisation de la productivité des zones humides côtières et diffusion des technologies associées.
Enhancement of the productivity of coastal wetlands and development of connected technologies.

José Ferreira, responsable du département d'investigation et développement, Sociedade Portuguesa de Celulose, Alcoentre (P)

Recherches et diffusion des résultats sur l'écosystème forestier portugais et sur les améliorations génétiques de l'eucalyptus.
Research and dissemination of results relating to Portuguese forest ecosystem and genetic improvement of eucalyptus.

Mardi 8 février 1994 / *Tuesday, 8 February 1994*
9h00 - 10h40 / *9:00 - 10:40 a.m.*

Lars-Bo Nielsen, head of department, Force Institute, Aalborg (DK)

Réseau de Pme sur le choix, la fabrication, l'utilisation de matériaux plastiques.
SMEs network for guiding the choice, production and use of plastic materials.

George A. Zenzefilis, head of industrial automation, Intrasoft SA, Athènes (GR)

Le contrôle de procédé comme moyen de collaboration technique : le projet Artemis.
Process control as a mean of technical collaboration : the Artemis Project.

Fabrizio Bernardini, consigliere d'amministriazione, Erica, Marina di Carrara (I)

Erica : un consortium pour la recherche et l'innovation dans le secteur de la pierre et des technologies associées.
Erica : a consortium for research and innovation in the stone sector and related technologies.

Pr John Hughes, dean, Northern Ireland Knowledge Engineering Laboratory, University of Ulster, Newtownabbey (UK)

Joint-venture entre l'université d'Ulster et International Computers Ltd pour apporter des solutions aux problèmes posés par les entreprises.
Joint-venture between Ulster University and International Computers Ltd to bring knowledge-based solutions to problems formulated by industry.

Discussion / *Discussion*

PANEL

ATELIER N° 3

"LA PARTICIPATION DU SECTEUR PRIVE AU DEVELOPPEMENT TECHNOLOGIQUE LOCAL"

Mr. John LARKIN, Shorts Research and Technology Centre, Belfast (GB)

Fournir, avec l'aide d'un grand groupe chimique, l'appui technologique aux PME dans le domaine des matériaux composites.

Mr. GONCALVES FERREIRA, Soporcel, Alcoentre (P)

Recherches et diffusion des résultats sur l'écosystème forestier portugais et sur les améliorations génétiques de l'eucalyptus

Mr. PUYMEGE, Electronique Associés, Le Creusot (F)

Centre de recherche créé par une association de PME de l'électronique et de la vision artificielle.

Mr. L.B. NIELSEN, FORCES Institute, Aalborg (DK)

Réseau de PME sur le choix, la fabrication, l'utilisation de matériaux plastiques.

Dr. G. RAVAGNAN, Consorzio Ecologia e Acquacoltura Costiera (CEAC), Padoue (I)

.....

Dr. M. de LEEUW, Biotechnology Research and Consultancy Centre, Groningen (NL)

L'introduction des biotechnologies (traitement des déchets, procédés de production) dans les PME.

Pr. P. TAVARES DE CASTRO, Universidade, Porto et Mme I. MATALONGA, Direcçao Geral do Desenvolvemento, Lisbonne (P)

La recherche-développement dans les consortiums industriels, ses retombées technologiques.

Mr. ZENZENFILIS (ou Mme PALIOURI), INTRASOFT S.A., Athènes (GR)

Apporter les technologies de contrôle de process et de télémétrie électronique aux PME.

Pr. John HUGHES, Northern Ireland Knowledge Engineering Laboratory (NIKEL) Jordanstown (GB)

Joint-venture entre l'Université d'Ulster et International Computers Ltd pour apporter des solutions aux problèmes posés par les entreprises.

Mr. Paris MAZZANTI, ERICA, Massa di Carrara (I)

Consortium de recherche, développement et formation des PME du secteur du marbre.

IVe Conférence Stride

Arsenal de Metz (France)
7-8 février 1994

DOCUMENT DE TRAVAIL

WORKING PAPER

TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Mike G.W. DE LEEUW
General manager
BIOTECHNOLOGY RESEARCH & CONSULTING CENTER
Zernikepark 8A
NL - 9747 AN GRONINGEN
(31) 50 777850

BRCC

Biotechnology Research & Consultancy Cent

Introducing biotechnological processing to small & medium sized businesses; we use niche marketing as a principle tool to overcome the fundamental problems.

BRCC (Biotechnology Research & Consultancy Center) has been established in 1992 in the city of Groningen, which lies in the north-east of the Netherlands. Originated as a spin-off from the Groningen University and Polytech, it is aimed at introducing and establishing biotechnological processing techniques in small and medium sized industrial organisations.

The ultimate achievement is the improved performance of the customer's operations, either by more cost-effective processing, or by new products to strenghten the market position. BRCC concentrates on three strategic developments: Waste water treatment, Improved Processing and Product & Process development. The current staff consists of seven people, blending science, technology and marketing skills into a new promising market approach.

In our start up fase we have to overcome some fundamental and specific problems in order to acquire a working base and business future. The fundamental problems deal with bridging the gap between centers of expertise and small and medium sized companies, or as you like, between Research and Entrepreneurs. The specific problems are connected with biotechnology as a new technology and the special barriers it is now encountering.

BRCC has chosen to concentrate on the marketing aspects to cope with these problems. I will try to explain our approach by introducing two cases that deal with medium sized factories and smaller glass-house cultivation. Both cases are concerned with the biological degradation of waste water.

IVe Conférence Stride

Arsenal de Metz (France)
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TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

Mme Paola-Sophia SEREMETIS
Consultant
DANISH TECHNOLOGICAL INSTITUTE
P.O. Box 141
DK - 2630 TAASTRUP
(45) 43 50 48 63

SMEs in technological networks: Italy, Denmark and the United Kingdom

Ever-increasing global competition hitting both large and small companies alike is provoking some creative thinking. Small and medium sized enterprises, (SMEs) need to change behaviour to meet the challenges. One of the few ways that SMEs can successfully fight the competition is by increasing interfirm cooperation or networking. This has enhanced the capabilities of SMEs to increase their competitive edge.

