

CLUSTER BUILDING AND NETWORKING

Analysis of transnational
technology networking between
existing clusters of SMEs and
one or more technology poles

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0 Executive summary

0.1 Project implementation

The main objective of the study on hand has been the establishment of the most appropriate method of setting up a transnational technology network. In order to achieve the objective of the study, a research design was developed which was mainly based on a) a collection and analysis of data gathered by means of a questioning of enterprises from different technology networks and b) on interviews and workshops with cluster managers, companies and technology poles from all in all seven European automotive regions.

The decision to base the development of a model of technology networking on empirical findings from the automotive industry was taken due to the fact that technology networking is particularly advanced in this industry, which is subject to heavy international competition. Additional research instruments have included a network analysis based on cooperation projects between different enterprises and technology poles.

The enterprise survey was conducted with a sample of enterprises taken from the three different technology networks (Verbundinitiative Automobil NRW; Automobil-Cluster Oberösterreich; Automobilcluster Steiermark) chosen for the primary data collection. All in all, 126 questionnaires were managed to be collected. The results of the enterprise survey were evaluated statistically. To provide further evidence on a European scale, data from Basque and Welsh enterprises and technology poles was collected, analysed and compared to the results from the primary data set.

The interviews and workshops provided detailed information on the regional approaches taken towards clustering, the management and moderation of automotive networks, the methods used to stimulate SME participation, the cultural and economic background of each region and the prevailing view on the methodology to establish a transnational technology network.

In the final stage of the project, the results of the data evaluation and of the case-study interviews were compared across the different regions to identify common factors and best-practice regarding regional technology networking as well as a common approach towards transnational technology networking.

0.2 The background conditions of technology networking in the automotive industry

The world automotive industry is undergoing a period of turbulent change. In a situation characterized by increasing competition and cost pressure on the international markets, exacerbated by worldwide overcapacities, the manufacturers try to pass on cost and innovation pressure to their suppliers.

As a result, the supply chain is undergoing a far-reaching transformation. Focusing on their core competencies and pushing towards globalization, the manufacturers are contracting-out development jobs and the integration of new components to selected suppliers in an attempt to optimize the whole supply chain. With the limits between

car manufacturers and system suppliers beginning to blur, the latter are becoming development partners of the manufacturers.

The pressure to adapt to the new requirements, however, is felt at all levels of the supply chain. In order to compete, suppliers have to increase their technological capacities and follow their customers shifting production abroad. Hence, a need for increased access to technology, innovation, training and information on future market requirements all of them being essential resources for the successful change management process.

A large part of Europe's automotive suppliers are SMEs. In the long run, the competitiveness of Europe's car industry is contingent upon the competitive edge of the small suppliers. However, without assistance, SMEs are slow to adapt. For a lack a strategy and a short-term perspective on markets they have difficulties in envisaging and implementing cooperative solutions to problems they cannot master alone.

While SMEs face difficulties in actively engaging in cooperations, enterprise networks and clusters offer an adequate framework for responding to the increasingly demanding requirements from industry. By joining forces, both horizontally and vertically, and learning from other partners from the supply chain, SMEs are put in a much better position to compete. Technology networks are well placed to facilitate enterprise access to resources such as technology, qualification, information on market requirements, business support services and personal contacts.

0.4 Regional technology networking in the automotive sector

In several European automotive regions regional development policies have promoted the development of regional technology networks, i.e. networking activities between SME clusters and technology poles. These cluster-based regional development strategies aim at a strengthening of regional supply chains by means of the employment of targeted assistance instruments, at safeguarding regional employment and at realising productivity gains and economic growth.

The implementation of cluster development strategies varies considerably from place to place. In the European best-practice regions of our sample there are significant differences concerning e.g. the partners of a technology network, its organization and the business support services offered.

In the course of the study, technology networking initiatives in the following European automotive regions were investigated in order to identify best-practices which have proven clearly successful in stimulating participation of SMEs in networks and in enhancing their access to technology as well as common factors underpinning the success of all clusters. Best practices and common factors are important since the insights gained from regional networking can be exploited on an European level.

In Nordrhein-Westfalen a networking initiative, the Verbundinitiative Automobil NRW, was set up in 1993 to strengthen the competitiveness of the regional automotive suppliers. After more than 5 years, the VIA NRW was transformed into a self-managed organization. Over a period of 5 years, more than successful 55

cooperation projects were instrumental in fostering the transfer of technology to regional SMEs.

In the Austrian state of Styria a technology network in the automotive sector, the ACStyria, was established as a pilot-cluster in 1996. The ACStyria was successful in earmarking Styria as a top automotive region in Europe. After three years of operations, the ACStyria is currently undergoing transformation into a self-managed organization led by several lead companies.

In Wales a collective body for the self-help of automotive suppliers, the Welsh Automotive Forum was set up in 1998. Initially supported by public funds, the Forum now draws upon donations of its members to provide a range of services for its members.

In the Piemonte region an encompassing, unified platform for regional technology network is still missing. Various intermediary organizations and associations sharing responsibilities for specific constituencies co-exist, however, without being coordinated by an overarching, neutral network manager.

Nord-Pas de Calais in Northern France is one of Europe's top automotive regions. The regional car manufacturers, the technology poles and some of the leading automotive companies have started promising networking initiatives. Lacking a common interface and in absence of a focus on the small suppliers, these, however, have remained isolated from each other.

In Upper Austria the Automobil Cluster was established in 1998 and is experiencing rapid growth. In late 1999, the network has counted more than 270 members for which a wide range of services is provided. Innovative cooperation projects and an information and communication platform provide for the dynamics of the network.

In the Basque Country technology networking is coordinated by the cluster grouping ACICAE which was established in 1992. Being a grouping of 27 leading automotive suppliers the well-structured organization is advancing the interests of the suppliers in various fields, including technology. ACICAE also acts as an interest representation of the suppliers vis-à-vis the regional government and the car manufactures.

0.5 Basic issues in constructing a regional technology networking

In the process of constructing a regional network the basic organizational principles of a technology network concerning the partners of the network, the network coordination and the financing of its services are to be determined. Moreover, the spectre of available business support services has to be fixed. Thirdly, a know-how management architecture has to be put in place. Last but not least, the sequencing of the steps in setting up a network is important.

As regards the network partners, it is important to achieve integration of all groups of producers, service industries and technology poles along the production chain to inspire the flow of communication and know-how between these producers. Enterprises are primarily concerned with the integration of their supply chain partners: suppliers, customers and technology poles. Nevertheless, intermediary

organizations should be linked to the network for reasons of acceptance in the industry. Political back up of a network is essential if it is important for a region's economic development.

In all successful technology networks from our sample, coordination was ensured by a common, unified platform for technology networking. A technology network can be managed by an independent association as in the Basque Country, by institutions linked to regional economic development agencies as in Upper Austria or with the help of an independent consultant as in Nordrhein-Westfalen.

The results from the enterprise survey mainly emphasize that the enterprises expect the network to be managed by a neutral moderator for example a technology pole or an independent consultant or even an enterprise partner. At a later stage, network coordination can also be transferred from public bodies to the partners of the regional networks themselves as is happening in Styria and in Nordrhein-Westfalen.

Establishing and maintaining a network engenders substantial costs. The need for external resources is crucial for the start-up. In a second stage, once the network is firmly established, public funds may gradually be phased out while members are requested to contribute to its financing. According the results of our survey, enterprises are willing to pay for services if they are tailored to their individual need and if compensation is regarded as acceptable.

A technology network makes business support services available to its members. The following or a similar division of services and activities has been applied in the regional networks covered by our sample:

- Information and communication;
- Support of cooperation projects;
- Support of qualification;
- Support of internationalization;
- PR and marketing.

According to our survey, the enterprises and technology poles under consideration primarily consider information services as necessary which help them keeping informed on economic and technological trends, the economic and technological profile of possible partner enterprises for match-making and public including European funding opportunities.

Cooperation projects between different companies and technology poles have proven successful to facilitate the transfer of technology to the enterprises as shown by the results of the enterprise survey. There are strong indications that cooperation projects are the single most important and successful method to foster enterprise networking and technology transfer. However, especially SMEs need assistance. It results from our survey that those cooperation supporting services are considered important which are helpful in facilitating the initial stages of a cooperation between partners.

Qualification services include making available a wide range of learning opportunities tailored to the specific needs of the networking companies. Support of internationalization should assist enterprises in finding access to foreign markets, foreign technological know-how and in finding cooperation partners from partner regions. PR and marketing activities are important to attract new members, to create confidence and a positive attitude towards the industry in the region and, importantly, give the member companies a common identity.

Furthermore, a regional network needs a communication platform where a) information between the partners is exchanged and b) where the available know-how is systematized and communicated to the partners.

0.6 Model of transnational technology networking

For companies, global competition, especially in the more globalized industries such as the automotive industry, places a premium on a shift of the focus to the international level. With this shift in perspective, the optimal geographic extension of a cluster may shift from the regional to the transnational, respectively transregional, level. Companies are acting on strictly economic principles. They strive for a technological leadership position and want to ensure access to new market opportunities in a globalized economy. Thus the need for transnational technology networking.

The model to establish a transnational technology network presented in the study on hand is informed by the recommendations of cluster practitioners, the results of the enterprise survey as well as by the expertise of agiplan. The model is designed to maximize the benefit of such a network for the main beneficiaries, the partner enterprises, especially the SMEs. We would also like, however, to strike a cautionary note. The method depicted here draws heavily upon insights gained from technology networking in the automotive sector. A transposition of the model to other clusters in other industries will require certain modifications.

The model is based on the conception that a transnational technology network is being superimposed on existing regional networks which will experience a transnational interlinkage. This means that a working transnational network presupposes existing regional networks as constituent elements. Thus, from the perspective of the companies, cooperation between clusters at an European level combines the advantages of regional embeddedness with an international perspective. From the perspective of the already existing regional initiatives, such a link is an appropriate tool to learn from experiences.

In order to participate, regional networks have to fulfil certain minimum requirements, e.g. a critical mass of regional partner companies available for match-making, a capability to provide detailed information on regional companies in order to deal with requests for cooperation and a continuous level of activities. If this cannot be ensured, we recommend to upgrade existing regional cluster organizations to a level where they can contribute to the transnational network as an equal partner of exchange.

To a large extent, the business support services of such a network will be offered by mutually drawing on the resources of every partner organization, which should be

harmonized and opened to the enterprises of the partner regions. Services in high demand by the main beneficiaries, as demonstrated by the enterprise survey, include all measures which are instrumental in initiating cooperations with foreign partners and which facilitate access to foreign technological know-how. These services are of primary importance for the main beneficiaries of the network in achieving the main objectives they pursue through transnational networks, i.e. opening up foreign markets and gaining access to latest technologies.

We recommend to apply a phased approach towards transnational technology networking. In a first stage, the construction of the transnational technology network involves primarily the regional network managers. They collectively have to establish the necessary infrastructure for transnational networking. In a second stage, these networking structures will be put at the disposal of the European enterprises seeking transnational business opportunities.

After the initiation of an exchange of experiences between the cluster organizations and in recognition of existing inter-regional and inter-cultural differences, it is necessary that all participating regional networks agree upon a minimum of common regulations, standards and procedures as rules governing the networking process. In general, all partners will have to comply with certain minimum requirements. In addition, there is the possibility that a more comprehensive and demanding common agenda can be set for the more advanced partner organizations.

- 1 Recognition of the cultural particularities of each of the partner networks and establishment of methods to deal practically with conflicts arising from these differences;
- 2 Regulations as to the design, management and moderation and of the network;
- 3 Common standards as to the service profile of the network;
- 4 Common goals concerning the future development of the transnational network;
- 5 A common action plan to steer further activities.

Once in action, a transnational network should link up to other European initiatives of relevance to the respective industry or covering issues such as cooperation and technology transfer.

1 Subject of the contract

Subject of the contract between the European Community represented by the European Commission and the agiplan Aktiengesellschaft signed on 30/12/1998 is the work programme for LOT 2 "Analysis of transnational technology networking between existing clusters of SMEs and one or more technology poles" as specified in Annex II of the contract.

As stipulated the subject of contract for this Lot is a study on the most appropriate method of setting up a transnational network incorporating existing clusters of SMEs as well as a number of players active in the field of research.

1.2 Project implementation/ Work programme

In close cooperation with the Commission's departments agiplan has drafted a detailed work plan for carrying out the work programme. The work plan was coordinated with the European Commission at the

- Kick-Off Meeting on 03/02/1999 in Brussels;
- Quarterly Working Meeting on 11/03/1999 in Brussels;
- Quarterly Working Meeting on 15/07/1999 in Brussels;
- Quarterly Working Meeting on 28/09/1999 in Lille.

1.2.1 Work programme in steps

According to the project schedule the following work steps had to be and were carried out during the conduct of the study. A description in detail of the single steps taken was given in the interim reports.

- Coordination with the participating technology networks
- Continuation of the detailed work plan
- Fixation of determinants and criteria
- Development of an enterprise questionnaire
- Completion of a questionnaire pretest with selected enterprises
- Determination of the enterprise sample for the questionnaire sample
- Implementation of the primary data collection at the level of the selected technology networks
- Evaluation of the enterprise data
- Network analytical preparation of the data

- Development of the enterprise questionnaire for the international networks
- Development of the interview guide for the implementation of the project at the level of the international networks
- Conduct of the project at the level of the participating international networks
- Evaluation of the data collected at the level of the international networks
- Establishment of a model for transnational technology networking

1.2.2 Applied methods

The most important methods applied by agiplan in the conduct of the study are described as follows.

1.2.2.1 Enterprise questionnaire (primary data collection)

An enterprise questionnaire was developed as a research instrument with special care taken to the integration of the relevant research issues. A translated full version of the enterprise questionnaire is in the annex to this final report. Three versions of the questionnaires were developed in consideration of minor regional and national differences in names, currencies, etc. The content of the questionnaire, of course, has remained the same.

The draft of the questionnaire was subjected to a pretest. Six enterprises, all being partners of the Verbundinitiative Automobil Nordrhein-Westfalen (VIA NRW), were selected for a test-run of the questionnaire. Feedback from these enterprises has helped adjust the questionnaire to better reflect the needs of the SMEs and optimize its design so as to achieve an optimum rate of return.

The questionnaire is divided into the following parts:

Part I: Questions relating to the identity of the enterprise and its technological and economic profile

Part II: Questions relating to the supportive and obstructing conditions of an active technology transfer in networks

Part III: Questions relating to cooperation as a means towards entrepreneurial success

Part IV: Questions relating to the design of international technology networks

1.2.2.2 Enterprise questioning (primary data collection)

The collection and analysis of data from enterprises including SMEs and technology poles which form part of different technology networks served as well to evaluate the active participation of SMEs in technology networks, as to determine the most

appropriate methodologies for setting up a transnational technology network. The questionnaire was dispatched to the more than 500 active enterprises including SMEs and technology poles from the survey sample.

The survey was conducted with a sample of enterprises taken from the three different clusters chosen for the primary data collection:

- Verbundinitiative Automobil Nordrhein-Westfalen (VIA-NRW), Germany (600 participating enterprises; about 160 of them including SMEs and technology poles active in some 55 successful cooperation projects have been selected for the survey);
- Automobil-Cluster in Oberösterreich (AC), Austria (180 active enterprises including SMEs and technology poles, all of them have been selected for participation in the survey);
- Automobil-Cluster Steiermark (ACstyria), Austria (180 active enterprises including SMEs and technology poles, all of them have been selected for participation in the survey).

1.2.2.3 International enterprise questionnaire

In order to draw up a model for transnational technology networking, an additional research instrument – extending the framework of the study as given in the offer - serving to gather the preferences of the enterprises in the European partner regions was developed in coordination with the European Commission. The reason for developing an international enterprise questionnaire was to get a base for comparison with the results from the survey conducted in Austria and Germany. In addition, the international questionnaire served the purpose of consolidating our knowledge about clustering in the European partner regions.

In large parts, the shortened international questionnaire has covered the main questions on technology networking from the previously used questionnaire in summarizing them. English, French and Spanish versions of the questionnaire were sent out to selected enterprises and technology poles in the partner regions by the local cluster managers. The English version of the enterprise questionnaire is in the annex to this report.

1.2.2.4 Enterprise questioning (international questionnaire)

The questionnaire was dispatched to a sample of enterprises including SMEs and technology poles from of each of the participating European regions by the local cluster managers being partners to our research.

1.2.2.5 Evaluation of the enterprise data

The data collected by means of both enterprise questionnaire (primary data collection) and the international questionnaire was evaluated. After the enterprise

data was fed into a database under MS-ACCESS 97, the data was evaluated statistically and prepared for display using graphical tools.

1.2.2.6 Network analysis

Network analysis was based on the evaluation of completed cooperation projects within networks. The analysis served to evaluate which kinds of partners have cooperated in these projects and which kinds of partners have cooperated more often than others in successful cooperation projects. Inferences were drawn regarding the model of technology networking.

The network analysis was based on a selection of cooperation projects from the Verbundinitiative Automobil Nordrhein-Westfalen. All in all, some 103 partners participated in these projects. The network analysis was run with the software package "UCINET 5.0".

1.2.2.7 Case-study fieldwork/ Interviews and workshops

Interview fieldwork was undertaken by the agiplan team in the selected case-study regions. This involved a series of interviews and workshops with the principal players involved in regional technological networking, especially the network managers, other intermediary institutions, technology poles and companies. Interviews and workshops were conducted in a structured manner, guided by an interview guide which had been developed beforehand.

The interviews and workshops provided detailed information on the regional approaches taken towards clustering, the management and moderation of automotive networks, the methods used to stimulate SME participation, the cultural and economic background of each region and the prevailing view on the methodology to establish a transnational technology network.

1.2.2.8 Development of a model of transnational technology networking

In the final stage of the project, the results of the data evaluation and of the case-study interviews were compared across the different regions to identify common factors, best-practice and a common approach towards transnational technology networking.

1.2.3 Technology networks participating in the study

The following organizations in charge of regional technology networks have participated in the study. The organizations listed here have supported the research commissioned by the European Commission:

- *Verbundinitiative Automobil Nordrhein-Westfalen (VIA NRW)*

Our local partner in Nordrhein-Westfalen (Germany) has been the Ministerium

für Wirtschaft und Mittelstand, Technologie und Verkehr Nordrhein-Westfalen (MWM-TV).

- *Automobil-Cluster Steiermark (ACStyria)*

Our local partner in Styria (Austria) has been the Steirische Wirtschaftsförderungsgesellschaft (SFG) of the Bundesland Steiermark.

- *Automobil-Cluster in Oberösterreich (AC)*

Our local partner in Upper Austria (Austria) has been the Oberösterreichische Technologie und Marketinggesellschaft ges.m.b.H. (TMG), Austria.

- *Agrupación Cluster Industrias Componentes Automoción Euskadi (ACICAE), Basque country*

Our local partner in the Basque country (Spain) has been the cluster grouping ACICAE.

- *Consortio per l'Internationalizzazione Sviluppo e Formazione delle Imprese (C.I.S.F.I.), Piemonte*

Our local partner in the Piemonte region (Italy) has been the trade consortium C.I.S.F.I.

Nord-Pas de Calais Développement (NPCD)

Our local partner in the Nord-Pas de Calais (France) has been the investment promotion agency NPCD.

Welsh Development Agency (WDA)/ Welsh Automotive Forum (WAF)

Our local partner in Wales (Great Britain) has been the Welsh Development Agency WDA in conjunction with the WAF.

2 Transnational technology networking in Europe: The economic background

2.1 The competitive position of suppliers in Europe's automotive industry: Facts and problems

Since the beginning of the 1990s large companies have consistently increased the number of products they subcontract in order to focus on their core activity whilst at the same time drastically reducing the number of direct suppliers. This holds especially for the automotive sector, which is organized in a pyramidal fashion.

The increasing importance of the suppliers, especially of the system suppliers, is reflected by the declining vertical range of manufacture of the car manufacturers (see Chart 8). In a situation characterized by increasing competition and cost pressure on the international markets, exacerbated by worldwide overcapacities, the supply chain is undergoing a far-reaching transformation.

The manufacturers have reacted to the situation on hand by globalization (manufacturing plants in new markets, global purchasing strategies), standardization (platform manufacturing), completion of the product range, concentration on core competencies (design, chassis, driving system) and binding of the brand image to the core competencies. As a consequence, the limits between car manufacturers and their suppliers begin to blur. The latter have become development partners of the manufacturers.

However, the manufacturers are under a high cost and innovation pressure which they pass on to their suppliers. Increasingly, the delivery of high quality products is taken as granted by the manufacturers, which are contracting-out development jobs and the integration of new components to their suppliers in an attempt to optimize the whole supply chain.

The changes in the car manufacturers' product strategies have substantive effects on the automotive suppliers:

- The strongly differentiated demand is answered by an offensive model policy. Separate variants are developed for foreign markets.
- Despite the efforts to reduce the variety of parts by means of standardization, there is a growing tendency to serve niche markets with special models.
- The models offered on the market are of an increased quality and become technically increasingly demanding.

The repercussions of this process are starting to make themselves felt even on the level of the tier 3 suppliers, mostly parts suppliers, which have to adapt by increasing their product quality as well as their technical and technological competencies and by shortening the product cycle.

In addition to these economic challenges the suppliers are faced with difficult adaptation processes to new regulations; administrative decrees on automotive-related issues such as waste management for old cars and control of energy consumption and emissions are critical constraints.

Thus, the need to have increased access to technology, innovation and training which regards all suppliers at the different levels of the supply chain. Furthermore, regular information on upcoming industry trends in order to be able to prepare for future market developments is required on the part of the sub-suppliers. This can only be served by a communication link to the upper echelons of the supply chain, especially the system suppliers.

A large part of Europe's automotive suppliers are SMEs. In the long run, the competitiveness of Europe's car industry is contingent upon the competitive edge of the small suppliers.

2.2 Improving the competitive position of SMEs in Europe: Technology networking and clustering

For a lack of strategy and a short-term perspective on markets, SMEs are slow to adapt to new challenges in their economic environment. In the long run, however, this is exactly what is required. This is why the long-term competitiveness of SMEs depends primarily on intangible factors which put these enterprises in a position to manage change. Such factors are investments in human resources, access to technology and innovation, the organization of the company, access to information and the capability to process information, etc.

Isolated from each other, single suppliers may not be in a position to meet the future market requirements. Enterprise cooperations offer small enterprises the opportunity to draw upon resources which enable them to collectively master more complex challenges. However, SMEs are slow to seek such solutions and only rarely engage in an active search for partners.

While SMEs face difficulties in actively engaging in cooperations, enterprise networks and clusters offer an adequate framework for responding to the increasingly demanding requirements from the leading companies. By joining forces, both horizontally and vertically, and learning from other partners from the supply chain, SMEs are put into a position to compete. Moreover, the importance of enterprise networks is increasing in terms of facilitating enterprise access to resources such as technology, qualification, information on market requirements, and business support services.

Thus, clusters and technology networks* are important tools for SMEs to enhance their access to technology and other resources and services which help them to stay competitive in a more globalized economy.

* The terminology used in the study on hand refers to a definition proposed by the OECD according to which "clusters can be characterised as being networks of production of strongly interdependent firms (including specialised suppliers), knowledge producing agents (universities, research institutes, engineering companies), bridging institutions (brokers, consultants) and customers, linked to each other in a value adding production chain." For the purpose of the study an enterprise cluster or network which maintains close cooperative relations to technology poles, thus facilitating technology transfer to the enterprises, will be called a technology network.

2.2.1 Regional technology networking

While trends towards globalization appear to reduce the importance of regions, there are countervailing tendencies on the regional level with enterprises in the same or related industries developing an interest to cluster.

In several European automotive regions regional development policies have promoted the development of regional technology networks, i.e. networking activities between SME clusters and technology poles. These cluster-based regional development strategies are based on the identification of comparative regional advantages and the strengthening of regional supply chains.