This paper compares three different modes of networking. Characteristics and examples of technology networks are drawn out from Italy, Denmark and the United Kingdom which exemplify certain learning curve parameters. A few characteristics of technology networks in these countries would be:

Italy : Local/regional bottom-up, service-oriented centres, SMEs pay for services, there is limited influence for the individual company, technology "leads" etc.

Denmark: National top-down, companies in networks have large influence due to veto power, ownership, aiming at new business/market oriented, and technology "follows "etc..

UK: Local top-down, plus all of the Danish (embryonic) characteristics, intentions towards establishing networks with participation from other regions/countries as well as working with local knowledge centres etc..

Another important aspect is the way in which firms in networks interact with the technological service environment. The modes of contact can vary in each country as well. In Italy, 20 years ago, there was generally a lack of a technological service infrastructure, consequently, service centres were created due to the technological needs of firms. In Denmark, on the other hand, the structures of technology service institutes were very much in place 20 years ago. Thus, Danish SMEs in networks do not regard their primary cooperation needs as being technology based. In the United Kingdom, it is expected that firms in networks will have stronger links to service/-research centres as in Italy. Nevertheless, it is necessary to note that the focus on networking is rather a new development in the United Kingdom.

Specifically, reference is made to networking examples occurring in Italy, (i.e. Castel Goffredo, Mantova, Stocking Service Centres) Denmark, (i.e. Aalborg, NFN, Trawler technology network) and lastly, United Kingdom, (i.e. Ayrshire, Scotland, Scottish Lace Guild).

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TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Jean-Marc VANDENBULKE
Président directeur général
DOUCE HYDRO
CHAMBRE DE COMMERCE ET D'INDUSTRIE
2, rue de l'Industrie
F - 80303 ALBERT Cedex
(3) 22 74 31 00

Projet STRIDE sur le Pôle Hydraulique et Mécanique d'Albert

RESUME DE LA PRESENTATION DE M. J.-M. VANDENBULKE

Président de l'association du Pôle Hydraulique et Mécanique d'Albert
Président Directeur Général de Douce-Hydro

Contexte

Le bassin d'emploi d'Albert est depuis longtemps spécialisé dans l'industrie mécanique de la transformation des métaux et dans la construction aéronautique, l'hydraulique de puissance et la fabrication des machines-outils, ce qui représente 85% des emplois industriels du bassin d'Albert (2 300 emplois).

Le bassin d'emploi a fortement souffert des problèmes des entreprises de la machine-outil en 80-85 et a bénéficié d'une mission de reconversion de 85 à 90.

La mécanique et l'hydraulique regroupent plus de 30 PMI avec des effectifs de 5 à 170 personnes. Si la conjoncture a été favorable à ce secteur, depuis quelques années des interrogations sérieuses commencent à poindre.

En 1991, un petit groupe de travail décide de revitaliser le bassin d'Albert. Cette démarche commence par la réalisation d'une étude par un cabinet de conseil en organisation Eurequip, qui propose d'orienter les actions sur 3 points :

- le partenariat et le renforcement des liens entre entreprises et les industriels,
- l'image et la promotion du Pôle,
- le soutien technologique aux entreprises.

A la suite de cette étude, la CCI de Péronne identifie le programme Stride comme le levier pour mettre en oeuvre les recommandations de l'étude.

Le but du projet est le développement économique du Pôle par l'élévation du niveau technologique des entreprises.

Les missions de l'ingénieur Stride sont les suivantes :

- animer et promouvoir le Pôle,
- identifier les compétences du Pôle,
- détecter les produits correspondants,
- aider les entreprises à élever leur niveau technologique.

Le projet Stride a débuté le 1er février 93. Ses actions sont pilotées par un comité de cinq entreprises représentatives du Pôle. Le projet a contribué par sa dynamique aux résultats décrits ci-après, dont l'impact sur la vie économique des entreprises d'Albert commence à être sensible.

La charte de partenariat local

Son objectif est la coopération des entreprises, notamment dans la prise de marché dépassant la compétence d'une seule entreprise. Plus de la moitié des entreprises y ont adhéré.

La promotion du Pôle

L'identification des compétences du Pôle a servi de matière première à la réalisation d'une stratégie de communication. Celle-ci se concrétise aujourd'hui par une plaquette, une charte graphique reprise par les entreprises du Pôle, l'envoi d'un mailing aux donneurs d'ordre, une participation au salon international de la sous-traitance Midest.

Identification des compétences : forces et faiblesses du pôle

Après réalisation d'un inventaire du savoir-faire local et de l'étude de l'état de l'art dans ces savoir-faire et leur évolution, les forces et les faiblesses du pôle ont été mises en évidence et sont restituées aux entreprises du Pôle.

Diversification produits

Les entreprises ont défini comme action prioritaire du projet Stride la recherche de niches de diversification correspondant à leur compétence. Une sélection de produits ou familles de produits est proposée aux entreprises. L'entreprise la plus motivée devient chef de file du projet d'évaluation du produit et définit avec l'ingénieur Stride les études à réaliser pour confirmer l'intérêt du produit et établit un partenariat avec les autres entreprises concernées du Pôle.

Elévation du niveau technologique

L'étude d'un nouveau produit réalisée avec le soutien de l'ingénieur Stride met en évidence la nécessité pour l'entreprise d'acquérir de nouvelles technologies et compétences. L'ingénieur Stride aide l'entreprise à préparer un programme de développement. Concrètement, ceci se traduit par le passage d'au moins un projet d'aide à l'innovation en commission Anvar par mois, depuis septembre 93.

De même, dans le cadre d'une coopération interentreprise, une mise à niveau technologique des entreprises est nécessaire, comme par exemple, la mise en place d'un contrôle fiable. Des actions collectives sont mises en place.

A plus long terme, on peut prévoir la mise en place d'outils communs aux entreprises.

Difficultés rencontrées

Les missions confiées à l'origine du projet à l'ingénieur STRIDE se sont révélées trop nombreuses et ont entraîné une dispersion. Après la mise en place de la charte de partenariat et le lancement de l'outil de promotion, le comité de pilotage a recentré celles-ci sur les deux priorités des entreprises : diversification produits et élévation du niveau technologique.

Enfin, le suivi du projet nécessite des industriels une grande disponibilité.

La mise en place d'une charte de partenariat et son fonctionnement est freinée par le poids des réticences des individus à échanger des informations et à collaborer. Un gros effort de pédagogie est nécessaire pour en montrer l'intérêt.

Concernant la recherche de produits nouveaux, celle-ci ne commence à porter ses fruits que lorsque un chef de file est identifié.

La sélection du produit nouveau et la mise en évidence de l'existence d'un marché se révèle dans la pratique un exercice difficile. Cette sélection doit être étayée par une pré-étude réalisée sous la conduite de l'ingénieur Stride, puis validée par le comité de pilotage pour éviter de se perdre sur des fausses pistes. Alors seulement, elle peut être proposée aux entreprises. Mais, le plus souvent, le développement de produits nouveaux va se heurter au manque de structure étude et commerciale dans les petites entreprises.

Le projet Stride est à destination de toutes les entreprises mais toutes les entreprises ne peuvent développer leur produit propre. Le défi est de maintenir l'intérêt de toutes les entreprises pour une démarche collective jusqu'au moment où elles en ressentiront les bénéfices.

IVe Conférence Stride

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WORKING PAPER

TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

Mme Isabel MATALONGA
DIRECCA GERAL DESENVOLVIMENTO REGIONAL
Av. D. Carlos I, 126-7°
P - 1200 LISBOA
(351) 39 68 148

M. Paulo TAVARES DE CASTRO
DEMEGI
UNIVERSIDADE DE PORTO
Rua dos Bragas
P - 4099 PORTO
(351) 23 11 241

Promotion of Research and Development Activities in Firms: the Portuguese Experience with STRIDE

Abstract

In Portugal, the STRIDE programme consists essentially on the following measures: (i) financing r&d projects in general, (ii) financing r&d projects specifically chosen taking into account regional development concerns, (iii) the creation of an Innovation Agency, (iv) the support for the creation of Science and Technology Parks in Lisboa and in Porto, and (v) the promotion of r&d activities coordinated by firms, and carried out by consortia of firms and r&d organizations, eventually including universities.

This paper will put STRIDE in perspective, giving a concise survey of the present situation and trends of r&d activities in Portugal. A short reference to the Portuguese economic tissue will show the large role of very small enterprises, and reference will be made to the very low percentage of the overall national r&d effort which is actually carried out by firms. Efforts currently being made to overcome this low percentage benefit in large measure from the STRIDE programme, particularly in what concerns the creation of the Innovation Agency (AdI - Agência de Inovação), and the promotion of r&d projects coordinated by enterprises.

AdI was created in June 1993, and is now finishing its first programme of selection and awarding financial incentives to r&d projects, which were chosen taking into account their market potential and the valorization of r&d results that were already available. AdI has the mission of promoting innovative processes and products in Portuguese firms; one of its objectives therefore is to incite firms to carry out r&d activities.

As mentioned above, one of the STRIDE measures is specifically concerned with the financing of r&d projects carried out by consortia coordinated by firms, and eventually asociating r&d institutions such as universities. The paper will discuss in some detail several examples of consortia, making reference to the variety of technical subjects being dealt with, and to some achievements so far.

IVe Conférence Stride

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TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Wilson McGAREL
Head of bonding and treatments group
SHORT BROTHERS Plc
B.O. Box 241
Airport road
UK - BELFAST BT3 9DZ
(44) 232 462515

SHORTS RESEARCH AND TECHNOLOGY CENTRE

"ORGANISING FOR TECHNOLOGY CO-OPERATION"

* The background and purpose of the Shorts Research and Technology Centre.

* The importance of technology acquisition and transfer.

* How the centre is organised and structured to compliment the company's business activities and develop co-operation regionally, nationally and internationally.

* Benefits of Stride funding in providing additional support.

* What we have achieved so far and what our future plans are.

* How the Northern Ireland infrastructure is being strengthened by the activities within the centre.

  - Links with other companies and academic institutions within the Northern Ireland region.

  - Links with institutions within Ireland.

  - Links within the UK.

  - Links within Europe.

  - International links.

* Lessons learnt.

IVe Conférence Stride

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TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Gino RAVAGNAN
Presidente
CONSOZIO ECOLOGIA E ACQUACOLTURA COSTIERA
Via Euganea, 29
I - 35141 PADOVA
(39) 49 76 96 00

Dans le cadre du projet de recherche STRIDE, le Consortium pour l'Ecologie et l'Aquiculture côtière (CEAC) avec siège en Italie, à Padoue, Via Trieste n.22 et laboratoire dans le Delta du Pô, Valle Cà Pisani, a mis en place et en partie développé un programme inhérent l'affinement technique de la gestion productive des zones à lagunaires destinées à la "valliculture", c'est-a-dire à l'élevage intensif, semi- intensif et extensif d'espèces marines de poissons et de crustacés, pratiqué dans de vastes zones lagunaires - opportunément structurées- ayant reçu dans l'ancienne tradition vénitienne le nom de "valli".

Ce programme est articulé de la façon suivante:

1) Sujet:
Reproduction artificielle des organismes élevés.
Objectif:
Verification de la possibilité et avantage de réaliser le cycle reproductif dans les milieux de la "valliculture" (à savoir caractérisés par des eaux à faible ou très faible salinité) avec des installations très simples à gérer même par du personnel non particulièrement spécialisé.

2) Sujet:
Génétique des poissons
Objectif:
Sélection des reproducteurs aptes à mûrir même à faible salinité, par conséquent même dans les milieux des "valli".

3) Sujet:
Production aquicole et environnement
Objectif:
Relevé, dans un système de "valliculture" intégrée, de certains indices de l'état écologique et de la productivité biologique relative aux bassins d'élevage extensif fertilisés par les effluents des secteurs d'élevage intensif.

Comparaison entre situations de "valliculture" et celles de certaines lagunes soumises à des impacts eutrophiques provenant de facteurs humains.

1) La recherche exposée au point 1) est en cours depuis presque un an et a donné les résultats suivants:

- la nécessité de disposer d'eau de mer pendant les phases d'éclosion des oeufs et de premier élevage larvaire est confirmée;
- cette nécessité concerne une période extrêmement courte durant laquelle la "consommation" en eau est très réduite;
- l'incidence du besoin en eau de mer sur les alevins produits s'avère très modeste, d'une entité telle que le processus se révèle avantageux même si l'eau de mer doit être transportée à des distances de 100/200 km.