Although there is a great deal of variation in the structure and dynamics of different regional technology networks, they can operate in such a way that fosters regional innovation through enhancing the access of SMEs to technology, encourages technological spillovers and produces economies of scale and scope. As a result, the regional economy experiences productivity gains and economic growth.

To a greater extent than in the case of nation-wide networks, the building of trust and confidence among the network partners becomes possible due to the restricted geographical expansion of regional networking. Another decisive advantage concerns the flexibility with which networks centred on regional supply chains can react to turbulences in their environment – based on the ease of communication between the network partners.

The study on hand discusses the basics of regional technology networking and presents a practical guide towards establishing a regional technology network. This is an essential step upon which a model for the construction of a transnational technology network can be built.

2.2.2 Transnational technology networking

The continuing trend towards globalization set by the manufacturers and the tier 1 suppliers, forces all suppliers to increasingly engage in international transactions.

For larger suppliers dominating regional markets transnational cooperations become instrumental in ensuring global competitiveness. For those companies seeking technology leadership, access to the latest technologies becomes an imperative in order to stay competitive on world markets. For companies seeking new business opportunities abroad, international linkages serve to maintain an international presence.

Thus, given the fact that global competition, especially in the more globalized industries, places a premium on a shift of the focus to the international level, the optimum geographic extension of a cluster may shift from the regional to the transnational, respectively transregional, level. With companies refocusing their procurement and market strategies, existing clusters may be forced to follow suit through interlinkage in transnational networks. The key advantage is that regional companies do not have to give up their rootedness in their home region.

Thus, from the perspective of the companies, cooperation between clusters at an European level combines the advantages of regional embeddedness with an international perspective. From the perspective of the already existing regional initiatives, such a link is an appropriate tool to learn from experiences.

The study on hand explores into the fundamentals of transnational technology networking and gives a practical guide towards establishing a transnational technology network by proposing an appropriate method.

3 Results of the collection and analysis of enterprise data

3.1 Overall participation of enterprises

3.1.1 Overall participation of enterprises in the primary data collection

The collection and analysis of the enterprise data from three different technology networks (AC Oberösterreich, ACstyria and Verbundinitiative Automobil NRW) served as well to evaluate the active participation of SMEs in technology networks, as to determine the most appropriate methodologies for setting up a transnational technology network.

The questionnaire was dispatched to more than 500 active enterprises including SMEs and technology poles from the survey sample. The closing date for the return of the questionnaire was May 31st, 1999. All in all, 126 questionnaires were managed to be collected; thus constituting the sample of the primary data set.

The return rate of the questionnaire varied between the three different technology networks.

	Frequency	Percent of the sample
Oberösterreich (AC)	51	40,48
Steiermark (ACstyria)	35	27,78
Nordrhein-Westfalen (VIA)	40	31,75
Total	126	100

Table 1: Return of the questionnaires/ Regional composition of the sample

According to the original offer around 30 to 40 returned questionnaires per cluster were deemed sufficient to have a representative sample. This target could be achieved in every cluster. In relation to all enterprises questioned a return rate of 25% or more was achieved in the case of the AC Oberösterreich and the Verbundinitiative Automobil NRW. The overall return rate in terms of the sample as a whole is 24,2%.

	Return	Number of enterprises targeted	Return rate in %
Oberösterreich (AC)	51	180	28,3
Steiermark (ACstyria)	35	180	19,5
Nordrhein-Westfalen (VIA)	40	160	25,0
Total	126	520	24,2

Table 2: Return of the questionnaires in relation to enterprise questioned

With regard to the homogeneity of the sample a fair representation of all kinds of enterprises including SMEs and technology poles was managed to be achieved. Enterprises from the sample were classified and subsumed under the different relevant groups of producers and service industries networking in the cluster. The composition of the enterprise sample in terms of the differential share of the enterprise groups is shown in chart 1.

The relative share of system suppliers, component suppliers and parts suppliers in the sample reflects very well the integration of suppliers in the supply chain which is marked by its pyramidal shape.

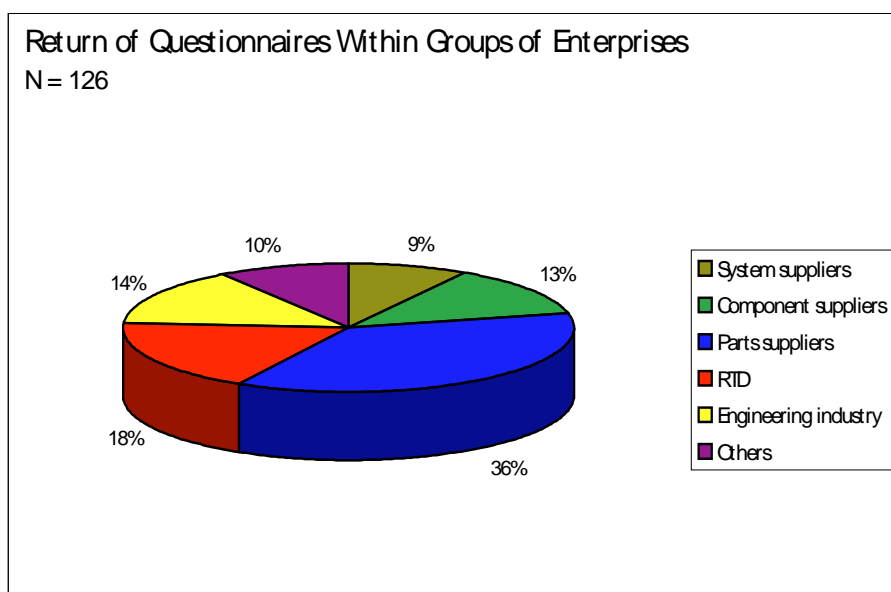


Chart 1: Primary data collection – Return of Questionnaires.

3.1.2 Overall participation of enterprises from the international networks

3.1.2.1 Basque-Country

The local partner in the region dispatched copies of the international questionnaire to regional enterprises and technology poles involved in networking. The response was excellent. 56 questionnaires were managed to be collected. It was therefore decided to run a full-scale computerized statistical evaluation so as to register the preferences of the Basque enterprises and technology poles for comparison with other results.

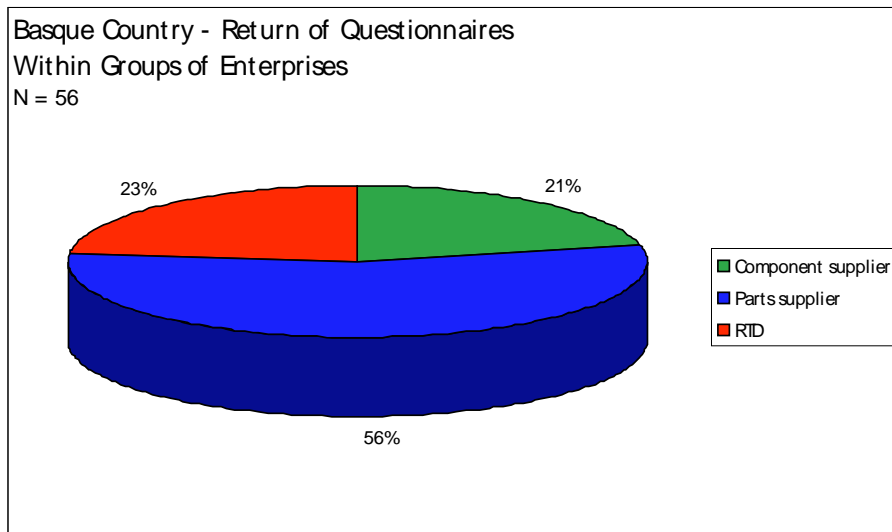


Chart 2: Basque Country-Return of Questionnaires

3.1.2.2 Wales

The local partner in the region dispatched copies of the international questionnaire to regional enterprises and technology poles involved in networking. The response was sufficient. 17 questionnaires were managed to be collected. It was therefore decided to run a small-scale computerized statistical evaluation so as to register the preferences of the Welsh enterprises and technology poles for comparison with other results. The differential share of enterprise groups was not calculated.

3.1.2.3 Piemonte

The local partner in the region dispatched copies of the international questionnaire to regional enterprises and technology poles involved in networking. The response, however, was lagging. Only 5 questionnaires were collected. We therefore decided not to subject these questionnaires to a computerized statistical evaluation but to take the statements into account in a qualitative manner.

3.1.2.4 Nord-Pas de Calais

The local partner in the region dispatched copies of the international questionnaire to regional enterprises and technology poles involved in networking. The response, however, was lagging. Only 6 questionnaires were collected. We therefore decided not to subject these questionnaires to a computerized statistical evaluation, but to take the statements into account in a qualitative manner.

3.1.3 Differences in the degree of participation among the international networks

With respect to the participation of enterprises and technology poles in the international network study there is obviously strong variation between the different technology networks. While over 50 enterprises and technology poles participated in Basque Country, the results in Nord-Pas de Calais and Piemonte turned out to be meager. Despite intensive efforts in form of written correspondence and personal contacts, only few enterprises were willing to participate.

In our perspective, these differences can be explained by incongruent degrees of institutionalization achieved by the different European technology networks. As described in chapter 4 of our study, “unified and encompassing cluster organizations“ were implemented in the Basque Country (ACICAE) and in Wales (WAF) while Nord-Pas de Calais and Piemonte can be characterized by less formalized and therefore looser structures; one can assume that for this reason the latter enterprise’s motivation to participate in the international study was lower and more difficult to organize on the part of the respective technology networks, which managed the questioning (i.e. the dispatch and collection of the questionnaires) and the immediate assistance of the enterprises throughout the project. Though supporting the networks by providing translations, argumentative framework etc., agiplan couldn’t impose any direct influence on the results.

3.2 Classification and definition of enterprise groups and technology poles

3.2.1 Car manufacturers

The present-day product strategy for satisfying the market-requirements implies an increase in the development of new models. Standard modules, e.g. platform reduction, are used for controlling the variability of models. Intensive cost-competition and striving to be the market leader resulted in the fact that to be at or near market terms and hence a global orientation have become success factors. Manufacturing levels were drastically reduced and with the integration of suppliers at the beginning of the production chain, the system suppliers determine even more the basic technology of the vehicles. Noticeably, strategic components such as lighting systems and gears are generally deployed, reducing the number of tier 1 suppliers.

Based on this situation, the manufacturers impose demands on the suppliers, such as:

- Performance of additional tasks;
- Implementation of special know-how and skills on the part of the supplier pool;
- Globalization of marketing, procurement and production.

These tasks are performed within various partnerships of suppliers situated at different levels of the supply chain.

Given the fact that the manufacturers have access to the ultimate buyer and consequently determine the goals of the entire supply chain, their concepts are to be taken into account on the part of the suppliers.

The supply-pyramid in the automobile industry is particularly characterised by the differentiation of systems, modules, components and parts. As only one car manufacturer participated in our study we abstained from analysing this category separately.

3.2.2 Systems suppliers

3.2.2.1 Definition

Systems are based on technological and functional unity with development as core activity, e.g. brake systems, cooling systems, lighting systems.

In most cases, the system-supplier, who increasingly takes over the task of system-integration, is the direct partner of the car-manufacturer and is responsible for the 'subcontractor' vis-à-vis the car manufacturer. Development management and standardization are required.

This development has two consequences on the part of the system suppliers: a) the formation of big corporations, who control a lot of key-technologies and generate a higher value creation and b) the establishment of joint initiatives c.q. consortia of different companies with a temporary structure designed for solving specific problems and with changing leadership. As a chance for SMEs this requires Integration and the ability to co-operate.

3.2.2.2 Evaluation

To a large extent, the system suppliers do not qualify for the EU-classification (up to 250 employees and a turnover up to 40 million Euro). Based on technology leadership and their direct access to the car manufacturers, however, system suppliers are indispensable with respect to the supporting activities for SMEs.

More than half of the system suppliers achieve a total turnover of more than 40 mio. Euro. 60 % of their turnover is apportioned to international markets. Conversely, some 70% of the enterprises obtain more than 50% of their total purchases on the international markets.

In addition, more than 40% of the enterprises achieve more than half of their turnover through new products, which were manufactured in the last three years. This is also reflected in the budgets invested into research and development.

Although more than 40% of the companies achieve a vertical range of manufacture of maximum 40%, the manufacturing penetration mainly hovers around 60%. This is particularly due to the fact that specific strategically important parts are manufactured in-house, in order to get a grasp on quality and failure risks, safeguarding technology leadership at the same time.

More than 60% of the companies interviewed, emphasise that technology leadership constitutes the essence of their competitive ability.

3.2.3 Module and component suppliers

3.2.3.1 Definition

Modules comprise the typical spatial composition needed to ensure the optimal assembly of separate parts (e.g. the front, the doors). Hence, the output of the module supplier mainly consists in the just-in-time assembly of parts and components of other suppliers.

On the part of the module supplier production and logistic know-how are required.

Given that during the assembly process the modules are usually supplied directly to the (conveyor) belt, the module supplier is usually locally linked with the construction plant.

Components on the other hand are installations, appliances and devices for establishing a function, e.g.: electrical regulating motor, spark plugs, compressors, bearings, pumps etc. Process- and material-specific technology leadership, along with the respective potentials for innovation management, is concentrated on the part of the component suppliers. Only the maintenance of technology leadership by means of respective development expenditures facilitates broad compatibility of the components, which allows the number of pieces adequate to economical production.

Despite the differences in detail, module and component suppliers have to perform similar tasks:

- to achieve competitiveness through know-how-leadership, either by means of innovative concepts regarding design-for-manufacturing and design-for-assembly (module suppliers) or by means of technological innovation for the purpose of enhanced functionality (component suppliers);
- to implement just-in-time solutions for high-quality logistics in order to achieve permanent use to capacity without storekeeping.

Comprehensive knowledge about the technological state-of-the-art and permanent technology transfer resp. development expenditures are crucial for coping with these tasks, which thus require joint initiatives and cooperations exceeding the economic and financial limitations of an individual enterprise.

Both, module suppliers and component suppliers, have congruent demands on enterprise networks, namely the achievement of substantive additional benefits for the own enterprise by participation and integration. This circumstance allows for the combined evaluation of module and component suppliers. Henceforth both categories of enterprises are subsumed under the category 'component suppliers'.

3.2.3.2 Evaluation

With the component suppliers, the number of items and standardization are business-determining factors for products, which potentially can be introduced into many markets. Furthermore, 80% of the companies asked, employ more than 250 employees. In special components niches, such as sensor or sequence control, there are also companies with less than 10 employees.

The turnover of the component suppliers is concentrated around 40 %. Hence, about 1/3 of the companies fall into the category of medium sized enterprises (7-40 million Euro).

Moreover, 60% of the companies make more than 60% of their turnover internationally. Conversely, 70% of the companies buy more than 50 percent of their materials on the international market. This emphasises the pressure for the latest and most favourable products.

For about 50% of the component suppliers, the vertical range of manufacture is situated between 40 and 60%. About 30% of the enterprises even reach a higher percentage.

Anyhow, still 1/3 of the companies realise more than 40% of their turnover with products, which were introduced during the last three years. This forces 60% of the companies to invest about 5%-10% in development.

The existing and prevailing emphasis on competitive issues, such as quality and technology leadership (each aspect is responded to by 40-50% of the enterprises) lead to somewhat contradictory consequences: on the one hand enterprises favour core production and development to be performed in-house; on the other hand there is the necessity to purchase products on the international market in order to obtain knowledge about the latest technologies.

3.2.4 Parts suppliers

3.2.4.1 Definition

Parts comprise all products of different materials, based upon design, arrangement and combination, such as standard parts, fittings, etc. For parts suppliers, operational perfection and the most economical production method are of crucial importance.

When taking this supply hierarchy into consideration, different partnerships for securing the necessary innovation adaptations and use of technology transfer can be found:

- Independent relationships.

The development activities of the suppliers are not directly orientated to specific customers. No product support for the customer is granted. The development activities follow general market requirements and the latest technology (this type of relationship mainly applies to parts and component suppliers).

- Normal relationships

The development activities are tuned to the partner requirements. The customer's power is very strong and implicates a great risk for the supplier. In most cases, there is a sporadic customer support (this type of relationship also applies mainly to parts and component suppliers).

- Partnership relations

The development activities are strongly partner-orientated and partner-aligned. In most cases, customer support is given (this type of relationship is realized mainly by system and module suppliers).

3.2.4.2 Evaluation

Most of the parts suppliers are SMEs. About 80% of the companies employ less than 250 employees and have a turnover of less than 40 million Euro. Almost 30% of the parts manufacturers are small enterprises: They have less than 50 employees and have a turnover of less than 7 million Euro.

With shares of 15% to 80%, the proportions of international turnover are distributed symmetrically.

For approx. 50% of the cases, the international purchase is lower than 20% of the total volume. The vertical range of manufacture is high; almost 60% of the companies reach a value above 60%. For about 80% of the companies, turnovers with new products manufactured within the last three years remain under the 40% limit.

In the same way, the proportion of RTD expenses reaches hardly more than 10% of the turnover; 60% of the enterprises even remain below 5%.

All this makes clear, that the parts suppliers are situated at the lower end of the supply chain. Few of them are engaged internationally, while they are characterized by a high vertical range of manufacture and somewhat meager capacities for technological development. Their efforts are mainly focussed towards deployment of material and process engineering and rarely towards the actual product development.

More than 40% of the parts suppliers, consider quality leadership as the key to competitiveness.

3.2.5 RTD

3.2.5.1 Definition

The category RTD comprises all technology poles (universities, technology centres, research institutes, innovation centres etc.) active in the field of research, which are connected in one way or the other to the automotive sector.

3.2.5.2 Evaluation

The major part of the companies and institutes, which offer research and development services (80%) has up to 50 employees and with 90% of them, their corresponding turnover is situated around 7 million Euro. Thus, the majority of them are small businesses.

The relatively small establishments realize their turnover mainly within the national boundaries, given that they are either offspring of academic institutions or orientated towards specific business requirements. Only when the expertise or the company's size grows, internationalization becomes an important theme.

Their vertical range of manufacture (50% of the enterprises and institutes reach a value above 80%) is a result of extensive development activities, including the construction of facilities and devices used for experiments. 50% of the companies and institutes make more than 50% of their turnover with products invented in the last three years.

The RTD proportion naturally takes up the main expenditure. The basis for the competitiveness is technological leadership and the quality of the results.

3.2.6 Engineering industry

3.2.6.1 Definition

In the automotive sector, the engineering industry is responsible for the manufacturing prerequisites. They produce systems, tools and controls of different size and complexity as well as the accompanying software.

3.2.6.2 Evaluation

The large majority of the enterprises in our sample falls into the category of the SMEs. In all the cases, more than 80% have less than 250 employees and realized a turnover of 40 million Euro.

More than 60 of the companies indicate that their activity on the international market counts for more than 40% of their turnover. However, the purchases mainly take place within the national boundaries. Almost 60% of the companies buy about 20% of their needs on the international markets.

With 80% of the companies the vertical range of manufacture is around 40 to 80%.

About 60% of the companies realize less than 40% of their turnover with new products, which are not older than three years

At approx. 70% of the companies, the RTD-part is situated around 10% of the turnover. 30% of the cases are actually between 5-10%. Another 20% of the companies are investing more than 20% of the turnover for RTD.

The competitive strengths are technology leadership (33%) and quality (33%). Within this group of enterprises, a further emphasis on niche-products (22%) is striking. To maintain technology and quality leadership RTD measures are deployed, which require substantial efforts, considering financial limits and understaffing. This is only possible through the international integration of knowledge and performance potential. Concentration on niche-production is one way to cope with these challenges.

3.2.7 Comparative view and implications for technology networking

The car manufacturers themselves are under an ever-increasing pressure from customers to change models and a pressure to adapt themselves to the new market conditions. Thus, suppliers were asked to deliver ever lower-priced products and at the same time to take over additional development performances and assembly requirements. The tasks imposed by internationalization require adaption on the part of the suppliers; the intensity of which is determined by the size of the turnover, the number of employees, the position in the supply chain and the expenses for RTD, which go along with it.

According to indications of the enterprises in our sample, the different types of suppliers can be categorised into the following profile (Indication of the prevailing tendency):

	System suppliers	Component suppliers	Parts suppliers	Engineering Industry	RTD
Number of employees	≥ 250	≥ 250	≤ 250	≤ 150	≤ 50
Turnover (Mio. Euro)	≥ 40	≤ 50	≤ 40	≤ 20	≤ 7
International market as a share of turnover	70-90 %	70-90 %	≤40 %	≤ 20 %	≤ 40 %
Purchases as a share of turnover	≥ 50 %	≤ 60 %	≤ 40 %	≤ 20 %	≤ 40 %
Vertical range of manufacture	40-50 %	ca.60 %	60-100 %	40-80 %	≥ 80 %
New products of the last three years as a share of turnover	≥ 40 %	≤ 50 %	≤ 40 %	≤ 50 %	≥ 40 %
RTD expenses as a share of turnover	≤ 5 %; 10-15 %	≤ 10 %	≤ 5 %	≤ 7 %	---
Main focus of competitiveness:	Technology	Technology and Quality	Quality	Technology and Quality	Quality

Table 3: Profile of the different enterprise groups

Growing technological integration throughout different branches enables the creation of new processes and new products. This technology results from an interdisciplinary combination, as can be seen with airbags, new steering systems etc. For this reason, cooperations between enterprises of different branches, scientific organizations, freelance specialists, customers, etc. are required.

Based on the figures for the vertical range of manufacture gained for the different enterprise groups in our survey the ongoing change in the manufacturing pyramid of the automotive can be demonstrated. Chart 8 visualises the process of change in the course of which the system suppliers have become the development partners of car producers. The percentage figures

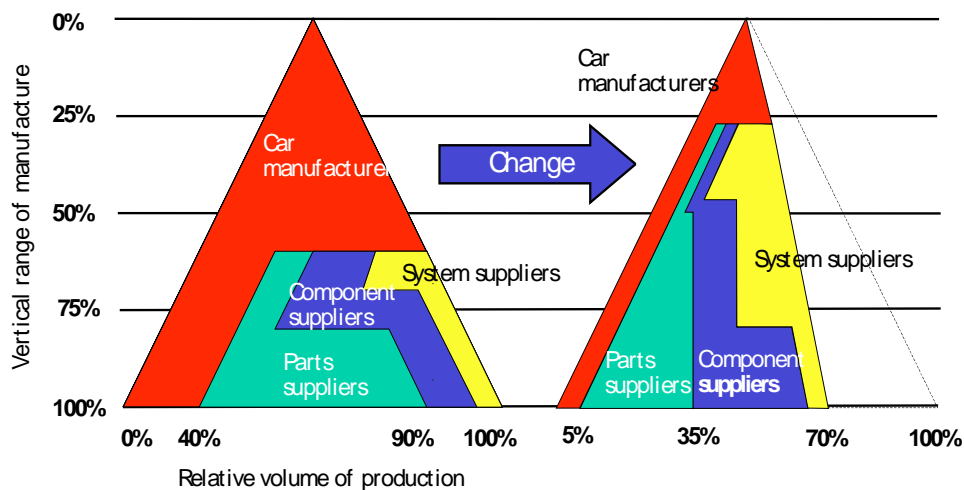


Chart 8: Change in the manufacturing pyramid

The knowledge about how companies elaborate technological development and how new technologies are translated into production constitutes the basis for supporting services in an enterprise network, designed for enabling adaption to new requirements.

The situation in the companies, anticipating the results of the enterprise survey presented in the next chapter can be described as follows:

- Approx. 80% pursue their own development;
- Approx. 40% solve technology problems by purchasing new systems;
- Approx. 20% implement joint development in co-operation projects;
- Less than 20% pursue specific developments in collaboration with suppliers;
- Less than 20% involve academic institutes in development tasks.