L'expérimentation a été effectuée sur le bar et la daurade au printemps et en été, en travaillant à des températures naturelles. On a constaté que les températures élevées (à partir de 25°C et plus), fréquentes pour la "valliculture" durant les mois d'été, bloquent totalement le processus reproductif. Le seuil thermique opérationnel inférieur se situe aux environs de 14°C.

2) La recherche concernant la génétique commencera dans le courant de l'année 1994. Dans l'intervalle, on a projeté l'installation pour effectuer les expériences nécessaires, installation qui sera construite d'ici fin avril 1994.

3) La recherche "production-environnement" a commencé à la mi-juillet 1993 et s'est achevée au mois de décembre de la même année; elle fait suite à celle qui a été faite en 1991.

Des éléments d'un intérêt considérable en ressortent. On a établi plus de 30 stations d'observation réparties sur environ 700 hectares de "valliculture". On a rassemblé des données concernant les flux de l'eau et les bassins touchés par les effluents des secteurs d'élevage intensif ainsi que des données concernant le paramètre oxygène dans les phases "jour-nuit" et durant toute la saison d'élevage.

Une première élaboration met en évidence:

- la nécessité de cultiver - à travers des interventions particulières - les bassins destinés à l'élevage extensif;
- la disponibilité d'un potentiel trophique très élevé finalisable à des productions commerciales;
- l'opportunité de poursuivre les recherches et les observations afin de parvenir à la planification d'une véritable agronomie aquatique.

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TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. J. Gonçalves FERREIRA
Responsable du département d'investigation
et développement
SOCIEDADE PORTUGUESA DE CELULOSE SA
Apartado 15
P - 2065 ALCOENTRE
(351) 63 44490

In a country where the **needs in science and technology** are in opposition to the sums that the Governmental Budget (OGE) consign to them, the comunitary programs, among which **STRIDE** is a good example, play an essencial role in the development and support of the portuguese technological and scientific system.

In countries like Portugal, with limited resources and quite integrated in a strong competitive internacional system, more than any other structural changing, **the investment in R&D**, by means of the rises coming from the practical application of the knowledge, will be able to contribute to the **economic growth**.

As the mentioned aim is mainly supported by the renewing changings which, introduced at the production level, originate whealth, the **innovation spread process**, meant as the dissemination of new technologies (product, process or system) within the potencial user population, deserves a very particular attention. It is on the fulfillment of its mission that the final success of the national technological modernization is based.

A reference to the R&D projects practical implementation will be made, as a way to emphasize not only the capacity to develop technological abilities but also its share in the **internationalization and national capacity reinforcement**, in general, and the industrial sector, in particular.

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TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Lars-Bo NIELSEN
Head of department
FORCE INSTITUTE
Niels Jernes Vej 10
DK - 9220 AALBORG
(45) 98 15 10 55

"SME`s technological networks"
by
Lars-Bo Nielsen
FORCE Institute, Aalborg
Dep. for Polymer Technology.

Background for the STRIDE project.

The area of North Jutland is characterised by heavy unemployment and lower average income than the rest of the country, and on top of that closing down of many businesses.
The employment in North Jutland has decreased ever since 1987 until to day, the unemployment was 15,1% in august 1993 and the tendency seems to continue, the average unemployment for the whole country is approximately 3-4% lower. In 1992 the average unemployment for EU and Denmark was 9,5% while it was 12,5% for North Jutland. Beside the trouble with unemployment, the area has approximately 5,5% lower average income pr. person than the rest of the country.
In 1990 North Jutland had 41824 registered companies, of which 32068 had less than six employees and 257 companies with more than 100 employees. The small enterprises are characterised by an owner and a few employees working with traditional technologies without much innovations. Even larger companies do not always have engineers or other higher educated people. This means that they have to be reliant on subsuppliers information concerning new materials, process ability and other technology, which is obverse not always the best solutions. Furthermore it is very difficult for small enterprises to educate their employees, as they are needed in the every day production.

A short descriptions of the network: Plastics and plastics composites.

Members of the networks:

Aagaards Maskinfabrik A/S
Products: truck tanks for distribution of oil and other liquids.
Annual turnover: approximately 22 mill DKK.

Aalborg Polstermøbelfabrik A/S.
Products: High quality furniture for the export market.
Annual turnover: approximately 22 mill DKK.

Bio Process Aps.
Products: Water cleaning column for aqua cultures
Annual turnover: approximately 1 mill DKK.

A/S De Smithske.
Products: Pumps and equipment for water pollution
Annual turnover: approximately 100 mill DKK.

LH Agro A/S.
Products: Electronic device for agriculture machinery
Annual turnover: approximately 30 mill DKK.

Raadvad A/S.
Products: Kitchen knifes and other domestic equipment
Annual turnover: approximately 75 mill DKK.

Teiser A/S.
Products: Special products in glass fibre reinforced composites
Annual turnover: approximately 3 mill DKK.

Danyard A/S.
Products: Ships in glass fibre reinforced composites
Annual turnover: approximately ? mill DKK.

University of Aalborg.
Experts i polymer technology.

FORCE Institute.
Network administration, and experts on non destructive testing and welding of polymers.

The network consist of eight companies, Aalborg university and FORCE Institute, the companies are very different in sizes and business area, two of them have less than five employees, two have more than 100 and the rest between 25 and 50 employees.
The network is based on extending the knowledge on, how to use, to manufacture and to choose plastic materials in an effective way. Although all the participants are very different in their business areas, they all share a common interest in basic knowledge of plastic materials. They have all been working with traditional materials before, and therefore they realise they need more know how on the subject.
The network is run by a monthly meeting, with general discussions of materials and processing, and a theoretical contribution from an expert on a special subject. In some cases we invite guest speakers from outside the network area to tell us about their speciality.
In addition to these activities, we are working on setting up a range of short courses supported by the ESF, covering materials, material selection, processing, environmental aspects, recycling etc.

Results of the STRIDE-projects:

Aalborg Polstermøbelfabrik A/S - *A. P. Furniture A/S*, is a 30 years old company with 25 employees, specialised in design of "Action Recliners" for domestic and institutional use. 90% of the annual turnover is exported to Europe, The far East, Israel and The States.
Even though this project has only run for less then a year, A. P. Furniture has already experienced an extensive benefit from the STRIDE projects. A. P. Furniture uses plastic as hinges in advanced expensive furniture's, but they only had a very limited knowledge of

material behaviour and processing. This resulted in insufficient specifications for the subsupplier of the plastic hinges, and in complaints of broken hinges. The network was able to help him to reconstruct the hinge, and to give details of how to condition the materials correct, all together this resulted in a total reduction of complaints of approximately 40 %. His next development will be carried out in close corporation with the experts in the network.

Raadvad A/S is an other company, who has benefited from the STRIDE project. It is not possible to put actual figures on, but a change in materials selection and material supplier has solved some problems with the injection moulding of a new product. Raadvad has also initiated a production developing project, where the work is carried out by a group of engineering students from the university. These kind of projects often result in changes in production technology in the involved company.

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TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. George A. ZENZEFILIS
Head of industrial automation
INTRASOFT SA
Adrianiou 2, str
GR - 11525 ATHENS
(30) 1 69 17 763

Process Control as a means of Techical Collaboration
The ARTEMIS Project

1.0 Summary

The application of Information Technology in the manufacturing enterprise, proves to be an area where human-intensive collaborative effort is required. The impact of succesful implementation is high since critical production indices are affected.
Greece, with its specific human and manufacturing profile, has the need and potential for related implementations. Well designed National and European Union funded projects can support this process.

2.0 Introduction

The ARTEMIS project started as a collaborative effort between Greek companies, to address the problem of Development of Real Time Systems. The envisaged prototype are to be applied in a case study, concerned with the Process Industrial Sector and in particular, monitoring of Refinery Operations.

In this paper, the emphasis is placed on the underlying issues of this collaboration, seen from the viewpoint of the overall Business and Social environment in Greece, and the possibilities offered by programmes similar to STRIDE.

3.0 Business Environment

In order to analyse the effectiveness of National and European funded programmes, as is the current STRIDE Programme, an abstract model of the enterprise will be utilized. The model serves to distinguish between the external and internal environment of the firm, by highliting the interaction patterns which may be affected by research and development programmes.

An essential factor of influence to the operation of modern Enterprises, is the external *political, business* and *social* environment with which interaction occurs. The external environment poses rules of behaviour, ultimately affecting both the startegic choices as well as short term operational decisions of the enterprise. The degree of influence is indeed dependent on

- the *size* of the company,
- the established *organizational* procedures
- the level and type of installed *technology*
- the technological *competence* of human resources
- the *cultural* characteristics of the human resources

Note that the contribution of technology to the aforementioned defence factors of the enterprise is evident. One may argue, that technology has managed to differentiate the competitive advantage of the company, by observing that

- technological advances lead to product *diversification* which in turn requests higher specialization. The Value Added to the product plays a decisive role.
- complexity of technology requires efficient collaboration of highly specialized units, as opposed to production patterns, which include transformation of raw material to end product, under one enterprise unit. This leads to the concept of the *Extended Enterprise* and *Networks of Collaboration.*
- higher *technological competence* of production employees is deemed necessary to cater for changes and followup of respective advances in the field, as well as operation of specialized equipment
- the capabilities of production equipment determine also the cost factors and quality characteristics of products. Given the *shorter lifecycle* of production equipment, frequent changes and investments are requested. This proves to be competitive advantage for those companies where decisions are not totally influenced by already installed investements.
- with emphasis to *Information Technology* and in particular Software related products, one observes that the existence of international networks and infrastructure together with decresing cost of hardware, shift the competitive advantage towards the Quality and Productivity of human thinking.

How do the above reflect in the Greek Manufacturing environment and practice?. The main structural characteristics of the Greek Economy are

a) the relative higher participation of the Public Sector, as compared to the Private Sector , to the economic developments of Greece. the main reason being the size of the former. In addition to the influence exerted on the macroeconomic figures of the country, this specifies (or in some cases constrain) the economic development, due the inherent inertia of decision making of the Public Sector. The social implications are also evident since productive forces have historically found a convenient working environment, in terms of the employment safety.

b) the relatively shallow production history of the country, mainly focused on traditional production rather than high technology and value added products. The complexity of industrial products (e.g complexity of Bill Of Materials) may be characterized low.

c) competitive advantage exists in specific sectors (e.g food) where superior quality has managed to establish a high and increasing demand at an international level.

d) the level of Greek scientists is high, with international records of successes and a large portion from this force being positive to their impatriation.

e) a rather short and recent period of political stability. The country has witnessed violent disturbances in the normal evolution during the last five hundred years.

Within this overall concept, it is evident that business activity (especially from the SME community being a backbone of greek production) attempts to identify the competitive strategies and products. Industial production should be directed towards High Value Added products ensuring Diversification and Quality. This of course requires mostly qualified human resources and specialized equipment supported by the necessary financial resources.

European Union Research and Development programmes, provide a means for supporting this effort . However the degree of success depends on

- the existence of a (strategic) plan, at the Enterprise level, which will guide the individual developments/projects. This will ensure the complementarity of the funded projects towards a unique set of goals.
- the compliance of Programme Objectives with enterprises needs.

In the sequel, I will attempt to place the experiences gained within the ARTEMIS projects against the context described above.

4.0 The domain of Process Control

The applications of Information Technology in Industry, range from the solution of otpimization of individual processes at the equipment level to the introduction of Computer Integrated Manufacturing (CIM) principles. The common denominator of industrial applications, is the influence of Human factors and Organizational issues to the final design decisions of the systems.

Given the technological characteristics of modern manufacturing , and the industrial profile of Greece, as described in Section 2.0, it is recognized that CIM can play an instrumental role in

- providing *fast and reliable access* to production information
- transform operation data to useful *indices*, facilitating decisions
- *control costs*, by minimizing inventories and utilizing production capacities
- *control Quality*
- increase *customer satisfaction*, by providing services (e.g status of order) and mimizing delivery delays.