The considerable share of developments pursued by the individual enterprises is to be explained by the fact, that technology leadership is considered the dominating competitive factor by those enterprises situated on the top of the supply pyramid.

Briefly, four main requirements have to be fulfilled by the supplier:

- Excellence of performance and outstanding quality;
- Permanent and leading realization of innovation, i.e. better realization of new solutions for customers demands;
- Enhancement of integration, i.e. the extension of tasks and the taking over of additional services;
- Intensification of internationalization, i. e. following customers to new markets, not only in sales, but also in production.

Using these opportunities means both, safeguarding a faster, smoother exchange of know-how and obtaining a greater insight into the demands of the customer and the market. Internationalization with concentration on core products and targeted regional services requires the compliance with specific legal, market and economic conditions of the individual countries.

3.3 Results of the enterprise survey (data collection and analysis)

In this chapter the results of the enterprise survey, both conducted at the level of the primary data set (AC Oberösterreich, ACstyria and VIA NRW) and at the level of selected international networks (Basque Country and Wales) are presented and discussed.

The chapter is divided in three main parts. In the first part results relating to the constituent elements of networking (supportive and obstructing conditions of an active enterprise participation as well as the environment most conducive to achieving this) are discussed. In the second part cooperation projects will be shown to be an important method to stimulate the participation of SMEs in networks. The third part relates to the functional requirements of international networks.

The percentage value put in brackets behind the variables refers to the frequency of responses to the most positive category (e.g. 'Very important') based on the valid cases within the variables, if not stated otherwise.

3.3.1 Results relating to the supportive and obstructing conditions of an active enterprise participation as well as to the environment most conducive to achieving this

Part II of the enterprise questionnaire has combined questions concerning the preconditions of and possible support services for a successful technology transfer in networks, the criteria of success relating to the organization, management and development of a network, the SMEs' requirements for as well their advantages from active participation in such networks and, last not least, the obstacles faced by them in participating actively.

Thus, the results have a direct impact on the identification of the supportive and obstructing conditions of an active enterprise participation in technology networks as well as to the environment most conducive to achieving this.

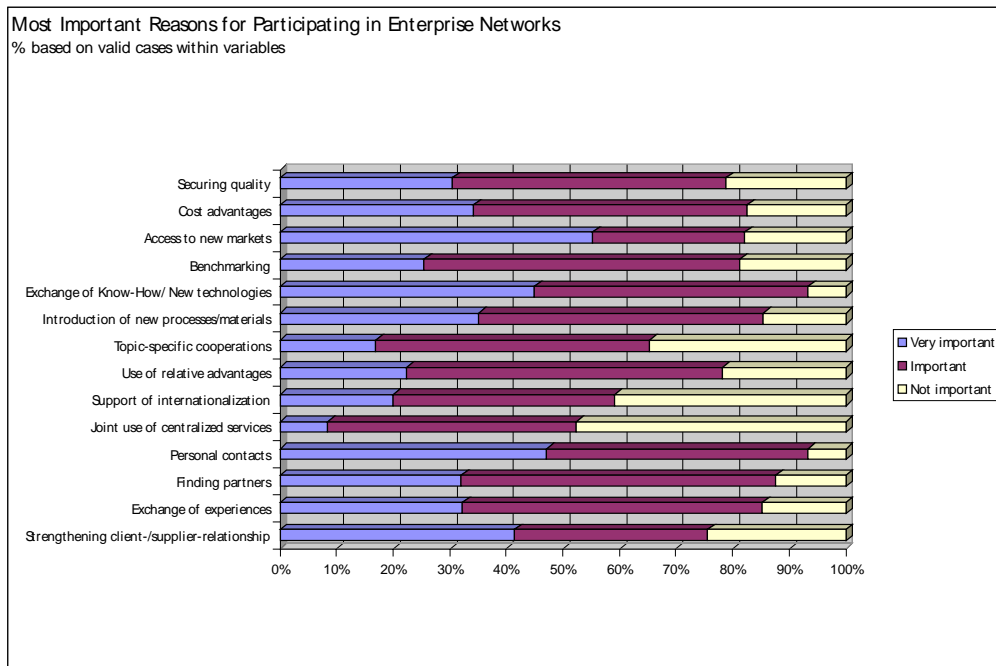


Chart 9: Most important reasons for participating in an enterprise network

Chart 9 shows the most important reasons for participating in an enterprise network from the perspective of the participants of the German and Austrian clusters. Focusing the category "Very important" the following points can be identified as the most important reasons to join a network:

1. Access to new markets ($\geq 55\%$);
2. Personal contacts ($\geq 45\%$);
3. Exchange of know-how/ Access to new technologies ($\geq 40\%$);
4. Strengthening the client-/ supplier relationship ($\geq 40\%$).

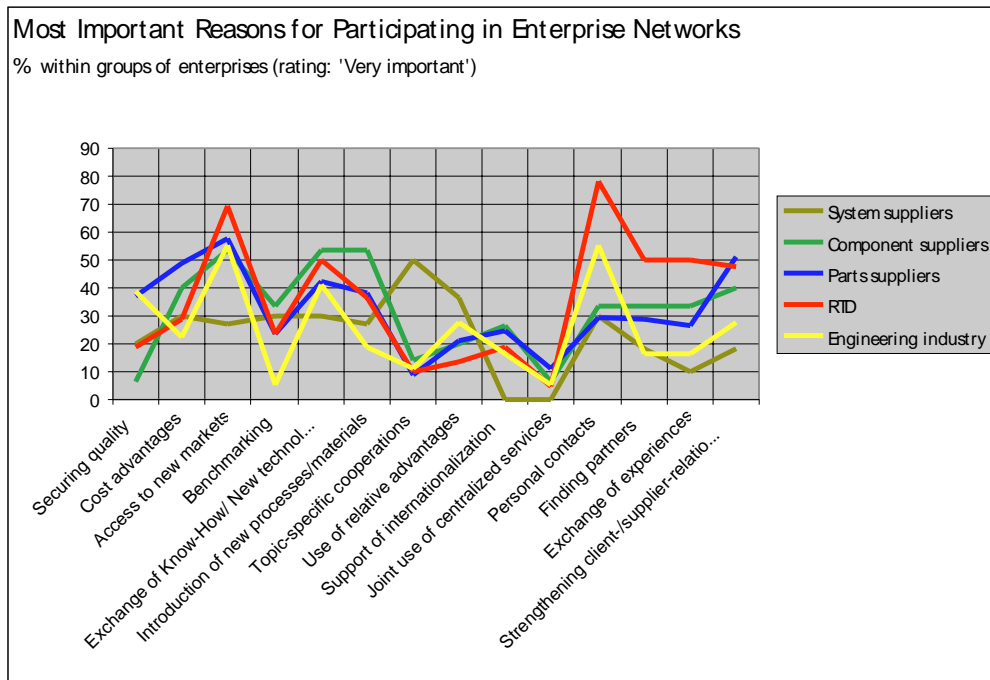


Chart 10: Most important reasons for participating in an enterprise network within groups of enterprises (rating “very important”)

Chart 10 shows the preferences of the different enterprise groups. Among other things, it is significant that 80% of the RTD institutions consider the establishment of personal contacts as a prime incentive for joining a network. With exception of the system suppliers all enterprise groups rate access to new markets a very important reason. System suppliers are generally less interested in the issues such as exchange of know-how or the support of internationalization activities.

For the parts and components suppliers issues such as “exchange of know-how” and “introduction of new processes and materials” are more important than for the system suppliers.

Strengthening the the client-/supplier relationship mainly concerns parts suppliers ($\geq 50\%$) and RTD providers ($\geq 45\%$) who expect to gain access to higher ranking suppliers.

In summary, one can say that the first priority consists in finding new markets by establishing the right contacts and to obtain a more intense customer relationship. The second priority is to supply more information and to show the possibilities about the further development of technological competence.

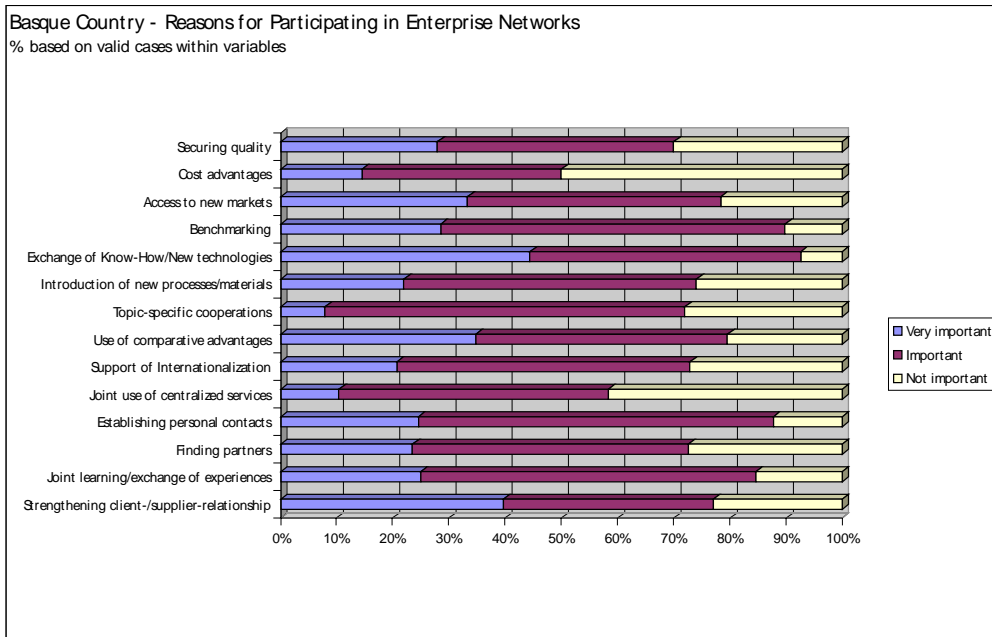


Chart 11: Basque Country - Reasons for participating in enterprise networks

Chart 11 shows the most important reasons for participating in an enterprise network from the perspective of the Basque automotive cluster grouping ACICAE. The chart shows the data for the different enterprise groups participating in the association for the rating “very important”. Except for the importance of personal relationships, the issues most highly rated by the Basque enterprises are similar to the responses given in the primary data set:

1. Exchange of know-how/Access to new technologies ($\geq 45\%$);
2. Strengthening client-/supplier relationship ($\geq 35\%$);
3. Use of comparative advantages ($\geq 30\%$);
4. Access to new markets ($\geq 30\%$).

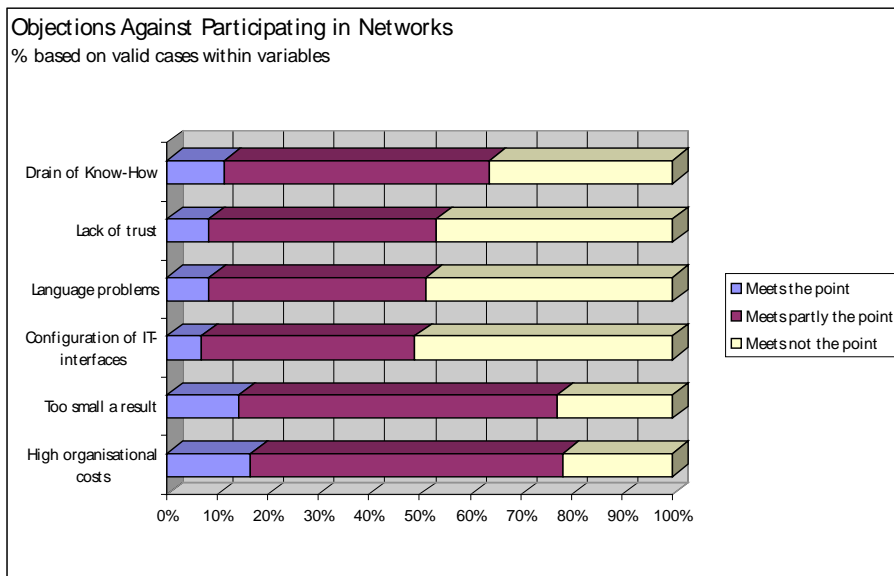


Chart 12: Objections against participating in networks

Chart 12 shows the most important objections against participating in an enterprise network from the perspective of German and Austrian enterprises. The qualifications 'Meets the point' and 'Meets partly the point' resume in a nutshell the most important obstacles for active participation in a network. The following three points can be identified to be by far the most significant objections:

1. High organizational costs ($\geq 70\%$);
2. Too small a result for the own enterprise ($\geq 70\%$);
3. Possible drain of know-how ($\geq 60\%$).

This underlines, that for the enterprises – when it comes to possible engagement in cooperations - internal problems are more significant constraints to networking than concerns about IT-interfaces, language problems or even lack of trust and fear of a possible drain of know-how. It appears, that network services are to be arranged in a fashion, that enables the partners to participate without high organizational costs. A lean design in organizational terms would just be convenient for SMEs with their typical lack of manpower.

It is remarkable, that over 70% of the enterprises have doubts with respect to possible advantages of networking. This is an important hint, that networking still has to consider the individual interests of the enterprises involved.

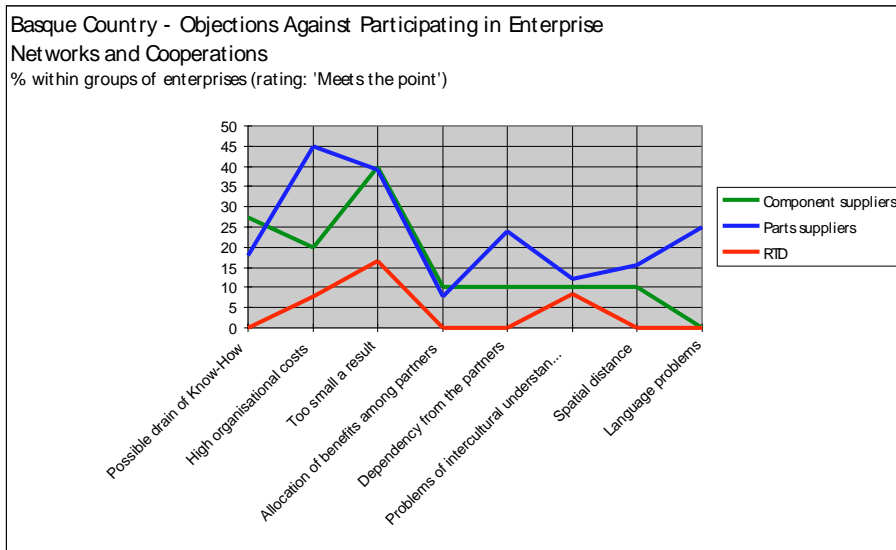


Chart 13: Basque Country - Objections against participating in enterprise networks and cooperations within groups of enterprises (rating "Meets the point")

Chart 13 shows the most important objections against participating in an enterprise network from the perspective of Basque enterprises in the Basque automotive cluster ACICAE. The chart shows the data for the different enterprise groups participating in the cluster for the rating "Meets the point". As in Germany and Austria, enterprises do not primarily suffer from a dependency from the partners or a possible unjust allocation of benefits between partners but from high organizational costs and a lack of capacities within the enterprise itself.

These objections are most frequently cited as major constraints. It can be easily determined that this holds especially for the parts suppliers and the component suppliers but only to a far lesser degree for the RTD institutions. The latter can be supposed to be better equipped whereas especially the parts suppliers, being SMEs, face a severe constraint in organizational costs.

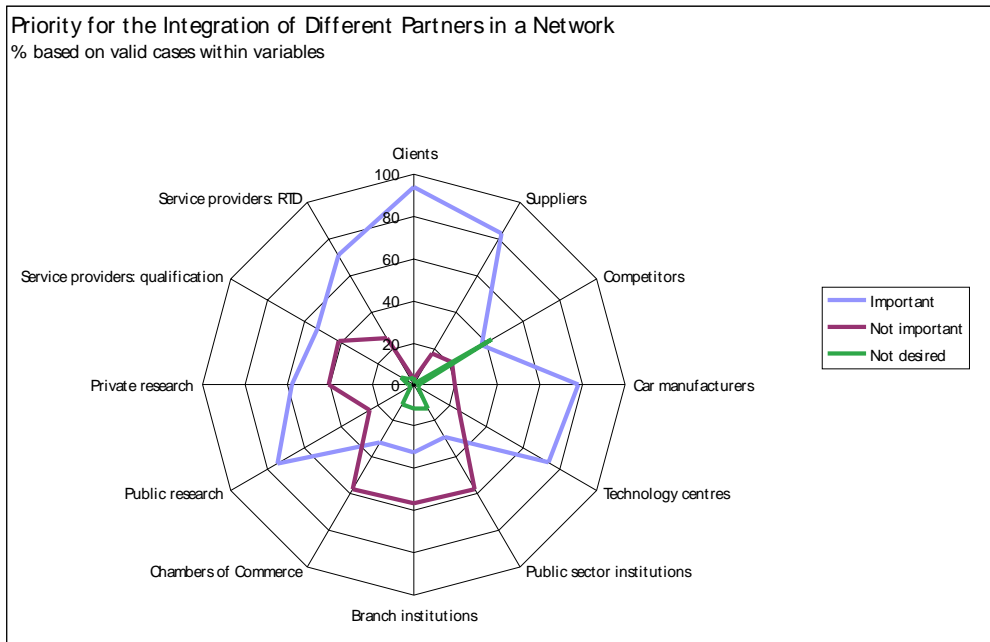


Chart 14: Priority for the integration of different partners in a network

Chart 14 shows the potential partners for a technology network which are desired or important to have within the network. Focusing on the category “important” it is discernible that the integration of all partners along the supply chain including the RTD institutions is regarded as important – while it seems less important to include institutions which are not directly connected to the supply chain. The following partners were given the highest rankings (from the perspective of the individual enterprises):

1. Clients ($\geq 90\%$);
2. Suppliers ($\geq 80\%$);
3. Car manufacturers ($\geq 75\%$);
4. Technology centres ($\geq 70\%$);
5. Public research institutions ($\geq 70\%$).

The ranking order of clients, suppliers and car manufacturers indicates the requirement to adapt performance to the needs of the customer, for the realization of which adequate communication is crucial. The requested integration of technology centres and public research institutes reflects the overall significance of technology transfer.

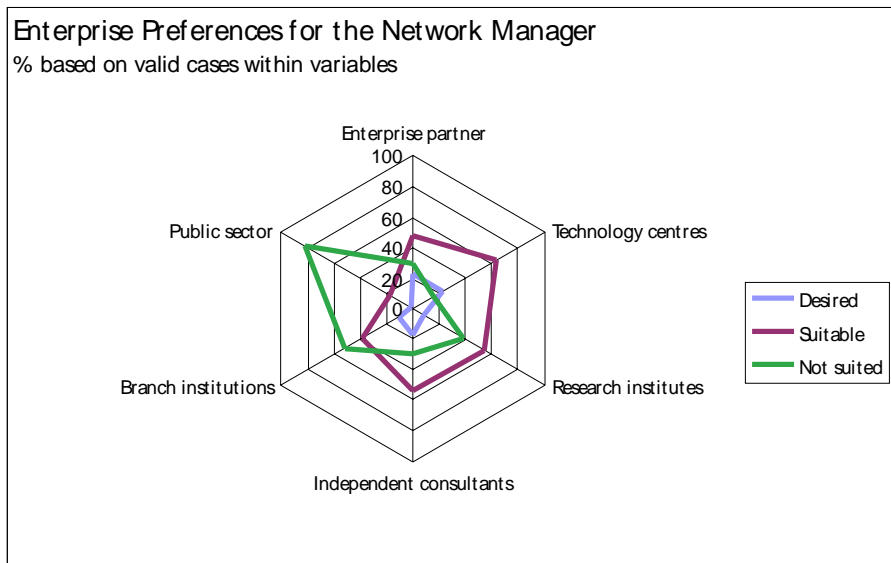


Chart 15: Enterprise preferences for the network manager

Chart 15 shows the institutions which the enterprises and technology poles on hand regard as desired, suitable or not-suitable for the management of a technology network. Focusing on the category “suitable” the following preferences were stated:

1. Technology centres ($\geq 60\%$);
2. Research institutes ($> 50\%$);
3. Independent consultants ($> 50\%$);
3. Enterprise partners ($> 45\%$).

By contrast, highlighting the category “not suited” it can be suggested that enterprises would like the public sector to keep a low profile in managing an enterprise network.

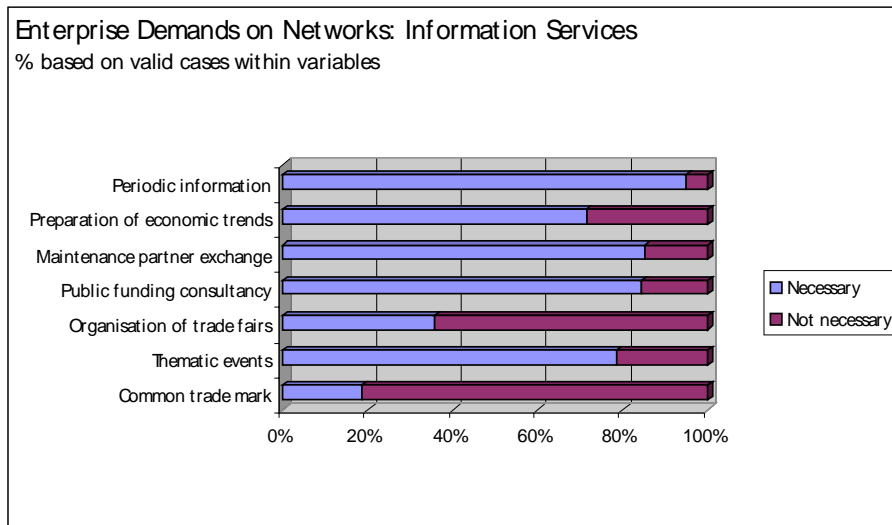


Chart 16: Enterprise demands on networks: Information services

Chart 16 shows that the enterprises and technology poles under consideration primarily consider those information services as necessary which fall into the categories of a) information on ongoing economic and technological trends in the industry and b) consultancy on potential cooperation partners and getting advice on public funding opportunities.

The most important information services the enterprises demand to be provided by making use of the network are:

1. Periodic information on trends and developments ($\geq 90\%$);
2. Establishment and maintenance of a cooperation partner exchange ($\geq 80\%$);
3. Public funding consultancy (complexity and also the intricacy of the supportive programmes overwhelm the companies) ($\geq 80\%$);
4. Follow-up and adaptation of economic trends by means of thematic events ($\geq 70\%$).

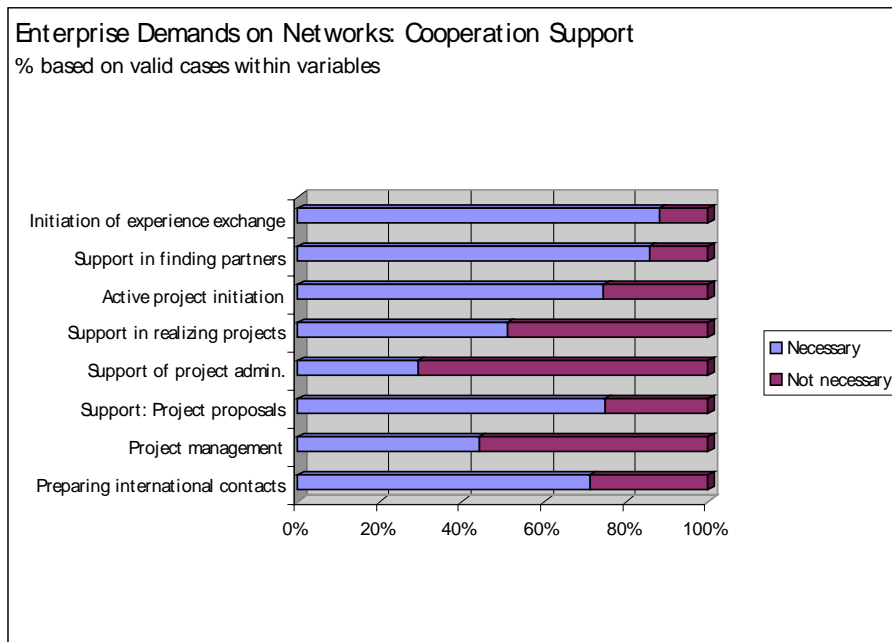


Chart 17: Enterprise demands on networks: Cooperation support

Chart 17 shows that the enterprises and technology poles under consideration primarily consider those cooperation support services as necessary which are helpful in facilitating the initial stages of a cooperation between partners. They even want the network management to come up with ideas for projects. Support services at the later stages of the project cycle (project management, project administration) are in less high demand. The most significant supporting services demanded by the enterprises are:

1. Initiation of an exchange of experiences ($\geq 85\%$);
2. Support in finding partners for cooperations ($\geq 80\%$);
3. Support with project proposals ($\geq 70\%$);
3. Active project initiation ($\geq 70\%$).