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In terms of the development effort for successful implementation, it is recognized that CIM requires collaborative efforts between:

- end users with the actual production problems
- application experts, mainly consultants on the specific enterprise activities and Academia
- software scientists
- system engineers and integrators.

Process Control in particular, goes a step further i.e. by providing solutions at the lower levels of the CIM hierarchy and by involving problems phased by the Process Industrial Sector. In this case, efficient implementation requires also Modelling experts to express, in computer readable form, the dynamics of the individual processes.

Note that the required participation profile, is mostly of the human intensive type and can be found in the Greek environment. The relative impact of the results on the overall economic performance of the enterprise is high.

5.0 Overview of the ARTEMIS Project

The ARTEMIS project started as a collaborative effort, within the framework of the STRIDE Programme, to apply advanced, Software Engineering Methods in the domain of Real Time Systems.

Time criticality is a prevailing characteristic for real time software engineering and special effort should be exerted in order to develop efficient, modular and user-friendly systems that satisfy User Requirements. The development life cycle commences from the requirements capture and analysis stage through to design, implementation and pilot operation. The flexible use of *CASE* tools is seen to be instrumental for supporting the development process.

The real time systems, on which the ARTEMIS Projects is concentrating concern:

- The domain of PROCESS CONTROL, and in particular the construction of supervisory monitoring systems based on mass-balance principles and performance models for the Fluid Catalytic Cracking Unit of the Hellenic Aspropirgos Refinery.

- The domain of SCADA Systems and in particular the design and construction of unified telemetry electronic equipment for use in the Utilities Industrial Sector.

In parallel a separate workpackage level activity is devoted to the identification of Software Engineering methods appropriate for real time systems development, and the

implementation in a unified CASE supporting toolset to be utilized in the above domains.

An element of importance is the novelty of the focused application domains and the respective knowledge transfer required both at European and International level (with follow up of similar practices and academic developments) as well as at the Consortium level with strong interaction between academia, SME technology providers and established Software Development centers in Greece.

6.0 Synthesis of the Consortium

The composition of the Consortium which was assigned to accomplish the goals of the ARTEMIS Project, was as follows:

a) End Users

These were the industrial Enterprises, exerting the need for the technological implementation in the form of a Case Pilot Study. The end user members of the consortium were:

a1) *Hellenic Aspropirgos Refinery (HAR)* which is one of the largest industrial petroleum refinery installations in Greece. The Fluid Catalytic Cracker (FCC) was chosen as the pilot process where Information Technology was to be applied to solve the problem of on line monitoring of the process performance by utilizing Model Based techniques.
HAR is owned and managed by the Greek State .

a2) *Athens Natural Gas Organization (DEFA),* which the State owned and is an Organization for the operation of gas networks for Athens district. The case consisted in the application of a Unified Telemetry System (UTS) for the remote measurement and transport of network and customer information , to be developed in the Project . DEFA decided not to contribute to the project at an early phase of development .

b) Technology Providers

These were the Industrial Enterprises that would provide the technology to support the a) Case studies and b) lead to a generalized product applicable to other similar industrial settings.
The members of the consortium are

b1) Private Sector

b1.1) *INTRASOFT*, being also the Prime Contractor of the project, as the Software House which would construct the software prototype for the HAR application and the CASE prototypes to support the development life cycle of real time systems.

b1.2) *INTRACOM*, being responsible for the construction of the UTS prototype applicable within the general Utility Sector, including Electricity, Gas and Water distribution.

b1.3) *SoftVelvet*, as a Software House responsible for constructing a subsystem of the HAR Application, and in particular the detection of Steady State changes of the FCC process. SoftVelvet is classified in the SME category of companies specialized in the provision of IT solutions in the Greek Industry.

b2) Academia

b2.1) *National Technical University of Athens, Laboratory of Electronics*, responsible for the development of interfacing communication software for the installed IT systems for the HAR application.

b2.2) *National Technical University of Athens, Laboratory of Intelligent Systems*, responsible for the development of specialized Expert System based software for the filtering and smoothing of production measurements from the FCC process of the HAR application.

7.0 Technological Cooperation and Development

It is evident that the success of the project depends on the efficient collaboration of the participants, sharing different experiences, technological background, company size, technological viewpoint s and management practices.

The above situation is typical for a multicompany collaborative project like those supported by European Union Programmes. The following observations were recorded during the course of the project.

a) HAR provided the User Requirements (which is an ongoing and dynamically changing process) to the consortium. There appears to be a tendency to solve the current problems by automating Data Entry, rather than taking the position of process optimization (which is also a research issue of high value added able to provide a competitive advantage). This is the result (to the authors opinion) of the lack of an overall strategy for IT, part of which could ARTEMIS be.

b) The process chosen for HAR Case Study, is of interest to the overall refinery operation. One side result of the project is the experience gained by shop personnel, on possible problems and technological capabilities arising in similar projects, so as to safeguard against future investments.

c) Academia can play an instrumental role (if supported by a general operational framework) in making available to technology providers, ***applicable*** state of the art knowledge . This is especially important for SMEs that cannot support extensive R&D budgets, a situation encountered in the Greek environment.

d) the optimization of consortium communication is an important issue. This is a management problem coupled (especially for IT related projects) with a common ***Technical Language.*** The utilization of *CASE* tools in a flexible manner should be favoured. Also formal multiteam communication techniques (e.g. Joint Application Development sessions) can have a relatively high beneficial impact.

e) the management should be given the means to manage the project as an ***internal project.*** This relates to the fact that pre competitive research can establish links between companies. To sustain economic development however, product oriented consortia and projects should be funded.

IVe Conférence Stride

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TRAME DE L'INTERVENTION DE :

ABSTRACT OF THE SPEECH BY :

M. Fabrizio BERNARDINI
Consigliere d'Amministrazione
ERICA - Internationale Marmi e Macchine
Viale Galileo Galilei, 133
I - 54036 MARINA DI CARRARA
(39) 585 787 963

ERICA
Consorzio Internazionale Marmi e Macchine

Le consortium ERICA a été constitué par la volonté d'un groupe d'opérateurs privés se joignant à la S.A. Internazionale Marmi e Macchine Carrara (société pour la promotion du marbre et du matériel, ainsi que société de services aux entreprises) et au BIC (Business innovation centre) afin de donner une forte impulsion, à un moment de difficultés importantes, au secteur de la pierre et de la mise au point de technologies pour le travail de la pierre, qui représentent une source importante de la production de Massa-Carrara. ERICA veut être une référence pour la relance de l'industrie, celle de la pierre en particulier, qui est basée sur l'harmonie entre l'innovation technologique et le tissu productif traditionnel.

Le consortium poursuit les objectifs suivants :

a) constituer une référence scientifique et technologique dans sa région,

b) étudier les applications avancées de la recherche scientifique dans un milieu industriel,

c) constituer un trait d'union entre la recherche universitaire et le monde de l'entreprise,

d) promouvoir l'innovation technologique dans les secteurs industriels en se référant en particulier au secteur de la pierre et aux problèmes concernant la réindustrialisation de la région,

e) étudier l'impact du développement industriel sur l'environnement et les moyens qui rendent compatibles l'un et l'autre,

f) promouvoir et réaliser des interventions en formation permettant d'atteindre des profils professionnels de haut niveau scientifique,

g) bâtir des projets généraux et des projets d'éxécution pour la fourniture de services et les analyses des marchés,

h) éxécuter des travaux qui sont dans le champ des compétences des membres du consortium.

Le cadre communautaire d'appui pour les zones d'objectif 2 de la Toscane identifie la province de Massa-Carrara comme étant une zone caractérisée par une particulière faiblesse de la structure des services à la production et du système local des PME.

La présence d'un pôle mondial de longue tradition industrielle, celui du marbre, est sans doute une ressource de cette région, mais pour faire face à la concurrence mondiale croissante dans ce secteur, il est nécessaire de procéder à la mise à jour d'un système productif dans la filière du secteur de la pierre, en favorisant les innovations de procédés ou de produits, le transfert de technologie ainsi qu'une diversification.

En d'autres termes, la situation économique et industrielle actuelle dans la province de Massa-Carrara est fortement caractérisée par un secteur productif qui continue à travailler avec des technologies et des techniques qui n'ont pas varié depuis des années, qui d'un côté sont utilisées par les pays en voie de développement et de l'autre sont dépassées par les innovations des pays développés comme le Japon.

C'est dans ce contexte qu'il est nécessaire de développer l'insertion d'innovations et de transferts de technologies dans les schémas de production ayant pour but soit le produit et sa qualité, soit son coût énergétique pour un impact sur l'environnement faible.

Le transfert de technologie devra en outre nécessairement améliorer la qualité de l'environnement, ce qui est un autre aspect dont il faut tenir compte dans la reconversion économique de cette zone.

Le programme Stride est donc défini pour la région Toscane par la nécessité que constitue la situation économique et sociale particulièrement délicate de la zone de Massa-Carrara.

Le futur pour le développement de cette zone passe par la réindustrialisation qui, en tirant profit des éléments positifs laissés en héritage par la grande industrie (culture industrielle diffuse et ample présence d'une main d'oeuvre qualifiée) réussira à faire renaître le développement industriel en s'appuyant d'abord sur la vitalité et le potentiel de croissance des PMI qui naissent sur place ou qui, par nature, sont encore présentes.

La première phase du projet Stride prévoit la mise en route d'un laboratoire technologique dirigé vers la recherche industrielle appliquée.

A titre d'exemple :

1) mesures et essais techniques sur des échantillons homogènes et composites de panneaux à base de pierre.

2) tests des matériaux de support et de collage,

3) caractéristiques et classification de panneaux composites en fonction de leurs propriétés,

4) étude d'optimisation de processus industriels de panneaux composites

5) techniques d'analyse non destructive utilisable pour les matériaux à base de pierre,

6) vérification de la compatibilité avec l'environnement des procédés et des produits,

7) enquête sur les projets et les technologies ayant pour objet le contrôle de l'impact sur l'environnement des productions à base de pierre,

8) méthodes et techniques de mise au point de machines industrielles pour le travail de la pierre compatibles avec l'environnement en ce qui concerne la pollution acoustique.

Lorsque le laboratoire sera opérationnel :

- il fournira des services aux entreprises de production du secteur concernant l'utilisation et l'expérimentation de nouvelles technologies

- il fournira des produits de recherche industrielle obtenus sur la base de programmes de recherche propres ou acquis par des entreprises ou des sociétés de recherche

- il fournira des résultats de recherche industrielle obtenus sur la base de demandes provenant de l'industrie manufacturière

- des cours sur de nouvelles technologies et sur les techniques applicables seront donnés aux opérateurs et techniciens du secteur

- il aura pour objet de divulguer les programmes de recherche industrielle conclus.

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ABSTRACT OF THE SPEECH BY :

M. John G. HUGHES
Dean
UNIVERSITY OF ULSTER
The Northern Ireland Knowledge
Engineering Laboratory
Newtownabbey Co, Antrim
UK - NEWTOWNABBEY BT37 OQB
(44) 23 2 365513

NIKEL

THE NORTHERN IRELAND KNOWLEDGE ENGINEERING LABORATORY

Faculty of Informatics
University of Ulster
and
International Computers Ltd

SUMMARY

The Faculty of Informatics has received substantial support from the EC STRIDE initiative to establish at the University of Ulster, in collaboration with International Computers Ltd (ICL), the Northern Ireland Knowledge Engineering Laboratory (NIKEL). The emphasis of NIKEL is on research and development in knowledge-based systems and on technology transfer. The laboratory comprises a wide range of advanced workstations and software, a manager seconded from ICL, five full-time research officers and an administrative assistant. It is based at the University's Jordanstown campus with links to other sites across the province making use of the recent advances in telecommunications services supported by the EC STAR and Telematique programmes.

BACKGROUND

The range of tasks to which knowledge-based systems (KBS) have been applied in the commercial and industrial environments is now very wide and rapidly growing. Overall, the European market for such systems is expected to grow to a value of several billions of pounds per annum by 1994 and it has been predicted that by 1996 over half of all new computer systems under development will be knowledge-based. In the United States, where industrial applications of KBS started rather earlier than in Europe, several thousand major (i.e. million-dollar) projects are currently in progress, covering a wide range of industries. In Northern Ireland, the Industrial Development Board and the Department of Economic Development have identified KBS as a crucial aspect of their long term research and development strategy for industry in the province. Within this area, they recognise that close liaison between industry and the Universities is essential and they have supported a number of successful initiatives to foster such collaboration.