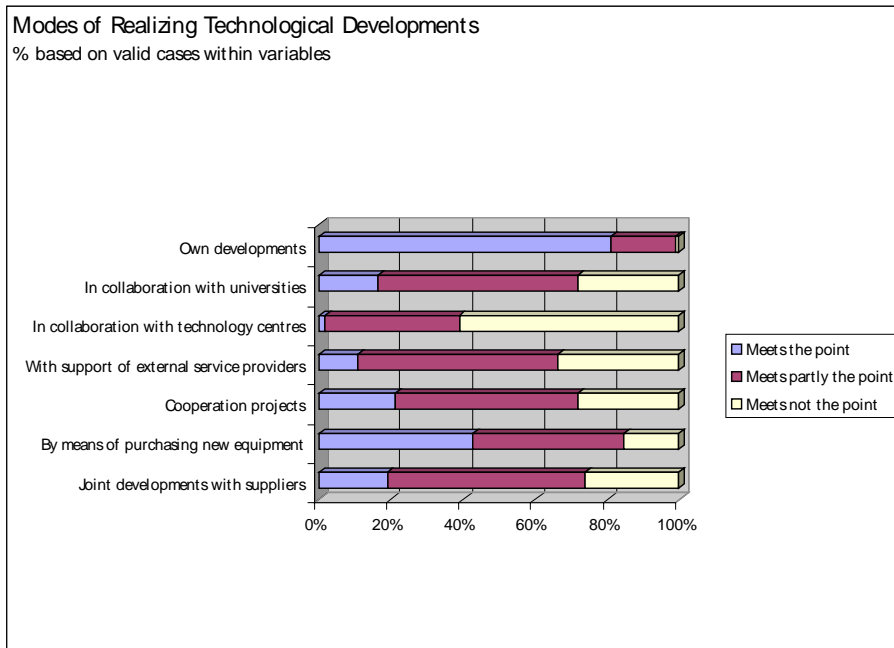


Chart 18: Modes of realizing technological developments

In order to know which technology transfer services are to be offered to the enterprises, it is important to know the ways in which new technological developments are realized. In the networks from our primary data set, the great majority of enterprises is developing new technologies on their own, or is purchasing new equipment. Hence, there is plenty of room for enhancing collaboration with technology poles.

1. Own developments ($\geq 75\%$);
2. Purchasing new equipment ($\geq 40\%$).

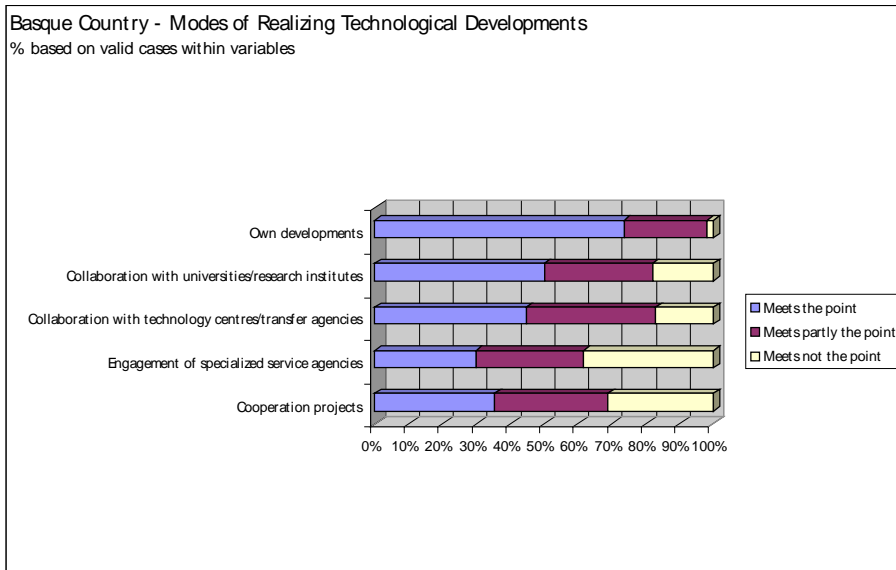


Chart. 19: Basque Country – Modes of realizing technological development

In the Basque Country the situation is slightly different. Although the majority of enterprises is developing their technologies themselves, collaboration with technology poles is much more common practice. Hence, the Basque technology network ACICAE was successful in linking enterprises to regional technology poles.

1. Own developments ($\geq 75\%$);
2. Collaboration with universities and research institutes ($\geq 40\%$);
3. Collaboration with technology centres ($\geq 40\%$).

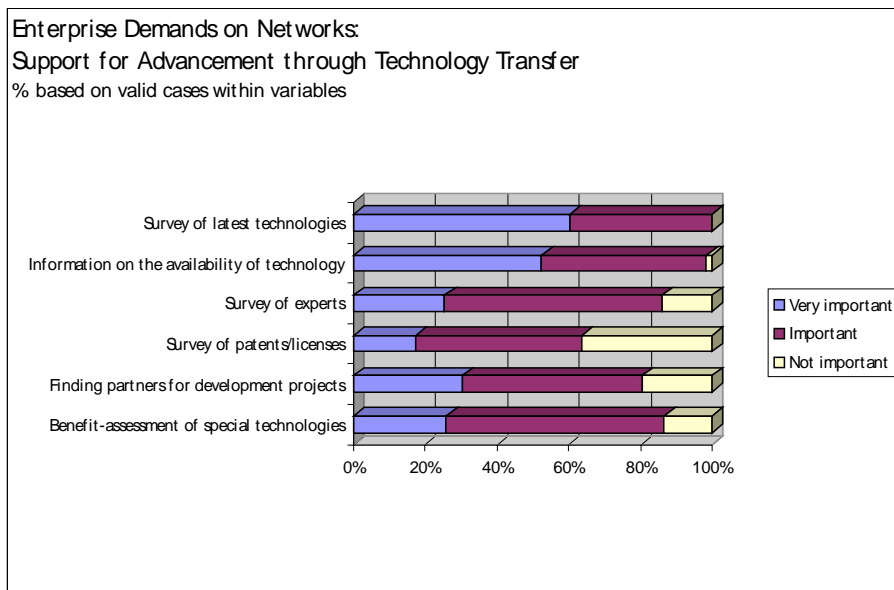


Chart 20: Enterprise demands on networks: Support for advancement through technology transfer

Chart 20 shows that the enterprises and technology poles under consideration primarily consider those technology transfer services as very important which keep them informed on the latest technologies and their availability. Highly specialized services such a survey of patents/licenses in particular technological field are regarded as less important. The two most important support services the enterprises demand to be provided by making use of the network are:

1. Survey of latest technologies ($\geq 55\%$);
2. Information on the availability of technologies ($\geq 50\%$);
3. Finding partners for common developments ($\geq 25\%$).

It is striking that 25% consider the mediation of a development partner to be very important. The increasingly cost-intensive developments require cooperation and the intervention of experts and partners in order to find efficient and cost-effective solutions.

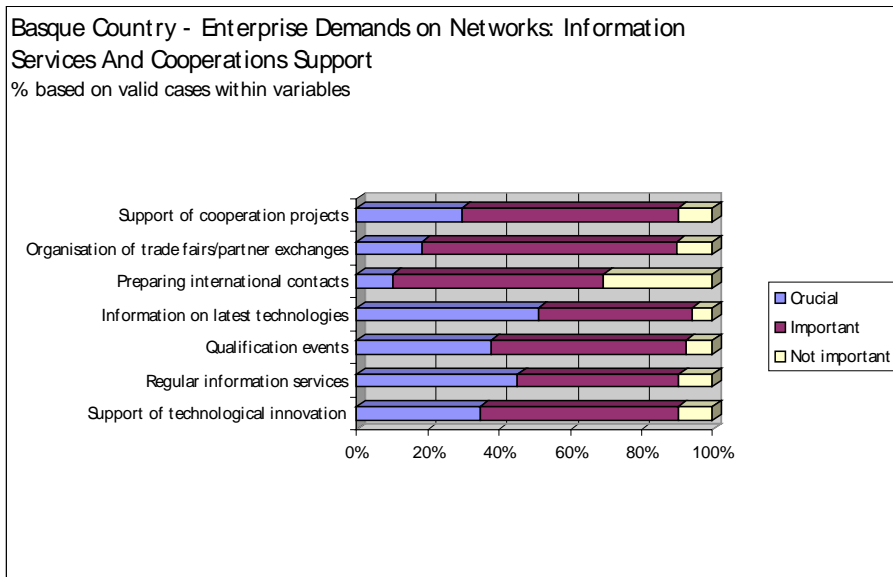


Chart 21: Basque Country – Enterprise demands on networks: Information services and cooperation support

Basque enterprises and technology poles primarily consider those services as crucial which keep them informed on the latest technologies and their availability. Regular informations services is second most important priority.

1. Survey of latest technologies ($\geq 50\%$);
2. Regular information services ($\geq 40\%$);
3. Qualification events ($\geq 30\%$);
4. Support of technological innovation ($\geq 30\%$).

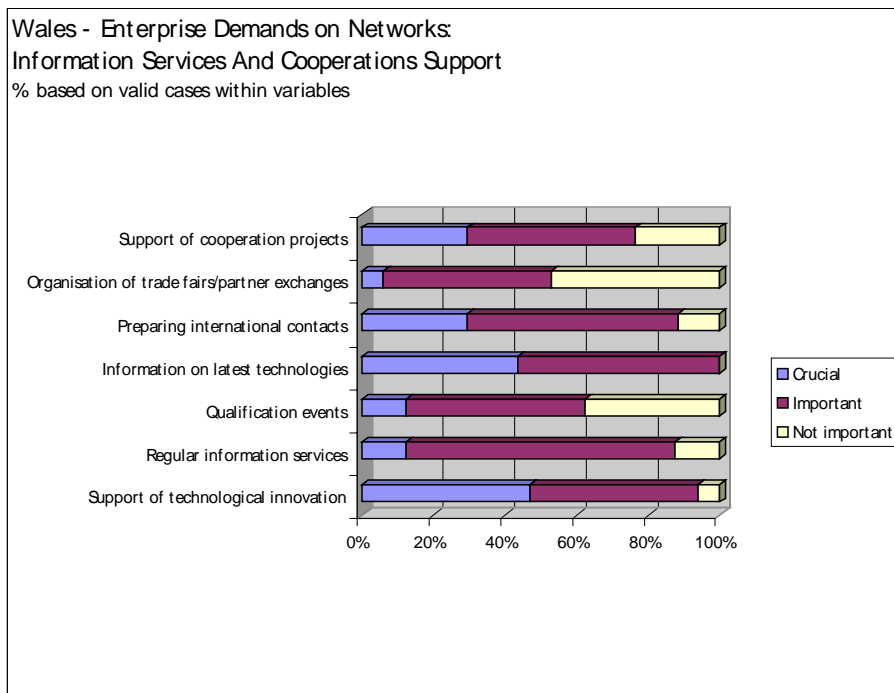


Chart 22: Wales – Enterprise demands on networks: Information services and cooperation support

In Wales, as in the Basque country, pride of place is awarded to information on latest technologies, closely followed by support of technological innovation.

1. Survey of latest technologies ($\geq 40\%$);
2. Support of technological innovation ($\geq 40\%$);
3. Preparing international contacts ($\geq 30\%$).

For both Wales and the Basque Country holds that the enterprise demands on networks are, more or less, in line with findings from the primary data set. Across Europe, enterprises need technology transfer services and want to be kept updated on recent economic and technological developments.

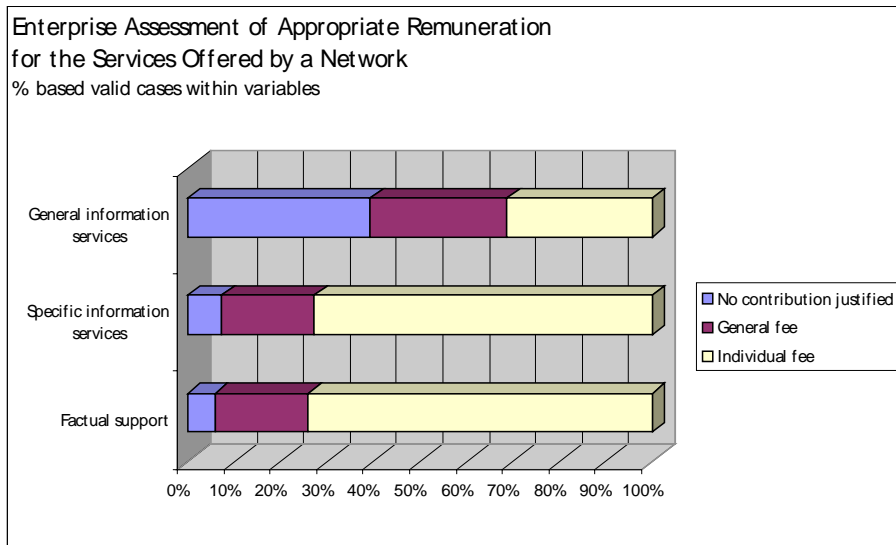


Chart 23: Enterprise assessment of appropriate remuneration for the services offered by a network

Business support services have been divided into the following categories:

- General information services: periodic information e.g. on funding programmes or foreign markets and technologies, events, trade fairs, available experts, etc.
- Specific information services: e.g. database research, selection of appropriate funding programmes, execution of market analysis, technology transfer investigations, etc.
- Factual support of cooperations for individual enterprises: project-initiation, match-making services, project management, etc.

The enterprises and technology poles in question make a clear distinction between, on the one hand, general information services, such as periodic informations, and, on the other hand, specific information services, such as database research or a public funding consultancy, and the factual support of a cooperation among specific partners.

While roughly 35% of the enterprises regard no contribution from them as justified with respect to general information services, almost 80% of the enterprise and technology poles on hand are willing to contribute individually to specific information services and a factual support of cooperations.

3.3.2 Results relating to the practical action needed to stimulate the participation of SMEs in technology networks (cooperation projects)

Part III of the enterprise questionnaire asked whether cooperation projects between different kinds of enterprises and technology poles realized within the framework of existing technology networks are an appropriate means to stimulate the participation of SMEs in such networks.

Cooperation projects provide a platform for the exchange of know-how and technology and allow for the realization of synergetic effects. The analysis of cooperation projects in terms of an evaluation of the different kinds of cooperations, the assessment of their success by the partners and possible objections provides a basis assessment of their usefulness in stimulating both the participation of SMEs in technology networks and in facilitating technology transfer.

The data was qualified as to consider the votes of especially those partners which are actually experienced in cooperation projects. All in all, some 50 enterprises were experienced in so defined cooperations and have thus responded to the respective questions. 15 out of the 50 enterprises gave answers not only for 1 but for 2 cooperations projects. As the main interest under part 3 lies in the analysis of cooperation projects we looked at all 65 project evaluations instead of analysing each enterprise for each project separately.

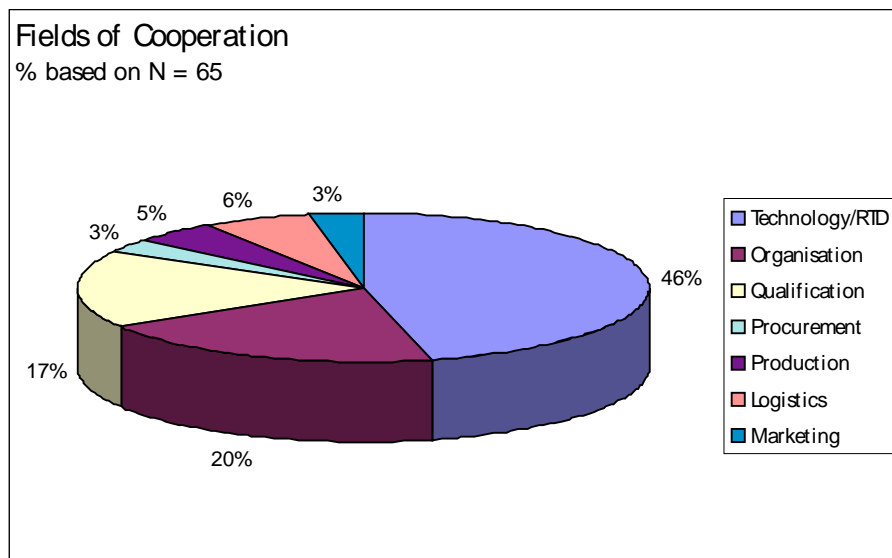


Chart 24: Fields of cooperation

Chart 24 shows for the 65 project evaluations on hand the field of cooperation. It is noticeable that 46% of project evaluations referred to projects in the field of Research, Technology and Development (RTD).

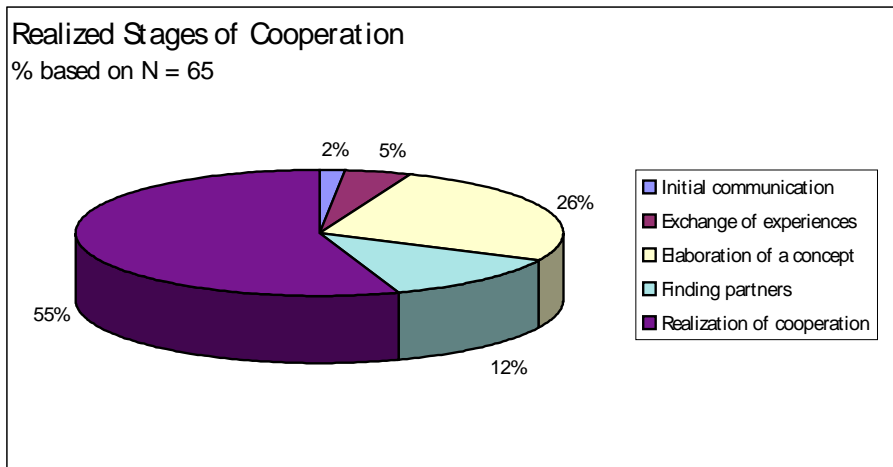


Chart 25: Realized stages of cooperation

Chart 25 shows that some 55% of the 65 projects on hand finally reached the stage of realization of the project. Only some of projects stopped at an early stage of the project cycle, e.g. after an initial communication or after a first exchange of experience.

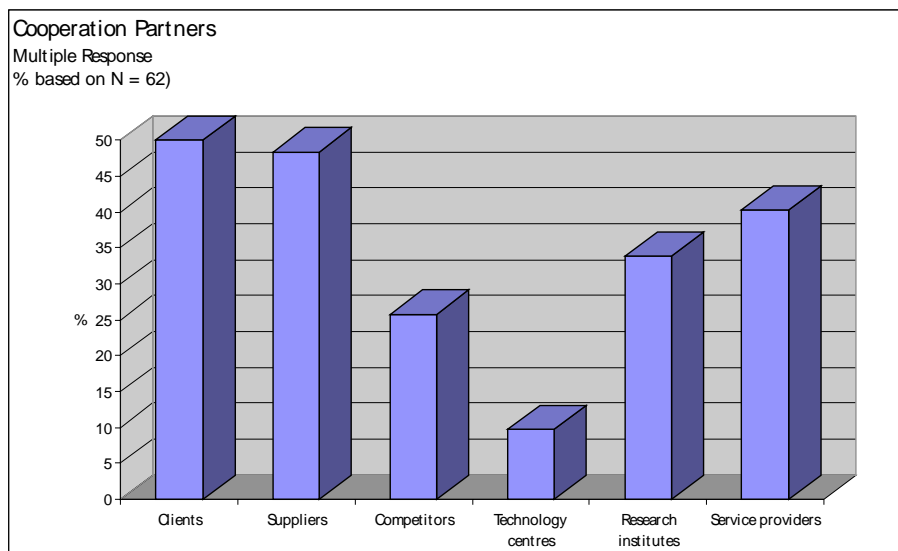


Chart 26: Most frequent cooperation partners according to enterprise groups

Chart 26 shows that for the 62 projects for which details were given under this question enterprises most frequently engaged in cooperations with clients and suppliers. These appear to be the most important cooperation partners. They are followed by research institutes and service providers in the field of research and technology.

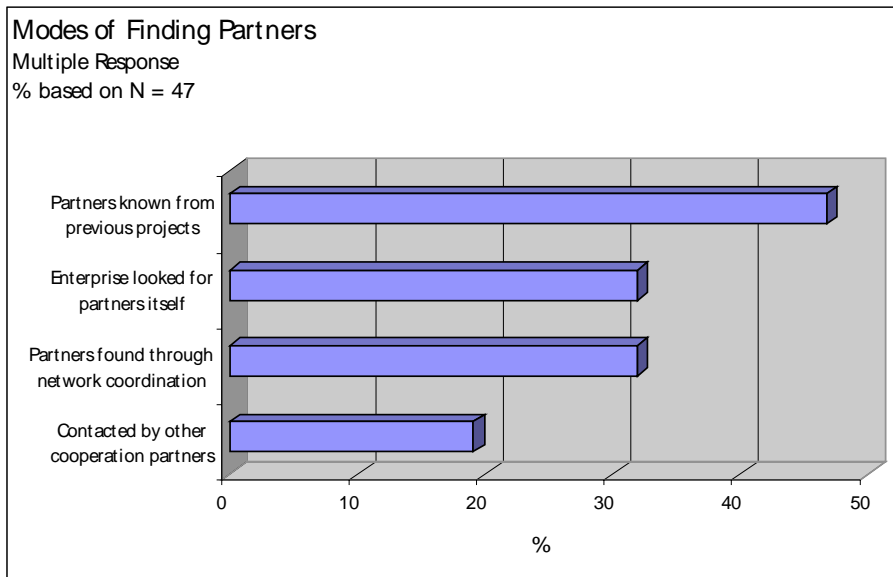


Chart 27: Modes of finding partners

Chart 27 shows that the most frequent way for enterprises to find partners for cooperation was to contact partners they knew from other or previous projects. Other frequently used modes to find partners were to make use of the services of the network coordination or to look for potential partners themselves.