Although knowledge-based systems are often regarded as an entirely new form of software for stand-alone applications, attention is increasingly becoming focussed on establishing links between such systems and the conventional computer systems found in commercial and industrial application areas. These efforts include the development of interfaces between knowledge-based systems and large-scale database systems, the provision of 'intelligent' front-ends for complex software systems, applications in real-time process control, and embedding knowledge-based software modules in conventional data processing systems. However, despite the undoubtedly high level of effort put into KBS development world-wide in the last few years, relatively few substantial systems are in regular use in industry. This is

particularly true in those areas of the Community, such as Northern Ireland, on which the STRIDE initiative has been focussed.

The Faculty of Informatics has many years experience of collaborative research and development with both SME's and large industrial companies in the province. NIKEL will assist with the development of these projects and help the research teams to establish new collaborative ventures with local industry. Our principal goals are to apply the Laboratory's research to real industrial applications and to ensure the continued applicability of that research.

THE LABORATORY

The Laboratory is managed jointly by Mr Gary Burnett, an experienced marketing manager seconded from ICL, and Professor Mike McTear, Director of the Faculty's KBS Research Group. Mr Burnett is responsible primarily for administration and the marketing of the Laboratory's services in the industrial sector. Professor McTear is responsible for research and development. A Management Committee has been established with Professor John Hughes as Executive Director and comprising the principal academic researchers, the managers of the Laboratory and representatives from industry.

The workprogram of NIKEL is motivated by clearly defined industrial and technical goals. The Laboratory takes a strong industrial approach to addressing the applications of knowledge-based information systems both in major industries and in small to medium sized enterprises. The University, with substantial assistance from ICL, is maintaining a dialogue with the potential users of its research and development, particularly within the local commercial and industrial community. The Laboratory will strive to keep actively abreast of significant developments in technical domains of related interest and assimilate them into their work.

Our principal goals are to apply the Centre's research to real industrial applications and to ensure the continued applicability of that research.

NIKEL currently has a wide range of industrial projects in progress. These include major research and development projects with Short Brothers, Northern Telecom, Tyrone Brick and Finlay Packaging. New collaborative ventures are about to begin with Ulsterbus, Seagate and others. The work of the laboratory is at the leading edge of KBS technology.

CURRENT PROJECTS

Northern Telecom Plc

Utilising case-based reasoning software, the system under development at Northern Telecom will help staff identify problem circuit boards quickly and accurately. An important part of the finished system will be its ability to 'learn' new cases as the products being manufactured do change through time. The work is to proceed in two phases: the first is to implement a solution at the shelf, or 'rack' level. Additionally, Phase I will include a software module to enable new cases to be added to the case base. The second phase concentrates on scaling up Phase I, and incorporating (circuit) board level fault diagnostics.

Short Brothers Plc

The Shorts Tucano aircraft is a single engined, turbo-prop trainer aircraft, in use world-wide. When the aircraft is being assembled, and prior to flight tests, the engine is connected to various electronic and mechanical components, and readings are taken at various engine running settings. When building the aircraft, some problems occur

more frequently than others, and the technicians usually identify such faults immediately. But rarer faults are more difficult for the technicians to trace, and frequently the engineers need to be consulted. The engineers draw on their more in-depth knowledge of the aircraft to solve the rare and difficult faults, but their availability is not always guaranteed.

The NIKEL Tucano Engine Ground Running Data Sheet System is a diagnostic system which assists technicians by identifying faults when the engine is first fitted to the airframe. It is designed to replace the manual paper data sheet, and free the time that the aircraft engineers spend in identifying faults.

The Tucano System was designed to operate in four modes:

- *Computer-Based Training (CBT) System.* To be useful, the system should provide a learning environment where the technicians can increase their skills in identifying faults.
- *Validation tool.* All the data entered into the Tucano system needs to be validated.
- *KBS that models the engine.* These rules encapsulate the aircraft engineer's problem-solving expertise, and govern the diagnostic process.
- *Specific engine test manager.* The technican must be able to load previous test data pertaining to older engine trials, and to perform the modelling and diagnostic tests on this data. This can be viewed as an extension to the CBT mode, as it provides the technician with a library of information with which to compare and contrast results.

The four modes are designed to operate together, providing a failsafe environment where faults are identified, and the technician's level of understanding of the underlying processes is raised.

Tyrone Brick Plc
NIKEL is developing a knowledged-based process control system, which ensures that all the readings taken from the brick-firing kiln are within permitted ranges. Furthermore, the system advises on new kiln burner settings, to produce the optimum brick size (within BS Quality limits). There may be future work with this project; in coupling the system with the company's database.

Finlay Packaging Plc
A reactive job-shop scheduling system is under development in collaboration with Finlay Packaging. The development software will be ICL's DecisionPower, Ellipsys & GraphicsPower packages. The system will be designed to off-load order information from the recently implemented Management Information System's (MIS) Informix data store, and produce optimised job-shop schedules.

Surgical CBT System
The Surgical CBT system provides a test regime for under-graduate medical students. The expertise is in the form of questions and answers in specialised areas of surgery, and the system generates a study period for a medical student from a database of such questions. The CBT project is a joint development between NIKEL and a surgeon at a leading Dublin hospital. The outcome will be a piece of software to be marketed commercially by ICL. The beta release of the first stage of the software will be in December 1993.

Ford Motor Company Plc
This project will investigate the viability of a system to assist plant engineers diagnose faults in a large, complex machining plant. The study will also investigate the coupling of the resultant KBS with an image database, with the intent of providing schematic drawings to the shop-floor repair teams.

Citybus / Ulsterbus
An agreement has been reached with management at Citybus to begin a feasibility study to examine the possibility of applying constraint-handling techniques to solve the problem of crew rostering. The software that will be used in this project will be ICL's DecisionPower, Ellipsys and GraphicsPower .

Ballylumford Power Station (British Gas Plc)
The study at Ballylumford will centre on the viability of a KBS to provide preventative maintenance assistance.