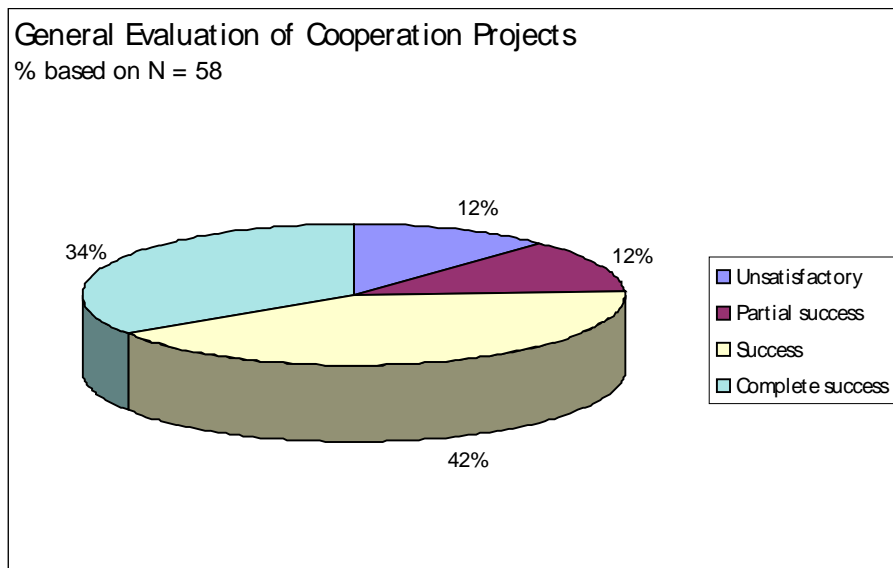


Chart 28: General evaluation of cooperation projects

Chart 28 shows an evaluation of the overall success of cooperation projects. Enterprises were asked to rate whether they thought the cooperations they engaged in a success or a failure. It turns out that more than 75% of the 58 responding

enterprises and technology poles rated the projects as a success or even a complete success (to some 34%).

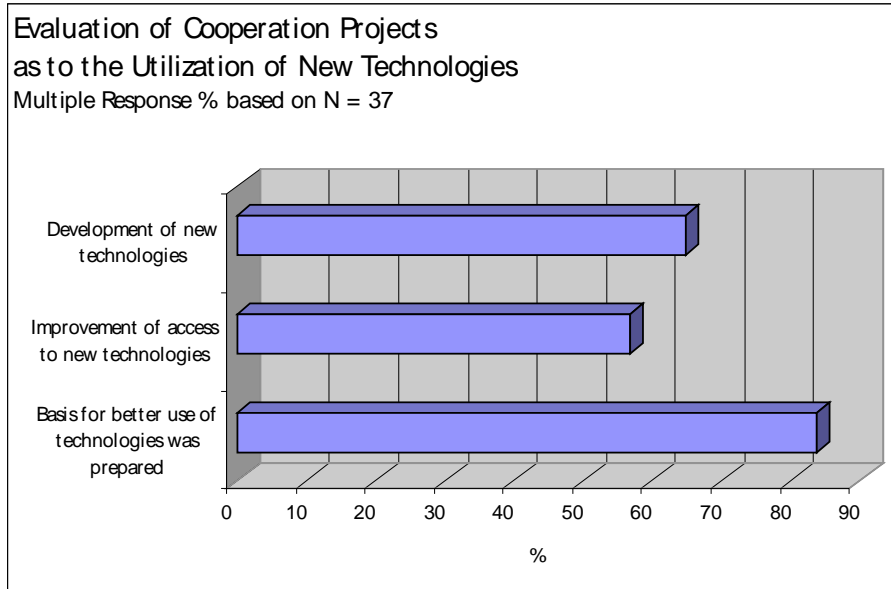


Chart 29: Evaluation of cooperation projects as to the utilization of new technologies

Chart 29 shows, that slightly above 80% of the enterprises understand their cluster experiences as a basis for better use of technologies. This is followed by about 60% of the enterprises, which were able to develop new technologies.

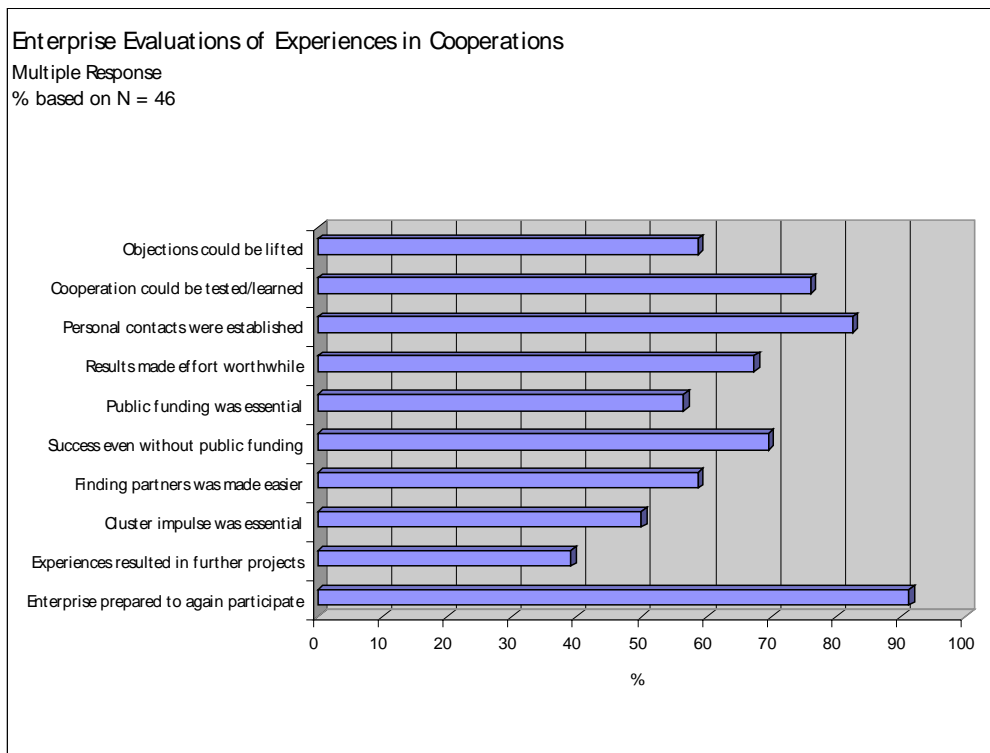


Chart 30: Enterprise evaluations of experiences in cooperations (multiple responses are evaluated)

Enterprises with experiences in cooperation projects were asked to give an evaluation of their participation in such projects along various dimensions. On an overall level, it turns out that the enterprises and technology poles from our sample have made positive experiences and are prepared to engage in further cooperations. Chart 30 shows that the experiences made and the contacts established serve as a basis for future activities.

1. The enterprise is prepared to again participate in a cooperation ($\geq 90\%$);
2. Useful personal contacts were established while cooperating ($\geq 80\%$);
3. Cooperation as a method could be tested and learned ($\geq 70\%$).

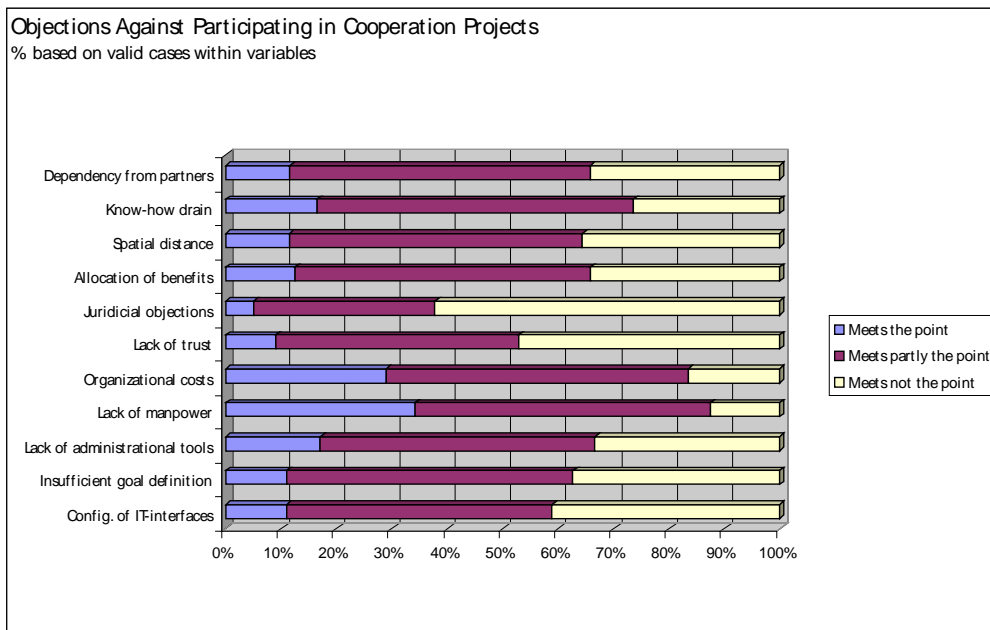


Chart 31: Objections against participating in cooperation projects

Chart 31 displays the objections this time against participating in cooperation projects. The following rank order is established by the enterprise responses:

1. Lack of manpower for the implementations of projects ($\geq 30\%$) which reflects the specific situation of SMEs;
2. High organizational costs in cooperation projects ($\geq 25\%$);
3. Danger of a know-how drain ($\geq 25\%$);
4. Lack of tools for the administration of projects ($\geq 25\%$).

The possible danger of a drain of know-how appears to be not so critical when specific regulations governing the relationship between the different parties to the cooperation are applied.

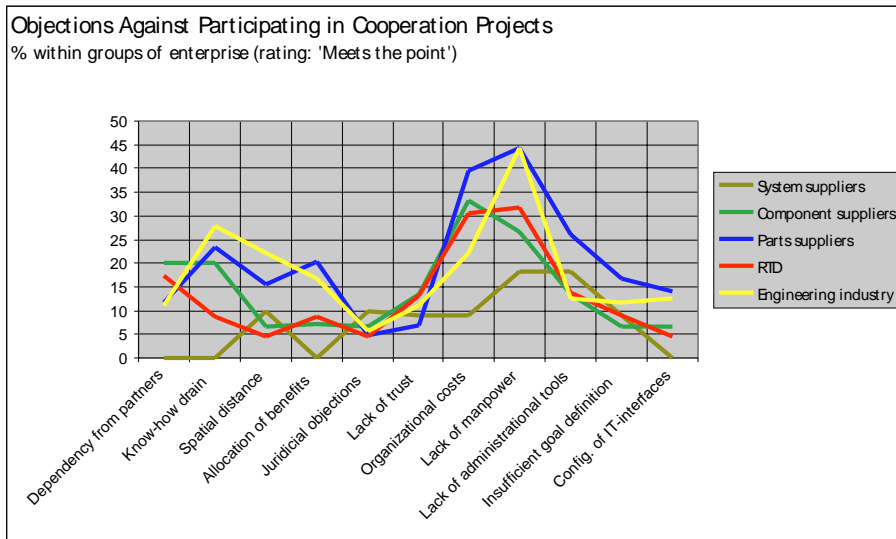
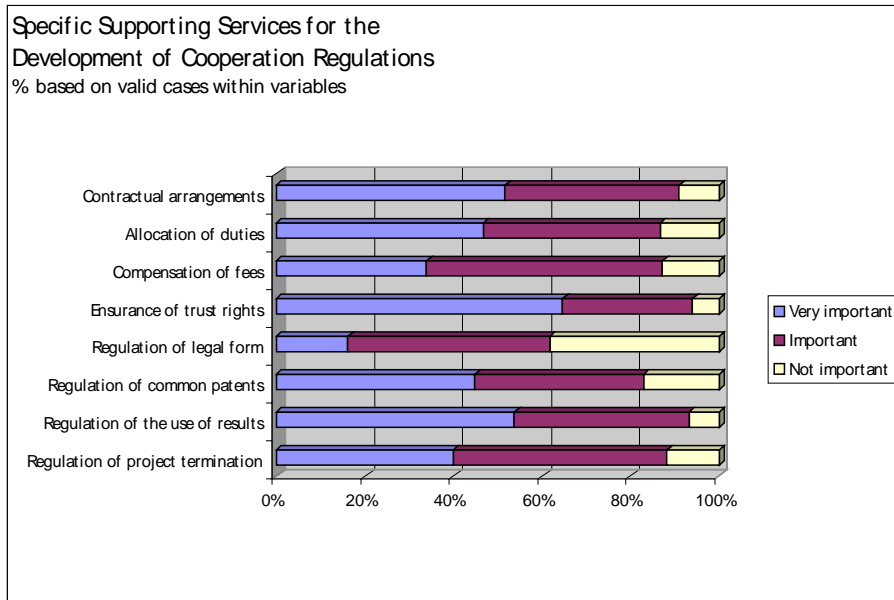


Chart 32: Objections against participating in cooperation projects within groups of enterprises (rating: 'meets the point')

Looking at the perspectives of the different enterprise categories as displayed in chart 32 reveals that in particular parts suppliers ($\geq 40\%$) appear to have serious objections against participating in cooperations, which is to be explained by lack of manpower and high organizational costs.



Charts 33: Specific supporting services for the development of cooperation

Chart 33 displays specific supporting services, enterprises consider important for the development of cooperation. Their responses result in the following ranking:

1. Guarantee of confidentiality in form of trust rights to prevent a possible drain of know-how ($\geq 60\%$);
2. Regulation of a mutual utilization of the cooperation results ($\geq 50\%$);
3. Contractual arrangements ($\geq 50\%$).

When asked for the objections to cooperation, it becomes clear, that when cooperation is defined in a contract, only a small percentage consider the know-how drain to be a major co-operation obstacle.

The overall results of the charts presented here underline the importance of cooperation projects in stimulating both the participation of SMEs in international networks and facilitating the transfer of technology to the SMEs.

3.3.3 Results relating to the functional requirements of international networks

Part IV of the questionnaire deals with the role of transnational technology networks in meeting the challenge of globalization and internationalization. It was asked, what kind of services transnational technology networks would have to offer their partners in order to support them. Further, it was inquired on the incentives for the enterprises to go global. The answers to these questions give valuable hints regarding the creation of a most favourable environment for an active participation of SMEs in transnational technology networks.

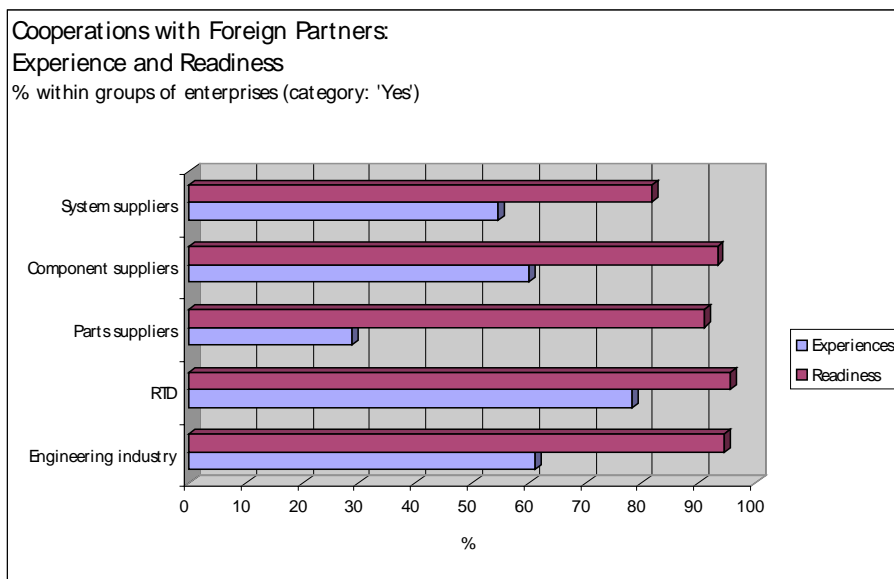


Chart 34: Cooperations with foreign partners. Experience and readiness. Analysed within groups of enterprises (category: 'Yes')

Analyzing the primary data set, it strikes immediately that with all kinds of enterprise groups the readiness to engage in cooperations with foreign partners is greater than respective experiences. This underlines the importance of assistance schemes facilitating transnational cooperations.

The gap between factual experiences and potential willingness is especially large in the case of parts suppliers. Mostly SMEs, these enterprises lack adequate tools and staff to manage transnational cooperations. Special assistance is needed to bridge the gap.

Technology poles, on the other hand, are leading with respect to both, experiences in and readiness for transnational cooperation. Furthermore, the gap between experience and readiness is the smallest, compared to the other enterprise categories.

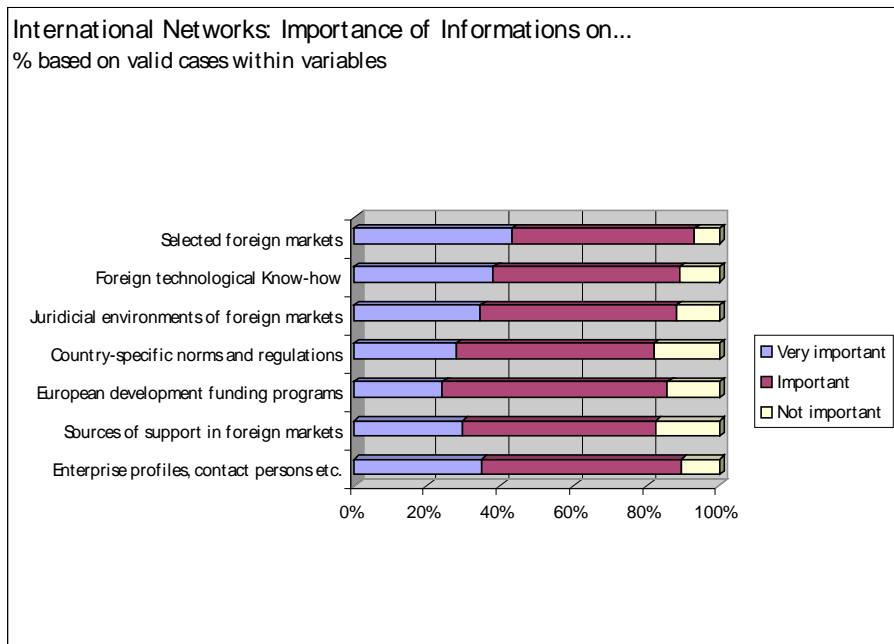


Chart 35: International networks: Importance of information services

As shown in chart 35 the enterprises rated the following information services as 'Very important' for international networks:

- 1. Information on selected foreign markets ($\geq 40\%$);
- 2. Information on foreign technological know-how ($\geq 35\%$);
- 3. Information on specific enterprises (enterprise profiles, contact persons etc.) ($\geq 30\%$).

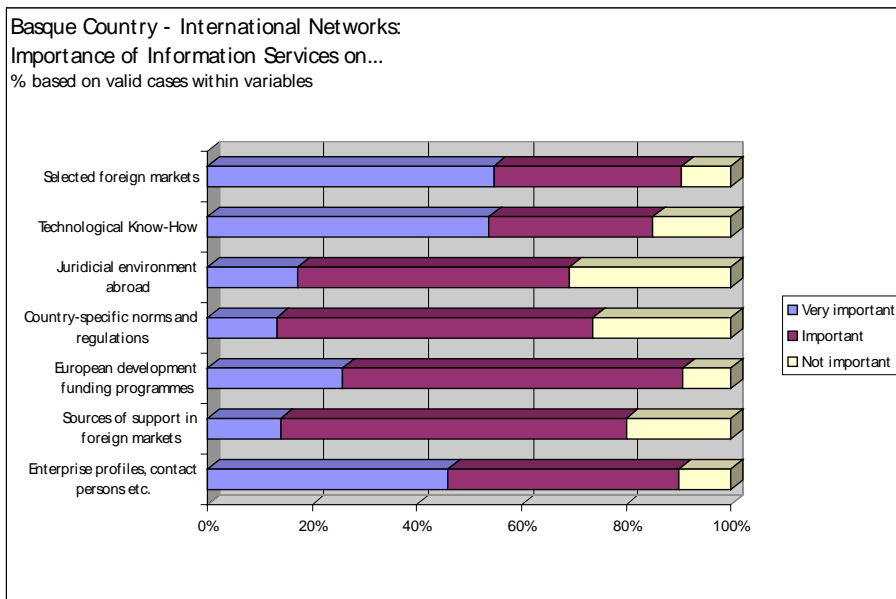


Chart 36: Basque Country – International networks: Importance of information services

The same question from the perspective of Basque enterprises in the Basque Automotive Cluster ACICAE shows that enterprises are preoccupied with roughly the same information services as their fellow colleagues in Austria and Germany.

Focusing on the category 'Very important' the chart 22 even more decisively points out the high importance attached to:

1. Information on selected foreign markets ($\geq 50\%$);
2. Information on foreign technological know-how ($\geq 50\%$);
3. Information on specific enterprise profiles ($> 40\%$).

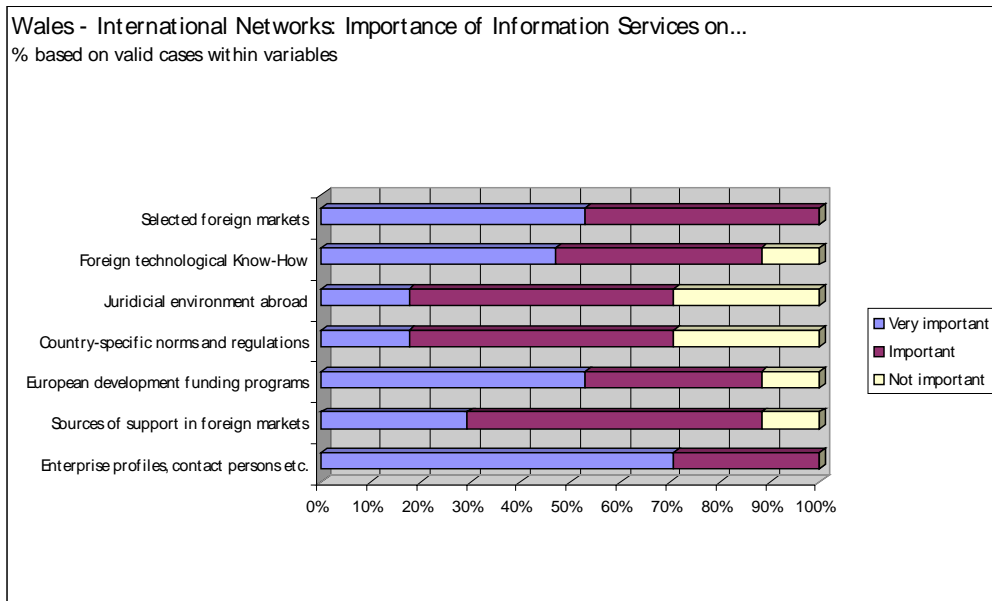


Chart 37: Wales – International networks: Importance of information services

A similar pattern can be extracted from the welsh sample, although European development funding programs appear to be somewhat more important:

1. Information on enterprise profiles, contact persons etc. ($\geq 70\%$);
2. Information on European development funding programs ($\geq 50\%$);
3. Information on selected foreign markets ($\geq 50\%$);
4. Information on foreign technological know-how ($\geq 45\%$).

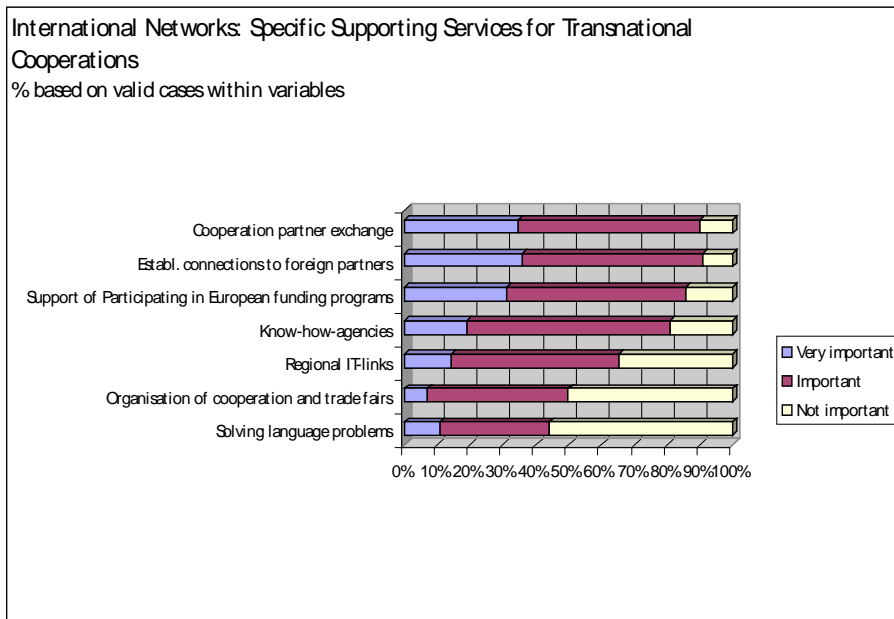


Chart 38: International networks: Specific supporting services for transnational cooperations

Focusing the ratings for the category “very important” chart 38 shows that the following three supporting services are considered by the enterprises as important in facilitating transnational cooperations:

1. Establishing connections to foreign partners ($\geq 30\%$);
2. Aid in finding foreign partners through a cooperation partner exchange ($\geq 30\%$);
3. Support of participation in European funding programs ($\geq 25\%$).

This result is related to the fact, that – as seen above - almost 50% of the enterprises in our sample already have made experiences with foreign partners and that 90% of them are prepared to cooperate with foreign partners.

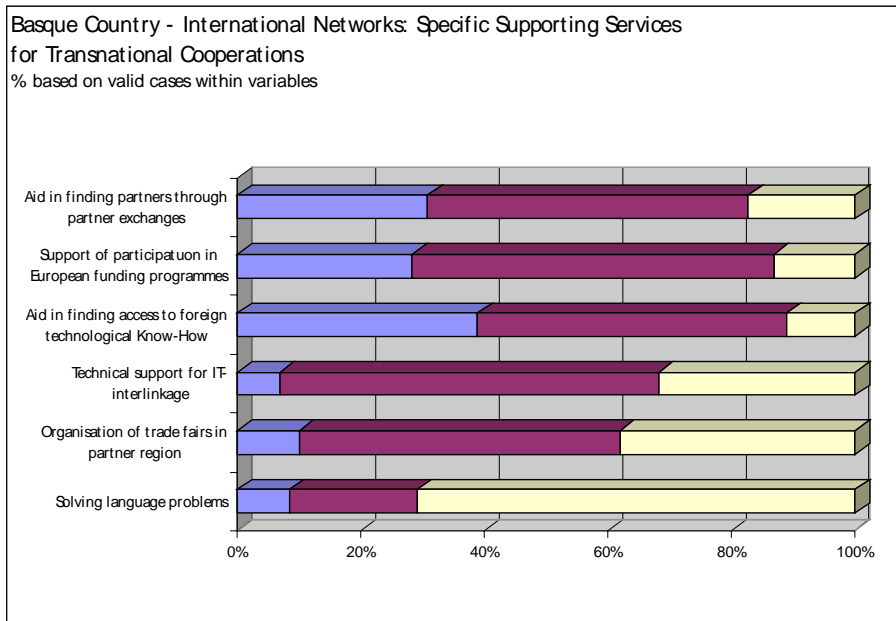


Chart 39: Basque Country – International networks: Specific supporting services for transnational cooperations

Taking a look at the preferences of the enterprises from Basque Country we find the following supporting services rated to be the most important:

1. Aid in finding access to foreign technological know-how (> 35%);
2. Aid in finding partners through partner exchanges (\geq 30%);
3. Support of participation in European funding programs (> 25%).

With respect to the establishment of a cooperation partner exchange and support of participation in European funding programs, the results extracted from the Basque sample are similar to the ones we obtained from our primary data set.

Finally we asked for the main incentives that motivate enterprises to participate in international networks:

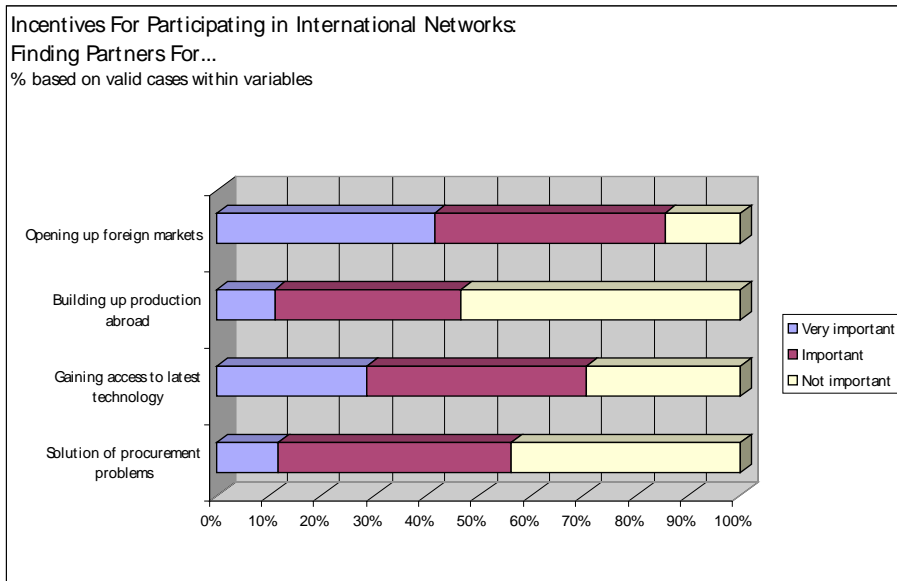


Chart 40: Incentives for participating in international networks

Based on inspection of the category 'Very important' the enterprises of the primary data set considered the following two aspects to be the most important:

1. Opening up foreign markets ($\geq 40\%$);
2. Gaining access to latest technology ($> 25\%$).

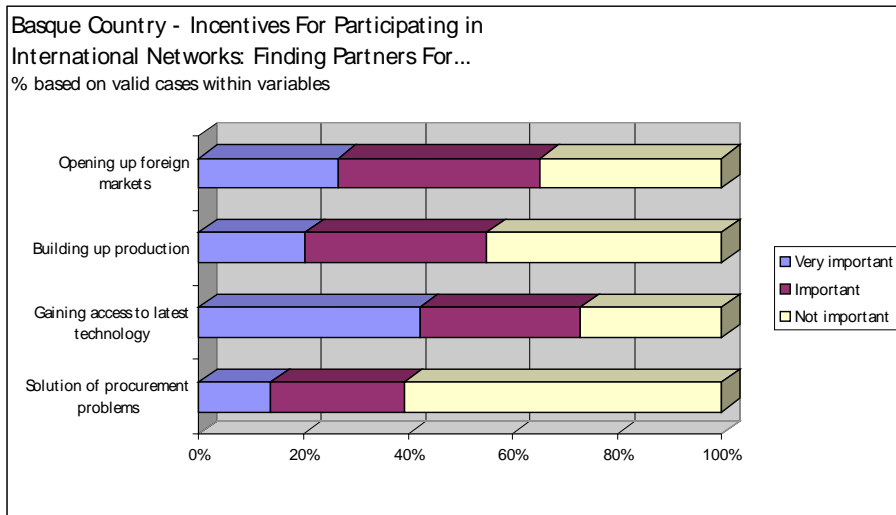


Chart 41: Basque Country – Incentives for participating in international networks

For the Basque enterprises the most important incentives are:

1. Gaining access to latest technology (> 40%);
2. Opening up foreign markets (\geq 25%).

That Basque enterprises apparently have a greater interest in building up production abroad can easily be explained by the fact that the Basque sample only contains three enterprise categories, wherein parts suppliers represent by far the largest proportion (56%).

3.4 Results of the network analysis

In response to the fact that questions dealing with social interactions between enterprises could not be included in the questionnaire, the approach to base the network analysis on the evaluation of completed co-operation projects between network partners was taken in coordination with the European Commission.

The analysis of cooperation projects as an important method to increase the success of networking also figured prominently under part 3 of the enterprise questionnaire. The results achieved by the network analytical preparation of the data thus support the questioning of enterprises in some crucial points and have partly born upon the data collected by means of the questionnaire.

The enterprises having participated in cooperative projects were classified according to their position along the production chain. The network analysis served to evaluate which kinds of partners have cooperated in these projects and which kinds of partners have cooperated more often than others in successful cooperation projects.

3.4.1 Choice of the sample for the network analysis

The number of ongoing or completed cooperations projects in the automotive networks under consideration varies between the networks.* In part, these differences reflect the differences in the life or project cycle of the respective clusters.

Cooperation projects take time to realize and usually last for a period ranging from 12 to 36 months. Thus, a mature cluster can be expected to have brought forth a higher number of cooperation projects than a young, maturing cluster. This is reflected by the fact that the VIA Nordrhein-Westfalen is characterized by a higher number of such projects than the relatively less mature Austrian clusters. In the framework of the VIA Nordrhein-Westfalen, which started in 1993, 55 formally structured and supported cooperation projects have been realized. The respective numbers of formally structured and supported cooperation projects for the ACStyria and AC Oberösterreich are much smaller.

For this reason the decision was taken to base the network analysis on a selection of cooperation projects from the Verbundinitiative Automobil Nordrhein-Westfalen. Only those cooperation projects and their partners were considered of which at least 3 had responded to the enterprise questionnaire. As a result, the sample of the network analysis was closely linked to the sample of the enterprise questionnaire. Missing details about other partners to the projects were added from other sources.

In due course the sample for the network analysis comprised data from 16 cooperation projects realized from 1993 to 1999 in the framework of the VIA

* In a cooperation project different independent enterprises are working together with a defined end on a temporary time base. Serving the solution of common problems, the result of the project contributes to strengthening the competitiveness of all the partners to the cooperation. Such cooperations can be divided into horizontal cooperations between potentially competing partners on the same level of the supply chain, vertical cooperations between partners on different levels of the supply chain and regional cooperations of locally connected partners.

Nordrhein-Westfalen. All in all, some 103 partners participated in these projects. The network analysis was run with the software package "UCINET 5.0".

3.4.2 The dimension of network centrality

The concept of network centrality focuses on enterprises occupying a central position in a network and thus can be regarded as a major channel of relational information. In the study on hand centrality is simply measured by the 'Degree' of an individual enterprise, i. e. the number of partners directly connected to it: The higher the value of an enterprise's 'Degree' the more contacts it maintains with other enterprises within the network or the more crucial a player it is. In contrast, enterprises with a relatively small value can be regarded as rather peripheral.

The overall 'Network Centralization' is an index measure to determine how centralized the degree of the whole set of enterprises is: The index reaches its maximum value of 100% when one actor is connected to all other actors within the network and the other actors interact only with this one. The index reaches the minimum value of 0 when all actors have the same 'Degree', i. e. the same number of relations, without any actor dominating the 'scene'. With a value of 21.68% the overall 'Centralization' within the network on hand is relatively low. The data matrix for the calculation of the network centrality is given in the annex of this report (8.4).

Due to the large number of enterprises the evaluation of each individual enterprise's centrality would lead to no clear results. The data has therefore been aggregated, i. e. centrality is examined within groups of enterprises.

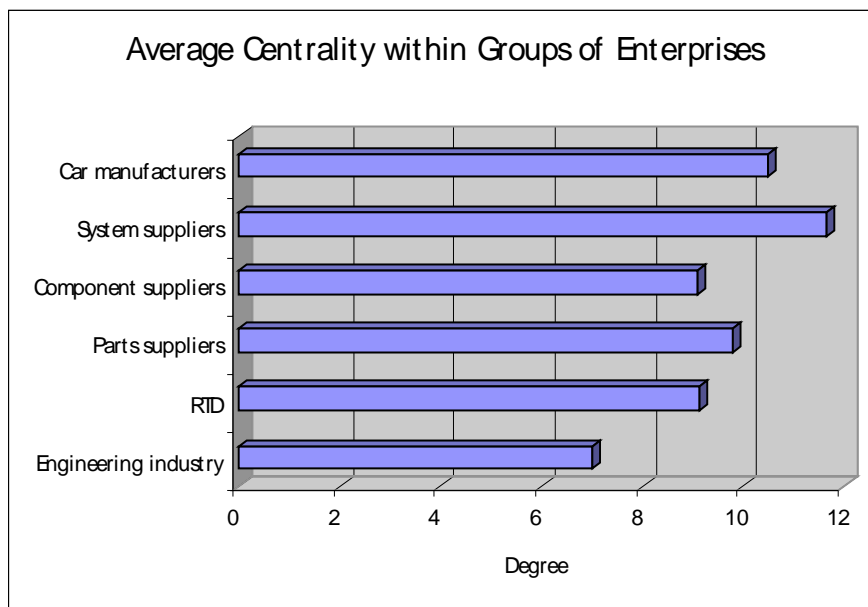


Chart 42: The average centrality of the key enterprise groups participating in a sample of 16 VIA cooperation projects

It results from the examination of the centrality within groups of enterprises (chart 42) that for the cooperation projects on hand the system suppliers are the key integrators of the network – they maintain the most contacts to other enterprises. They are followed by the car manufacturers in holding a key position.

3.4.3 The dimension of network density

The 'Density' of a network is determined as the proportion of possible relations between the network actors to those that are actually realized in the network. Density as a structural indice of a network is a measure of the distance between the different actors in the network. The number of relations within a network is limited by the number of the actors. Since the relation of an actor to himself is excluded from the analysis the maximum possible number of relations is determined by $N(N-1)/2$ with N being the total number of actors. The measure reaches its maximum value of 1 when all actors are connected with each other. If there are no connections between the actors, the measure assumes its minimum value 0.

In the network sample on hand there are 103 enterprises involved. We would thus arrive at a maximum possible number of 5253 relations. The 'Density' however amounts to 0.09 which means that only 473 relations have been realized by the enterprises. Thus, the 'Density' within the network can be regarded as rather low. The data input matrix for the calculation of the density is attached in the annex of this report (8.5).

3.4.4 Inferences from the network analysis relating to technology networking

An inference from the above analysis for the build up of a model is that due to the relatively low density no single partner from the network is in a position to manage the network. Such a network is in need of a network manager which maintains links to all other partners as otherwise information would not travel between the different partners the distance between them being too large.

4 A survey of European best-practice methodologies for the setting up, development and moderation of a technology network

4.1 Technology networking in Nordrhein-Westfalen: The Verbundinitiative Automobil Nordrhein-Westfalen (VIA NRW)

4.1.1 Origins of the Verbundinitiative Automobil (VIA NRW)

With some 200,000 employees and about 800 supply firms, the automotive industry is one of Nordrhein-Westfalen's (NRW) economic strongholds. About a third of Germany's motor industry is based in the region. More than 85% of the automotive suppliers have fewer than 500 employees, giving the state a significant small business potential.

Ford, Opel and DaimlerChrysler all have plants in the state. Producing at three different locations in NRW the Ford-Werke AG alone employs some 26,000 persons. The second most important car manufacturer in terms of employment is the Adam Opel AG in Bochum with a workforce of about 15,000 followed by the DaimlerChrysler AG with a staff of 4,500 in its manufacturing plant for commercial vehicles.

Against the background of a recession in the automotive industry in connection with soaring unemployment levels and long-term changes in the supply chain, the state government of NRW decided to confront the situation by a cluster-oriented industrial policy.

To support the structural change of the region and to improve the competitiveness of the regional suppliers of the automotive industry, particularly in the case of the SMEs, the Ministry for Economics and Small Business, Technology and Traffic of the Land Nordrhein-Westfalen (MWM-TV) brought into being the „Verbundinitiative Automobil NRW“ (VIA NRW) at the end of 1993.

The primary aim of the VIA NRW has been to support practice-oriented cooperation projects between car manufacturers and suppliers as well as between the individual suppliers of the automotive industry themselves. The initiative got representatives of the automobile manufacturing and supply industries, the chambers and associations, labour unions, banking firms, science and ministries round the conference table to develop solutions and to contribute to their implementation.

Originally, it was planned to let the VIA NRW run out in early 1999 after a period of 5 years. The experience from the initiative, however, has shown that especially for SMEs support concerning the access to information and the preparation of cooperation projects, etc. will still be necessary. Due to the success of the cooperation projects, which have already been carried out and to safeguard the informal network of the participating companies, the VIA NRW was converted into an independent body with an information platform and an enterprise network.

To provide SMEs with the necessary infrastructure for networking, under the heading „VIA new“, the VIA NRW is to be resumed in modified form under a new sponsorship model. By implementing the developed tools, e.g. information systems and a

company database, the management of the initiative was assumed by the partners themselves.

It is envisaged to build up a self-managed consulting and support infrastructure offering supraregional advisory services for automotive suppliers. By the participation of agiplan it is guaranteed that the know how compiled in the framework the VIA NRW continues to be available to all prospective customers.

4.1.2 Mission and institutional status

The main objective of the VIA NRW has been to work out practice-oriented cooperation projects between manufacturers and suppliers, to concentrate forces, and to activate potentials concerning quality and performance unexploited up to now.

A clear emphasis has been put on the support of practice-oriented cooperation projects between car manufacturers and suppliers as well as between the individual suppliers of the automotive industry themselves. Financial support by the state government was made available to help SMEs to translate innovations into action. The results of the concluded projects and the experiences gained were spread and used for an exchange of knowledge.

The success of the initiative can be measured along the following lines:

- intensification of the communication between parts suppliers, component suppliers, system suppliers and automobile manufacturers;
- sensitization for necessary actions within the automotive industry;
- improvement of the competitiveness of suppliers through the use of the knowledge gained out of the cooperation project handling;
- strengthening of the competitiveness of SMEs through facilitation of the access to new markets, the execution of international activities and the realization of innovations.

4.1.3 Network partners

Approximately 750 companies and technology poles participated in the activities of the initiative and used the connections offered. Between 1993 and 1999 some 283 cooperation projects were dealt with, 55 of which were supported by the state of Nordrhein-Westfalen. In these projects some 200 enterprises and technology poles cooperated actively.

A closely set network of science parks – called technology centres – provides the overall conditions for technology oriented business foundations and spin-offs in the region. The Aachen region with over 30 institutes at Aachen university as well as Ford's first European research centre is a key centre of automotive research in Nordrhein-Westfalen.

As part of the innovation network of research and transfer facilities, more than 60 technology centres together with leading training and research facilities have provided the automotive suppliers with RTD services. At the state's leading

universities and research institutes task forces were established with the intention to ensure that the latest technological developments were made available to the partners in the cooperation projects.

4.1.4 Financing

With the establishment of the VIA NRW, the MWMTV took over the financing of the coordination requirements for the technology network. Agiplan received the order for the management of the initiative without, however, being in charge of each single cooperation project.

In the framework of the "VIA new" some of the services offered to the automotive suppliers will have to be paid for by the customers. The members will receive an extensive supply of basic services for their contribution.

4.1.5 Organization

Management of the VIA NRW was assigned to the agiplan Aktiengesellschaft while the overall coordination of the initiative was with the MWMTV. The task of the advisory committee of the VIA NRW was to recognize development trends, to propose strategies and to secure the favourable reception in the automotive industry and its wider environment and to act as a multiplier. This committee met about three times a year.

The advisory committee consisted of universities, higher (technical) institutes, Fraunhofer Institutes, etc. Car manufacturers and tier 1 suppliers such as Volkswagen, Ford and Opel, interest groups such as the Federation of German Automobile Manufacturers (VDA), the Steel-Association, trade-unions, as well as public institutions such as the Chambers of Commerce, the professional crafts associations were also represented.

A substantial modification to the previous organizational model is that the "VIA new" will be driven by several partner organizations. Management of the VIA was transferred from the MWMTV to the partner organizations (self-management). At present the following partner organizations provide for the start of the VIA into the second phase:

- the regional chambers of commerce and industry;
- the "Arbeitsgemeinschaft Zulieferindustrie" in Hagen;
- the Fachverband Metall NRW (professional association) in Essen;
- the technology centre CarTec in Lippstadt;
- the agiplan Aktiengesellschaft in Mülheim a. d. Ruhr.

4.1.6 Services and Activities

Services and activities have involved the following areas:

- *Information and communication:* In order to comply with future requests for possible projects or to recognize a potential partner, corporate and project data were introduced into a well-defined information platform in consultation with the participating companies. Every cooperation project was documented; its results made available to the other partners. A catalogue figuring the economic and technological profile of the region's automotive industry was developed.
- *Cooperation:* The initiation, development and support of cooperation projects between companies and technology poles (e.g. in the areas of RTD, production, marketing, logistics, qualification, organization and information technology, internationalization). Participant companies were offered the following services:
 - Project-identification, project-structuring and project-description;
 - Assistance with partner search;
 - Formation of the cooperation for project completion;
 - Check of the available financial support by the state government;
 - Support for filing an application for obtaining supplementary funding;
 - PR-support for project implementation in the form of marketing promotion.
- *Internationalization:* The international representation of the VIA NRW, participation in international cooperation exchanges, assistance of companies in the internationalization process, the processing of inquiries from abroad concerning cooperation partners and company locations, networking with foreign automotive initiatives.
- *Marketing and PR:* In the press, in technical magazines, at professional associations, at happenings, during public events and on fairs, the VIA NRW instructed and explained the usefulness of collaboration. The spread of cooperation projects, which also appears in other sectors of the economy, takes place by means of publications and the presentation at the appropriate meetings under the patronage of the Ministry.

4.1.7 Cooperation projects in the framework of the VIA NRW

Innovative cooperation projects within the framework of the VIA NRW were promoted and have received public funding from the state government. Joint projects of the cluster partners have started as early as 1993. Companies of any size which are based in Nordrhein-Westfalen were able to participate in such projects. As a rule, in the framework of the VIA a cooperation project involved a minimum of four to six enterprises, RTD or qualification institutions. Most of the enterprises involved had to be SMEs.

Any other enterprise was free to participate without, however, being entitled to supplementary funding by the state government to the same amount as the SMEs,. The costs for the preparation and realization of innovative cooperation projects were partly borne by the enterprises and partly by the state government. While SMEs were entitled to supplementary funding amounting to up to 40% of project costs, other enterprises have received much less. Car manufacturers were not entitled to funding. Thus, the aim to strengthen the competitiveness of the regional SMEs also by enhancing their access to technology was ensured.

Within the framework of the VIA NRW cooperation projects have been funded in the fields of technology and logistics, qualification and quality, organization and information technology, accounting, and cooperations.

In a period of five years 283 projects were dealt with. The state of North-Rhine-Westphalia supported 55 of these projects with about 20 mio. Euro. Some 250 cooperation partners with in all about 60,000 employees were involved in the realization of these projects.

Apart from the support for the project-ideas, which were introduced by the companies, the coordination of the network also identified some workable projects. Based upon the detected market requirements, companies were addressed directly to compile and offer corresponding solutions in the framework of cooperation projects.

4.2 Technology networking in Styria: The ACStyria

4.2.1 Origins of the ACStyria

Styria, and especially the area around Graz, is on the threshold of becoming a major production site of the European car industry. The automobile cluster Steiermark, the ACStyria, combines regional efforts towards strengthening the international competitiveness of the regional automotive industry.

The automobile cluster Steiermark goes back to a political initiative by the Styrian Minister of Economic Affairs. Research undertaken in 1994 had identified four highly dynamic economic sectors in Styria suitable for initiating a cluster. One of them, the “traffic and transport” sector was deemed to have the greatest potential to lead to success and thus, to serve as a pilot cluster. A feasibility study undertaken early in 1995, however, concluded that inclusion of the whole traffic and transport sector would surpass capacities. Therefore, it was recommended to focus the pilot cluster process on its automotive branch.

The further development process of the ACStyria was mainly driven forward by the Steirische Wirtschaftsförderung (SFG) - the Styrian business promotion agency -, and the Federation of Austrian Industry in Styria (FAI). In the following, the cluster development team succeeded in enlisting the support of leading Styrian automotive companies – notably of AVL List (system supplier, workforce of 2,000), the Steyr-Daimler-Puch Fahrzeugtechnik AG (car manufacturer, workforce of 4,500) and the Eurostar Chrysler Corporation (car manufacturer, workforce of 1,600). The latter leading companies understood the cluster as a chance to improve their supply chain.

Other companies were also involved in the process of drafting proposals for the design of the ACStyria, so as to ensure that the companies themselves would be able to gain maximum benefit from participating.

In spring 1996 the Styrian Minister for Economic Affairs decided to support the ACStyria and guaranteed public funding for a period of two years starting in August 1996. Management of the ACStyria was laid in the hands of the SFG with the agiplan Aktiengesellschaft acting as an external consultant. Project sponsorship of the SFG ended in June 1999.

With the establishment of the ACStyria Autocluster GmbH in August 1999 management of the ACStyria was transferred from the SFG to the partners of the ACStyria. The automobile cluster Steiermark was transformed into a self-managed organization. The organizational form chosen for the new institution is a limited company (GmbH). Partners of the limited company located in Graz are the following key enterprises from and related to the automotive sector:

- AVL GmbH
- agiplan Aktiengesellschaft
- Federation of Austrian Industry in Styria (FAI)

- Krenhof Industrieprodukte GmbH
- TCM Tool Consulting & Management GmbH

4.2.2 Mission and institutional status of the cluster organization

The enhancement of cooperations between companies and the promotion of intercompany learning rank among the primary goals of the ACStyria.

The ACStyria team has consisted of a project leader from the SFG and several external consultants.

4.2.3 Network partners

Before the organizational reinstitution in 1999 the ACStyria counted more than 190 partner companies with a total workforce of about 13,000. All companies active in the automotive sector as well as technology poles and branch institutions of relevance are regarded as potential members of the ACStyria. In the future, it is planned that all companies having been members of the network will sign a service contract with the newly established ACStyria Autocluster GmbH.

The close entwinement with the research and innovation landscape of the Steiermark, especially the automotive engineering college of the Technical University of Graz, the Joanneum Research and the Montanuniversität Leoben as well as other facilities has always been considered as crucial.

4.2.4 Financing

From September 1996 to June 1999 financing of the ACStyria was based on subsidies from the state budget of the Federal State Styria. This has changed with the establishment of the ACStyria Autocluster GmbH in August 1999. The ACStyria now essentially finances itself by membership dues of the partner companies. The transformation into a self-managed network, however, is eased by interim funding from the Styrian government running up to 2001. This temporary subsidy allows to maintain services up to the point when expenses can be covered through membership dues.

The height of the annual membership dues depends on the annual turnover of the respective members. According to the height of their annual turnover, enterprises were classified into four categories; the respective membership dues start at a level of about Euro 500 and range up to about Euro 7,250. Members of the ACStyria receive an extensive supply of basic services for their contribution.

4.2.5 Organization

Day-to-day management of the network was with the SFG. Strategic issues, however, were dealt with by the advisory committee of the ACStyria. The steering and advisory function of the advisory committee lay mainly in setting the strategic

guidelines, acting as an arbiter of interests, and as a multiplier both within the network and in its environment.

The advisory committee gathered representatives from the leading companies, suppliers and SMEs, research institutions, car manufacturers such as BMW AG and VW-Audi AG as the most important customers, the Federation of Austrian industry in Styria, the social partners as well as representatives from the Styrian government.

4.2.6 Services and activities

Both the adjustment of production to the changes in the world sales markets and modifications in the structure of the supply chain of the partner enterprises require an appropriate reaction at regional level. The services of the ACStyria were divided into the following main areas:

- *Information and communication:* The ACStyria acts as an information and communication platform for the automotive sector in Styria and adjacent regions. Information services for the automotive sector include, e.g.: information to its members about current trends and expert knowledge on upcoming market trends, information on European development funding, organization of study trips and visits to companies, Internet presentation of the cluster and its companies, implementation of a database of the partner companies, creation of a periodical newsletter, firm-specific market studies.
- *Cooperation:* The initiation, development and support of cooperation projects between companies, especially in regard to the areas of RTD, qualification and organization. For this reason, a cooperation partner exchange was maintained.
- *Marketing and PR:* The provision of ACStyria information material to the general public, the positioning of the ACStyria both nationally and internationally, PR activities (Internet presentation of the cluster and its companies, development of the ACStyria logo, etc.)
- *Qualification:* Drawing upon the expertise of the leading companies and expert advice, the ACStyria has organized workshops on current topics which were free for members. A wide range of educational possibilities such as special training and advisory schemes were made available. Selected training courses arranged by leading companies were opened to the employees of all cluster partners. Firm-specific consulting and coaching services also rank among the currently available or planned services.

4.2.7 Cooperation projects in Styria

Innovative cooperation projects within the framework of the ACStyria are promoted by the ACStyria and receive public funding from the Styrian government. Joint projects of the cluster partners have started in late 1997.

The costs for the preparation and realization of innovative cooperation projects are partly borne by the enterprises and partly by the regional government. Funding is provided primarily to those projects which have a sustained positive influence on the

economic fabric and help to strengthen the competitiveness of the Styrian automotive sector.

All in all, some 50 topics of particular relevance to the automotive sector were treated in workshops. From this workshops numerous cooperation projects evolved.

4.3 Technology networking in Upper Austria: The Automobil-Cluster (AC)

4.3.1 Origins of the Automobil-Cluster (AC)

The automotive sub-supplier industry represents an important economic sector in Upper Austria. For its sustained support, the decision was taken to set up an automotive sub-supplier network. The Automobil-Cluster in Upper Austria (AC) started operations in July 1998.

As early as 1993 a study undertaken by the Österreichisches Forschungszentrum Seibersdorf GmbH had identified the automotive sector (road vehicles, motors and components), together with five other industrial areas, as an industrial complex with a high degree of interlinkage. It was concluded that the economic success of these industrial clusters would be dependent upon their ability to develop and market innovative products in the framework of cooperations, also and especially with technology poles.

In mid-1998 the "Strategic Programme Upper Austria 2000+" laid down strategic guidelines and measures for Upper Austria in the areas of technology, professional qualifications and location marketing. A clear emphasis in the field of technology was put on a cluster-oriented technology and innovation policy promoting the innovation potentials of enterprises, especially SMEs, through the intensification of cooperations. As a consequence, pilot actions to establish cluster organizations in selected industrial clusters, among them the automotive sector, were adopted.

The Oberösterreichische Technologie- und Marketing Gesellschaft mbH (TMG)* is responsible for the Automobil-Cluster in Upper Austria and on behalf of the Upper Austrian government, jointly implements all measures for the consolidation of the sub-supplier network in the automotive sector with the Upper Austrian Chamber of Commerce, the Confederation of Upper Austrian Industry and the agiplan Group. Since March 1999 the TMG has also been responsible for the Austrian "Cluster Diesel Technologie" aiming at a concentration of the Austrian know-how and competencies in the diesel sector.

Approximately 40% of the Austrian production value of the automotive sector is realized by Upper Austrian companies. The turnover of the automotive sector in Upper Austria is Euro 5 billion per year, with more than 50,000 persons employed. The largest Upper Austrian partner companies of the AC in terms of turnover are BMW Motoren GmbH, VOEST ALPINE Stahl, Steyr Nutzfahrzeuge AG, Bombardier Rotax, and Rosenbauer International AG.

4.3.2 Mission and institutional status

The Automobil-Cluster (AC) is a network of leading industrial companies and their direct and indirect suppliers in the road vehicle area, which includes cars, trucks, special vehicles and motor cycles.

* On the one hand the Upper Austrian Technology and Marketing Company (TMG) was established with the aim of attracting investors for the establishment of new companies and the expansion of existing capacity, and on the other, it is supposed to further the innovative strengths of regional companies.

The AC aims mainly at the enhancement of cooperations between companies, the improvement of the general conditions in the automotive sector by means of technology transfer, the strengthening of the competitiveness of the regional suppliers, the safeguarding of regional employment and the location of new enterprises in the region. Special attention is given to the needs of small and medium-sized companies (SMEs). All actions within the framework of the AC have been financed by the province of Upper Austria.

The Upper Austrian cluster team consists of 6 full-time employees from the TMG, experts from the agiplan Group and representatives of the Upper Austrian Chamber of Commerce.

4.3.3 Network partners

In late 1999 the AC Oberösterreich counts 272 partners. All companies either manufacturing road vehicles i.e. cars, trucks, special vehicles and motorcycles, or serving as a sub-supplier on the various supply and services levels, as well as technology poles are regarded as potential partners in the AC. The great majority of the partners of the AC are SMEs. Up to 80% of the partners have less than 250 employees.

Partnership starts with the completion of the AC questionnaire concerning company data and economic and technological performance profile and registration of the data in the AC database. Partnership is free of charge.

The AC Oberösterreich maintains close relations to the "Technologienetzwerk OÖ" (Technology Network Upper Austria) – a network of technology, university and research centres facilitating increased cooperation between science and technology. Both private and public research institutions are integrated into the network, which provides a telecommunications infrastructure that links the most important know-how centres within the region, from the Ars Electronica Center and the Upper Austrian Chamber of Commerce to educational establishments, polytechnic institutions, universities, research centres and technology parks. The "Technologienetzwerk OÖ" is also coordinated by the TMG.

4.3.4 Services and activities

The Automobil-Cluster serves both as a coordinator as as an information and communications platform for regional technology networking. Services and activities involve five areas of activity:

- *Information and communication:* A database with company information of all AC partners, presentation of the AC on the internet, an AC system catalogue on the virtual cluster car, plant tours, cooperation and sub-supplier exchange, a monthly news mail concerning the automotive market and the AC partners, a quarterly automotive paper;
- *Cooperation:* The initiation, development and support of cooperation projects between companies, especially in regard to technology transfer (e.g. in the areas

of RTD, production, marketing, logistics, qualification, organization and information technology, internationalization).;

- *Internationalization*: The international representation of the Automobil-Cluster, participation in international cooperation exchanges, assistance of companies in the internationalization process, the processing of inquiries from abroad concerning cooperation partners and company locations, networking with foreign automotive initiatives;
- *Marketing and PR*: The provision of AC information material, the positioning of the Automobil-Cluster both nationally and internationally as a top automotive region, PR activities, newspaper interviews, visiting and hosting of trade fairs;
- *Qualification*: Making available a wide range of educational possibilities, specialist events, workshops, intercompany learning, study trips.

4.3.5 Cooperation Projects in Upper Austria

Innovative cooperation projects within the framework of the AC are promoted by the management of the AC and receive public funding from the Upper Austrian government.

Companies of any size can participate in such projects. In the framework of the AC a cooperation project involves a minimum of three AC partners, RTD or qualification institutions. At least one of the companies involved must be a small or medium-sized enterprise (SME) and at least one of the companies must be based in Upper Austria. Thus, the transfer of technology to the regional SMEs is ensured.

Within the framework of the Automobil-Cluster cooperation projects have been funded in the fields of RTD, production, marketing and sales, logistics, organization and information technology, qualification and internationalization. Above all, funding is allocated to initial development work, feasibility and marketing studies, consulting and the preparation of manuals.

The project partners conclude a cooperation agreement for the planned project. One of the project partners undertakes the co-ordination tasks relating to an application, the completion of the project, documentation and the publishing of results, and therefore serves as the project co-ordinator.

The costs for the preparation and realization of innovative cooperation projects are partly borne by the enterprises and partly by the regional government. The volume of funding provided primarily depends on the sustained positive influence of the project upon the innovative strength and competitiveness of the Upper Austrian automotive sector and on the involvement of small and medium-sized enterprises. At a maximum, funding will amount to 40% of eligible costs of the individual partners. The maximum grant totals ATS 500,000 (Euro 37,500) per project partner.

4.4 Technology networking in the Nord-Pas de Calais

4.4.1 The regional supply chain

Nord-Pas de Calais is one of Europe's leading automotive regions and a focal point of car manufacturing in Europe. Renault is the leading car manufacturer in terms of employment with a workforce totalling 14,000. Next is the joint venture between Peugeot and Fiat producing the M.C.A. By 2001 Toyota will join them in producing its Yaris model. It is calculated that from 2005 on more than 1 mio. cars will be manufactured in the region per annum.

In the region a strong supply base has developed to serve the needs of the car manufacturers. All in all, more than 40.000 people are employed in the automotive sector, which figures more than 150 companies. About 60 of these are ranked as tier 1 suppliers.

4.4.2 Intermediary organizations of the automotive sector

The Association Régionale de l'Industrie Automobile (ARIA), the interest association of the regional car manufacturers, is a key player in automotive networking. The objective of the ARIA is promote the interests of the automotive industry and, also, to improve the regional supply base. There are six active founding members of the association, all of them car manufacturers and system suppliers (Francaise de Mécanique, M.C.A., Renault, Sevelnord, Peugeot SMAN, S.T.A). Together these enterprises represent some 50% of the regional automotive industry in terms of employment. Among the advisory members of the association count various public bodies and technology poles.

Membership of the ARIA is restricted to car manufacturers and tier 1 suppliers which have engaged in an active inter-company learning process. However, a mechanism which ensures the dissemination of relevant information to the regional SMEs is lacking. Nevertheless, being concerned about the market situation of regional suppliers and a threatened regional supply base, ARIA is offering help to SMEs. In collaboration with other regional bodies, notably the Chambre Régionale de Commerce de l'Industrie Nord-Pas de Calais (CRCI) and the regional government, ARIA is offering advisory services to SMEs in the fields of management and organization. Moreover, ARIA is prepared to support any initiative which would help regional SMEs in strengthening competitiveness through networking.

Nord-Pas de Calais Développement (NPCD) is the investment promotion agency for Northern France. Its main tasks are to attract foreign investment and to help foreign investors to locate in the region. Although NPCD has no formal mandate to support regional enterprises, the agency is getting increasingly involved with the local automotive supply chain and networking activities. Due to the fact that leading foreign investors have recently demanded that a sufficient regional supply base is in place as a precondition of investment, NPCD is becoming increasingly concerned with the regional suppliers up to the point of attracting additional suppliers in case the regional supply chain is incomplete.

Another important intermediary organization exists in the field of RTD. Since 1984 the Regional Transport Research Group (GRRT) tries to bring together technology poles and industry by providing training in modern car industry techniques and by responding to the needs of suppliers in the areas of testing, expert knowledge and technical assistance through the creation of a network of test and development centres.

The GRRT consists of six technology poles (CREPIM, CRITT M2A, IMFL ONERA, IEMN, ECL and C3T) providing services to the automotive industry especially in the fields of energy saving, comfort, security and materials. The GRRT is active in promoting and marketing its services with the car manufacturers and subcontractors. A catalogue of the services available from the technology poles lists their know-how relating to the automotive technology, their equipments and facilities as well as major cooperation schemes.

Other technology poles such as the Université de Valenciennes have started projects to improve the situation of regional suppliers by stimulating networking activities on the basis of new communication technologies. In the framework of the EU-financed "Transtech" project situated in the field of transport technology, network structures for the support of the product and process innovation management of SMEs are established.

Examples of horizontal cooperations between different enterprises within a certain geographical scope are complementing regional networking activities. Several leading automotive suppliers such as NAMKEY, Avvon, Boursault, Bridgestone, Société de Transmission Automatique and others have combined forces to jointly put in place and manage a research centre (CRITT M2A - Research centre for innovation and technology transfer in engines and automobile acoustics), which is providing centralized services for the partners.

The Centre aims to facilitate technology transfer and possesses the whole range of testing required for the development of the complex functions which make up automobile engines, as well as for analysing and acoustically optimising a complete vehicle or one of its component parts. It was constructed by drawing upon local, regional and European resources and is owned by public bodies such as the University of Bruay and the Communauté du Bruaysis. CRITT M2A is an important link in the regional technology transfer process between industry and universities, offering in-service training to students at the end of their studies in automobile vibro-acoustics.

As a result of the common undertaking, the partners are enjoying testing facilities comparable to car manufacturers. The founding companies of the Centre all contribute to its maintenance through membership fees. Because a separated private area enables the companies to work in strict confidentiality, the Centre can also be regarded as a successful example of a cooperation between potential competitors, where a solution to confidentiality problems was able to be found.

4.4.3 Prospects for regional technology networking

There are very promising starting points of regional technology networking in Nord-Pas de Calais. Regional technology networking activities have grown bottom-up and

encompass a wide range of institutions and companies. Intermediary institutions, technology poles and important companies, all serving their best interest, have acted to set up common associations such as the ARIA, networks such as the GRRT or other common facilities such as the CRITT M2A serving their best interest. Thus, the car manufacturers, the leading suppliers and the technology poles all have their own institutions.

However, although regional suppliers have already publicly deplored the lack of information from the part of the local car manufacturers, there is still no collective body uniting car manufacturers, the majority of suppliers and technology poles. The interests of the regional SMEs are not yet sufficiently represented through the existing institutions. The regional Chambers of Commerce and NPCD are concerned with the small suppliers but they lack the formal mandate and/ or the political and financial resources to put in place a more formalized technology network.

With no single focal point for collective action along the regional supply chain available, there is no infrastructure for inter-company learning or match-making services in place. The existing initiatives and institutions are not competing – they all have clearly delimited competencies. There are drawbacks to this. Firstly, none of the existing institutions is encompassing in terms of integrating all regional parties. Secondly, none has a clear focus on the small suppliers. Thirdly, these institutions interact without an overarching coordinator.

Therefore, what is still needed is an initiative for linking up the existing initiatives. Such an unified, neutral platform for technology networking would function as an umbrella organization connecting the existing initiatives. Additionally, such an initiative should be equipped with the mandate and the resources to reach down to the SMEs and set them into connection with the car manufacturers, the tier 1 suppliers and the technology poles. This would put into place the necessary infrastructure for reaping the benefits of participation in a transnational technology network.

4.5 Networking in the Basque Country: The Agrupación Cluster Industrias Componentes Automoción Euskadi (ACICAE)

4.5.1 Origins of the Basque Automotive Cluster

In the Basque country a formally institutionalized automotive cluster organization exists with the Agrupación Cluster de Industrias de Componentes de Automoción de Euskadi (ACICAE).

The cluster approach towards industrial policy in the Basque Country made its appearance roughly at the turn of the last decade. Against the backdrop of a recessive economic cycle, the Basque government, the employers' association and the trade unions agreed upon a stable multi-annual framework for industrial policy. Under the "1991-1995 General Framework of Action of the Industrial Policy" a competitiveness programme based on the "clusters" methodology was adopted.

At the end of the 1980s and in the early 1990s the main sectors of the Basque economy had been analysed by governmental task forces and committees of experts. The conclusions led to the creation of so-called "cluster groupings" in different industries. Among others, the automotive sector was identified as a priority cluster. In each of the priority clusters work groups gathering representatives of the enterprises concerned, the government and RTD institutions under the chairmanship of an elected president were established with the task to identify strategic development scenarios and actions.

The Automotive Cluster Work Group was established in March 1992. In its conclusions of Dec. 1992 the recommendation was given to set up an association with the objective to work for the automotive suppliers. As a result, ACICAE, the cluster grouping in the automotive sector, was constituted in June 1993 by 12 founding companies. By September 1999 ACICAE has evolved into a grouping of 27 leading automotive firms with a total workforce of around 12,200.*

In the Basque terminology a cluster is defined "as a series of economic activities related to a product in a specific geographical location" whereas a cluster grouping describes a network of enterprises from the cluster acting as a collective body for the cluster.

In terms of turnover and employment about a quarter of the Basque automotive industry is organized within ACICAE. In total, the Basque automotive cluster comprises more than 260 firms with a total workforce of some 50,000 people. It contributes to more than 25% to the Basque GDP. The development of sales of the Basque automotive suppliers is dynamic; in relation to the world turnover with vehicle and passenger cars it has risen twice as fast since the beginning of the 1990s.

Some idea of the industry's importance can be gained from the fact that the turnover of Basque automotive suppliers accounts for 30% of Spain's automotive industry. Major car manufacturers located in the region include DaimlerChrysler producing

* There are now 10 clusters groupings in the Basque Country: aerospace, the automotive industry, white line goods, machine-tools, knowledge in business management, energy, the environment, ports, paper and telecommunications. They were established over the period from 1992 to 1997.

both its Vito van as the Multi Purpose Vehicle, the Class V, as well as the bus manufacturer Irizar.

4.5.2 Mission and institutional status

ACICAE's main mission is to enable companies from the cluster to work together on improving levels of competitiveness in the Basque automotive industry through joint inter-business activities oriented towards collaboration with vehicle manufacturers and others suppliers.

On a regular basis, ACICAE discusses measures to support the automotive industry with the public authorities. Strategic decisions in the field of industrial policy are discussed both with the trade unions and the cluster groupings. Thus, ACICAE, while representing the particular interests of its members also acts as an intermediary between the companies and the government. While the companies have a voice in the definition of industrial policies through the association - in the fields of technological development and quality regular meetings are hold with the Basque authorities - ACICAE also serves as a vehicle for the diffusion of governmental policies to the companies. Thus, ACICAE is also charged with functions similiar to an interest association.

4.5.3 Network partners

By late 1999, ACICAE has evolved into a grouping of 27 leading automotive firms with a total workforce of around 12,200. The membership of ACICAE is composed of parts suppliers, component suppliers and system suppliers. There is, however, one important difference to other automotive clusters. For fear of being dominated by the resourceful car manufacturers, the latter are barred from being members. Only suppliers are welcomed as customers of the organization.

The reason for this resides in the dual organizational character of the grouping: While ACICAE's primary objective is to define and establish actions in order to improve the Basque Country automotive suppliers' competitiveness, the association also acts as a intermediary organization representing the interest of the suppliers both vis-à-vis the government and the car manufacturers. Thus, ACICAE enjoys a higher degree of institutional autonomy than comparable organizations.

Even if only 27 of the 260 Basque automotive companies are members of the cluster grouping, this does not impinge upon the effectiveness of the organizational model. Firstly, the member companies of ACICAE belong to the most important regional suppliers in terms of employment and economic clout; there are thus leading representatives of the industry on the whole. Secondly, ACICAE does not only provide services to the member companies. Invitations to participate in events are extended to all automotive suppliers as horizontal cooperation is promoted throughout the industry.

The link to the regional technology poles is provided notably through the Basque Network of Science and Technology. The network which comprises 9 technological centres, 4 sectorial centres, 3 laboratories, 4 universities, 9 R&D Management Units,

2 public investigation organisms and 8 intermediary organisms is providing support to the suppliers.

Also, a link is provided with suppliers of raw materials, machine-tools and capital goods, as well as service firms (engineering companies, consultancies and technology centres), and the Basque authorities, notably the Basque Government Department of Industry, Agriculture and Fishing.

4.5.4 Financing

The financing of ACICAE rests on contributions from different sources. Roughly, the division between the financial flows is as follows:

- 1/3 of funds are membership fees collected from the member companies;
- 1/3 of funds are charges for the provision of specific services to enterprises;
- 1/3 of funds are grants from the government and international organizations.

4.5.5 Organization

ACICAE is a highly differentiated organization with several organs:

- Assembly: All member companies are represented in the assembly.
- Board of directors: The board consists of a chairman, a vicechairman and a secretary, all of them being elected representatives from the member enterprises. Its main task is to define the strategic policy guidelines.
- Committees: On the committees members of ACICAE and officials from the public administration work together with non-member companies from the Basque automotive industry on the application of specific actions to increase the competitiveness of industry. Main policy lines to be followed are established by vote. In accordance with the Conclusions and Recommendations of the Automotive Cluster Working Group committees were established in the three preeminent fields of action:
 - Quality management
 - Technological development
 - Internationalization.
- Management: With a staff of 5 full-time employees the management has the task to push activities defined by the Board and the Committees.

ACICAE and the structuration of the Basque automotive industry

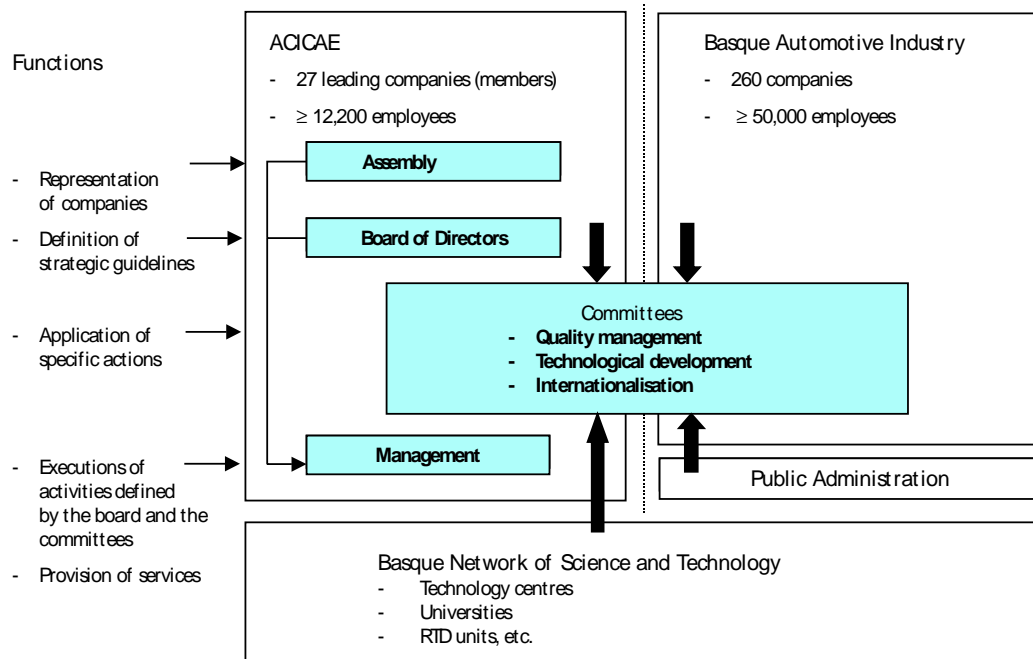


Chart 44: The structuration of the Basque automotive industry

4.5.6 Services and activities

Although ACICAE's mission is to work on increasing levels of competitiveness in the Basque automotive industry some of the services provided are only available for members. This is an important incentive for companies to join the association.

By regularly questioning the automotive suppliers ACICAE is trying to offer the services most in line with the demands of the enterprises. The long-term strategic evolution of the association is laid-down in a strategic plan running over a period of several years.

Within the framework of the Basque Automotive Cluster, activities for the enterprises are directed towards five main areas:

- *Technology and innovation*: Definition and development of the Cluster Technology and Innovation Plan by means of which the need of the companies in the technological area is communicated to the Basque administration, promotion of the participation of Basque enterprises in RTD support programmes;
- *Quality*: Promotion of the improvement in the management level of the cluster companies; initiation of specific courses for the automotive industry, organization of conferences and seminars, organization of the joint obtainment of the quality certifications (ISO, EAQF, etc.);
- *Information and communication*: Promotion of the cluster and its companies to customers, maintenance of an Internet homepage, publication of a

quarterly bulletin, development of a cluster directory, annual publication of the Basque Country Automotive Report, publication of a cluster CD-ROM;

- *Cooperation*: Promotion of inter-company relationships within the cluster;
- *Internationalization*: international representation of the Basque Automotive Cluster, assistance of Basque companies during the internationalization process, handling of international inquiries regarding Upper Austrian co-operation partners and the location of company capacity.

4.6 Technology networking in the Piemonte region

4.6.1 The regional supply chain

The Turin area looks back on a century of vehicle production activities. It accommodates about one third of the production facilities of the FIAT Group, as well as the groups' management centre and research centre. Other prestigious regional automotive brands include Pininfarina and Bertone producing sport utility vehicles, coupes and convertibles.

The area witnessed the growth of design and manufacturing capabilities in hundreds of enterprises in a variety of sectors (metalworking, electronics, plastic, rubber, chemical equipment, machines and services) connected to the automobile. Major regional fields of specialization include the design, styling, prototyping and manufacture of vehicle bodies and car components.

The Piemonte area is home to almost 50% of the turnover generated with Italian automotive components. About 300 - 400 companies in the region are tier 1 and tier 2 suppliers, producing systems, components and modules. The bottom of the regional supply chain is made up of about 2,000 small and medium-sized subsuppliers. In total, the regional automotive industry employs a total workforce of about 63,500.

In the field of technology regional automotive suppliers find assistance through the Turin polytechnic and more than 80 other technology poles, most prominently the FIAT Research Centre and the Politecnico, the prestigious technical university of Turin. The degree of interlinkage between these institutions, e.g. through common research projects for the automotive industry, however, is low.

The strong concentration of automotive suppliers and technology poles in the Turin area provides suppliers with the opportunity to transfer technology, learn from each other and engage in mutually beneficial cooperations.

4.6.2 Intermediary organizations of the automotive sector

The Consorzio per l'Internazionalizzazione, Sviluppo e Formazione delle Imprese (Consortium for the Enterprises Internationalization, Development and Training - C.I.S.F.I.) is the hub of a local network of automotive subsuppliers. The consortium is constituted by enterprises which have as a common characteristic the desire to penetrate international markets. It works on a non-profit basis, provides a network of its own offices abroad and has the aim to support Italian enterprises during the phases of development and reinforcement on foreign markets.

The activities carried out by C.I.S.F.I. in favour of the associated enterprises take the form of promotional and commercial consultation, market research and feasibility studies, professional training, launching and developing joint-ventures and internationalization projects concerning national laws and European Community programmes.

Thus, C.I.S.F.I. serves as a service provider mainly in two areas:

- *Internationalization:* Organization of trade missions and the participation of local companies at trade fairs all over the world as well as organization of business encounters with the aim of promoting transnational cooperation.
- *Qualification:* Professional training is done both through the periodical organization of seminars and follow-up courses and by means of targeting projects such as specialization courses for new entrepreneurs, guidance courses for foreign managers and training for professional qualifications.

However, in terms of institutional character C.I.S.F.I. primarily is a trade association with the potential to contribute to the development of a fully-fledged cluster organization. Not enjoying significant financial and political support from the regional government, C.I.S.F.I. lacks sufficient resources for ongoing activities in the fields of cooperation support and technology transfer. Although being in charge of a network of automotive suppliers, C.I.S.F.I. does not focus its services exclusively on the automotive supply chain nor is the consortium representative of the majority of the automotive suppliers.

Other institutions providing services for regional enterprises belonging to the automotive sector include the Chambers of Commerce's Observatory on Component Manufacturers, the Automotive Group of the Innovation Relay Centre network for technology transfer, the Association of Metal Manufacturers (AMMA) which has among its members numerous automotive suppliers, the Association of Small and Medium-sized Enterprises for Turin and its Province (API Torino) and ANFIA, the trade association of the motor vehicle industry. Several of these institutions provide help to SMEs in certain areas, without, however, being in close touch to each other.

Acting as an interest association API Torino's main task is to foster and safeguard the interests of SMEs at various levels. The association figures 3,200 member enterprises with some 56,000 employees, the majority of them being subcontractors. ANFIA plays an essential role in the dialogue between the major Italian and international political and institutional players protecting the interests of its member companies. Both associations provide best services for their respective clientele in terms of representing their interests and lobbying the government, without, however, being as close to them as necessary to be near to coordinating a technology network and to foster cooperations.

4.6.3 Prospects for regional technology networking

None of the relevant institutions in the Turin area has taken the lead in activities such as linking up to the regional RTD institutions for common projects, collecting and disseminating information related to the supply-chain, promoting inter-company learning or offering match-making services. Thus, there is no single focal point for collective action along the regional supply chain. Instead there are various, partially competing institutions.

While companies express their interest to participate in encompassing technology networks, they lack an opportunity to do so. Centering on multiple institutions without an overarching coordinator, regional bottom-up networking activities remain limited in scope and scale. Suppliers lack a powerful network with a neutral network manager able to counterbalance the preeminence of the region's predominant car

manufacturers. Especially sub-suppliers suffer from top-down cooperation at conditions imposed on them. At the same time, they lack access to their customers in terms of regular information on and communication of future market requirements.

Regional technology networking in the Turin area suffers from an institutional deficit. None of the existing intermediary institutions can assume such a neutral role because most of them are linked financially or politically to external bodies. This is partly due to the fact that there is a lack of involvement on the part of the regional policy-makers. The latter have failed to help set up a formalized technology network with an independent managing agency.

The Turin automotive industry has not yet developed into a well-structured cluster. A unified, neutral platform for regional technology networking is a prerequisite before the benefits of participation of the region in a transnational technology network can be reaped.

4.7 Technology networking in Wales: The Welsh Automotive Forum

4.7.1 Origins of the Welsh Automotive Forum

Until the 1980s the economic prosperity of Wales was dependent on the narrow industrial trade of coal extraction and manufacture of steel. The demise of these industries during the 1980s resulted in over 250,000 job losses. One of the strategies employed by policy-makers to encounter persisting unemployment was to attract significant amounts of foreign direct investment (FDI). This met with success. Since 1983 almost £12 bn of inward investment has been attracted. Among the forerunners are leading automotive companies such as Toyota, Ford and Bosch.

As Wales did not have a strong SME base, the rationale of attracting inward investment has also been to encourage the procurement of locally produced inputs thus creating backward linkages in the local economy. The Welsh Development Agency (WDA) has played a significant role in helping Wales to effect these economic changes.

Today, the automotive sector is one of the fastest growing sectors in Wales and is home to some 170 automotive suppliers (out of which 40 are 1 and 2-tier suppliers) providing jobs for more than 25,000 people. World class companies based in Wales include Ford, Toyota, TRW, Showa and Caisonic. The sector has experienced rapid growth fuelled by overseas investments.

The Welsh Development Agency (WDA)'s approach in the field of business development has been to "encourage the growth and development of existing small and medium sized firms and to promote and encourage the creation of new enterprises". Focusing on, among others, the transfer of technology and on innovation.

The aim of the WDA's Source Wales scheme is "to develop the performance and promote the capabilities of the supply base in Wales to create business opportunities for Welsh based companies". Preparing the ground for inward investment, the scheme was also instrumental in the establishment of the Welsh Automotive Forum which is an informal network of Welsh automotive suppliers. Initial sponsorship for the forum activities was provided by the UK Department of Trade and Industry (DTI) and the WDA.

Other networking initiatives in the region of Wales include the M4 network and Supplier Associations Programme of the WDA. Supplier associations are a group of firms connected vertically through prospective or current trading relationships through the supply chain. Often at the request of a leading company, the programme helps to implement new techniques and systems throughout the supply chain thus improving the quality and reliability of supplies.

4.7.2 Mission and institutional status

The objective of the WAF is to act as a conduit for Welsh suppliers to policy makers and opinion-formers, to provide a platform for the exchange of experiences and to bring together all parties of relevance to the automotive supply chain.

While the WDA is providing more general support to the enterprises, mostly on an individual basis, the approach of the WAF is to provide a forum for collective self-help especially of the regional SMEs and to look for leading companies to assist them. The forum was successful in bridging the gap between tier 1 suppliers and parts suppliers. Several lead companies were won to participate in the WAF and to assist SMEs in their product development strategies. The factual needs of the SMEs are established using fact-finding visits to the companies.

The WAF also brings existing support schemes for SMEs such as programmes encouraging greater technical collaboration between industry and academia to the attention of the SMEs. In so doing, the WAF positions itself as a focal point of support for the SMEs showing them how to find their way through the plethora of different support schemes existing in Wales. For regional suppliers, the problem is less the availability of funding programmes rather than the coordination between the different programmes.

In its activities the Welsh Automotive Forum is close to the EU-funded AUTOREG project in which several European automotive regions including Wales aim at spreading good industrial practice. In Wales, the main focus is on RTD and on the opportunities for acquiring or developing new technologies through cooperation with European partners.

In June 1999 a full-time official was appointed to act as a manager for the WAF.

4.7.3 Network partners

By mid-1999, the WAF had evolved into a network of 40 automotive suppliers having become members by contributing to the budget. Membership is predicted to reach 70 companies by the end of 1999, more than 60 % of which are SMEs. The WAF had already counted 70 members before the companies were made to contribute to its activities in mid-1999.

The Automotive Forum is also dedicated to bring support from the regional technology poles to the SMEs. 35 Centres of Expertise were identified by the WDA which offer industry the opportunity to benefit from their experience, research and facilities. Regarding the automotive sector the most important regional technology pole is the Manufacturing Engineering Centre of the University of Wales at Cardiff. The Centre is at the leading edge of research in both advanced manufacturing and rapid prototyping and does excellent at forging lasting partnerships with industry.

4.7.4 Financing

The financing of the WAF rested initially on contributions from the WDA and the UK Department of Trade and Industry. This sponsorship ended in April 1999 and was replaced by donations from member companies, the WDA and technical education centres. Membership fees now contribute to the budget of the WAF to almost 70%. AUTOREG resource has supported the restructuring of the forum and recognized it as an element of future strategic development for SMEs.

For the SMEs the height of the annual membership fees depends on the number of employees. While SMEs pay about 5 Euro per employee, large companies are requested a fixed payment of about 15,000 Euro per year.

4.7.5 Organization

The WAF's activities are overseen by a Steering Group consisting of managers from local car manufacturers such as the Ford Motor Company and Toyota, leading tier 1 suppliers, regional SMEs, leading academics from Welsh universities and representatives of the WDA. The Steering Group meets about 2 times a year.

Day-to-day activities of the WAF are directed by the Council which gathers representatives of regional SMEs, the Business Development branch of the WDA, an industry advisor and an official from the WAF. The Council meets up to 5 times a year.

The members of the WAF also meet in sub groups to discuss pressing issues and identify actions in the following fields:

- Education & Training
- Best Practice
- Auto industry activities
- AUTOREG
- Innovation & Business Development

4.7.6 Services and activities

In its activities the Welsh Automotive Forum is close to the EU-funded AUTOREG project. Action identified by the WAF may be undertaken by taking recourse to AUTOREG resource. AUTOREG seminars have taken up issues of relevance to the automotive suppliers as identified by the WAF's members. Topics discussed include presentations on the technical requirements of the car manufacturers, best-practice presentations on SMEs successfully collaborating with technology poles, and reports by raw material suppliers on materials and futuristic process developments.

Above all, the WAF is an information and communication platform. Relevant information is disseminated to the enterprises. Within the framework of the Welsh Automotive Forum actions are oriented to the fields covered by the sub groups:

- *Innovation*: A clear emphasis of the activities of the WAF is on technology transfer. An action plan is developed focusing on developing the support mechanisms existing for SMEs in the region of Wales. In line with enterprise needs, two aspects of regional research for the automotive industry were highlighted in common meetings and seminars over the last year: surface condition monitoring and robotics.

- *Business development:* The members of the WAF also act collectively with the aim to improve their supply base. Major weaknesses in the supply of important materials concerning the quality, delivery and technological limitations of supply were identified and a corrective action process initiated.

5 Regional technology networking: A model informed by best European practices

5.1 Definition of the limits of a model of regional networking

The implementation of cluster development strategies varies considerably from place to place. In the European best-practice regions of our sample there are significant differences concerning e.g. the partners of a technology network, its organization and the business support services offered.

Our model of regional technology networking draws on an analysis and evaluation of the regional clusters strategies in the automotive regions discussed, on the results of the enterprise survey in several European regions and on the long-standing experience of agiplan in cluster management. Certain approaches and best-practices which have proven clearly successful in stimulating participation of SMEs in networks and in enhancing their access to technology as well as common factors underpinning the success of all clusters will be highlighted.

This is, however, without to raise that each method recommended or highlighted here can be transposed and implemented one-to-one in any other given region. There are no single methods which are most appropriate in any given historical and geographical context. The adequacy of a certain method is always contingent on other circumstances which are specific to the socio-economics, politics and culture of a distinct region.

As a consequence, the discussion and recommendation of methods and constituent elements of networking with respect to the establishment of a model of regional technology networking is to be understood as constructing an “ideal type” of regional technology networking in the sense introduced by Max Weber. All methods discussed here need modification to the factual environment when introduced to a certain region.

Moreover, our model draws heavily upon technology networking in the targeted European automotive regions and on a questioning of automotive suppliers. This means that the inferences drawn from the analysis of these experiences rest biased towards favouring the networking structures prevailing in the automotive sector. In consequence, a transposition of the model to other clusters in other industries will require further modifications. This is because there are different types of clusters in different industries.

5.2 Principles and methods of regional networking

Companies are acting on strictly economic principles. They strive for a technological leadership position and want to ensure access to new market opportunities. In the long run, they will have to profit and gain access to new business opportunities as a result of networking. Networks will have to assist them in achieving a long-term competitiveness. Otherwise, the companies will opt out.

Technology networks offer suppliers an adequate framework for responding to the increasingly demanding requirements from industry. Cooperations in regional networks, both vertically and horizontally, facilitate the adjustment to new challenges,

even if enterprises, according to their economic and technological profile as well as their size and financial position, have different expectations.

Furthermore, enterprise networks are instrumental in offering business support services and in facilitating enterprise access to resources such as technology, qualification, internationalization, etc. Especially, personal contacts have proven essential in ensuring an ability to cope with new challenges. Regional networks are well placed to create new relationships..

In the process of constructing of a regional network, three basic issues have to be dealt with. First of all, the basic organizational principles of a technology network are to be determined. Secondly, the spectre of available business support services has to be fixed. Thirdly, a know-how management architecture has to be put in place.

5.2.1 Basic organizational principles

The basic organizational principles of a technology network are determined by the answers to the following questions:

- Which partners are to be involved in the network? Which interest associations, public bodies and branch institutions are to be integrated?
- Is a coordination mechanism required? If yes, who assumes the role of the network coordinator? Which institutional organs, such as advisory committees, steer, in which constellation, the concertation of the interests of the separate partners in order to reach synergies and a surplus value for the users?
- How shall the network and its services be financed?

5.2.1.1 Network partners

As a rule for networking, it is important to achieve integration of all groups of producers, service industries and technology poles along the production chain to inspire the flow of communication and know-how between these producers. The potentials of competitiveness can only be realized by means of networking among companies and institutions with a differentiated strategic orientation for example towards developing, introducing or applying new technologies. This is reflected in the answers to our survey. Enterprises are primarily concerned with the integration of their supply chain partners: suppliers, customers and technology poles.

According to the opinion of the enterprises, interest associations, chambers of commerce, branch institutions and public sector institutions do not belong to the key partners of a network. However, in order to guarantee the basic functions of a regional network, such as creating access to new markets, facilitating technology transfer and strengthening the competitiveness of the regional industry, both companies and intermediary organizations with a corresponding competency have to be involved.

Thus, intermediary organizations should be included for reasons of acceptance in the industry. Especially associations act as an important interface to the political system.

It depends upon the respective objectives of a network to which extent and in which way intermediary organizations participate in the network. A method which has been applied, e.g. in the VIA NRW and in the ACStyria, was to integrate important institutions in the advisory committee of the network where they could act as important multipliers. The disapproval of their membership by the companies, however, should come as a warning to these institutions. The question of their ability to adapt to the customer's demands is raised.

With regard to the involvement of the public sector, the crucial point is in how far a regional technology network should serve regional economic development objectives. If a such a network is part of an overall strategy for a region's economic development, both politics and the public administration are responsible for combining and coordinating relevant activities. In this respect, political back up of a network is essential.

In the automotive sector, the car manufacturers are at the top of the supply chain. They are the final customers and thus the trendsetters in terms of new products and processes. As with other leading companies, such as with the system suppliers, most small enterprises favour their participation in a network in order stay connected to the future market requirements. In most of the technology networks from our survey, e.g. in the case of the VIA NRW, ACStyria and WAF, car manufacturers were invited to and did participate.

However, their participation is not always desired. Although leading companies and car manufacturers are needed to push the networking process forward and to inform on future developments, it is hard to balance their supremacy in a network. Where the representation of the collective interests of the small suppliers vis-à-vis the manufacturers ranks among the important objectives of a network, a network can also dispense with the car manufacturers. The cluster grouping ACICAE in the Basque Country is an example of a successful regional technological network which excludes car manufacturers.

Competitors are disliked by the enterprises. However, they are nevertheless necessary for strategic purposes. While the wider network must always leave room for competitors, cooperation projects are the sole responsibility of the companies. It is up to them whether a competitor shall be included in a project or not.

After all, a network is not a closed system – it is an open process. Network partnership can be extended or restricted in line with current challenges.

5.2.1.2 Network coordination

In all successful technology networks from our sample, coordination was ensured by a neutral moderator. Without a common, unified platform for technology networking, different promising bottom-up initiatives may stay isolated from each other as in the case of Nord-Pas de Calais.

The necessity of network coordination is underpinned by the results of the network analysis which has shown that, usually, different partners to a network, are not that closely linked to each other as to rely on a continuous flow of communication in the absence of a central network hub. Moreover, without a central coordination

mechanisms, the necessary concertation of interests and the communication between the partners would engender transaction costs which are too high for each partner. The network would implode.

On a more fundamental level, the following basic processes regarding network coordination must be handled in a network:

- Exchange of information and communication
- Balancing of interests and conflict settlement
- Creating mutual trust between the network partners
- Preparation of decision-making processes
- Upgrading the common interest

For this, the acceptance of neutrality and equal treatment of the network partners is required. Regarding the moderation of the network, the balance of interests among the partner has always to be ensured. A culture of trust and understanding is essential for the successful implementation of a technology network. Furthermore, the network management must be sufficiently qualified and has to work efficiently in terms of minimising the expenses for the network partners.

Most fundamentally, the results from the enterprise survey emphasize that the enterprises expect the network to be managed by a neutral agency. There is no clear-cut picture whether this role should be assumed by an independent consultant, by a technology pole or an enterprise partner. Technology centres and consultancies comply best with the demands for neutrality. Both have specific self-interests, which, however, do not conflict with the competition-oriented goals of the other partners.

However, for reasons of acceptance in the industry, traditional public sector institutions are advised to play a less visible role in the operational management of the network. Nevertheless, as outlined above, the public sector is indispensable in supporting a cluster on a more fundamental level.

Regarding the institutional status of an organization coordinating the network, different models exist. In the Basque Country coordinating a cluster by an independent association met by success. In Upper Austria, Wales and in Styria regional economic development agencies have played a prominent role in fostering networking. In Upper Austria, an innovative cluster organization with a clear focus on the automotive sector was set up with support of the TMG, the local economic development agency. A common factor underlying all examples of successful network coordination has been the availability of full-time, professional staff, respectively consultants.

In different regional networks from our sample (VIA NRW, ACstyria, Wales), the networks were transformed into self-managed organizations in the second stage of their life cycle. Network coordination was transferred from public bodies to the partners of the regional networks themselves.

5.2.1.3 Financing the network

Establishing and maintaining a network engenders substantial costs. Especially, in an initial period of starting up the network investments into the infrastructure of the network have to be undertaken which do not engender an immediate net benefit on the part of the enterprises concerned. However, the expenses may pay off for the region on the whole in terms of economic development and employment.

The establishment of a network is in the collective interest, it equals the provision of a collective good. Consequently, initial expenses for setting up an encompassing enterprise network have usually to be reimbursed, at least partially, by a third party representing the collective and/ or public interest – be it an interest association representing the collectivity of the enterprises concerned or be it the public sector. In all examples of successful technology networks from our sample initial expenses for setting up and running the network were covered by public funds as companies showed little inclination to pay for uncertain long-term projects. The need for external resources is crucial for the start-up.

In a second stage, once the network is firmly established, the enterprises experience a visible net benefit from participating. In examples from our sample, such as in the case of the ACstyria and the WAF, regional networks are undergoing a transformation after a first period of public sponsorship. Public funds are gradually phased out while members are requested to contribute to the financing of the network services. Membership fees are differentiated according to the number of employees and/ or the height of the turnover of the respective member.

What a financial contribution is appropriate in order to create a balance with the services offered, has to be determined in agreement with the partners of the network. It results from our survey that only a minority of enterprises regards a contribution to fund general information services as justified. In line with the "Zeitgeist" and with the abundance of available sources of information (Internet), companies consider information about services, products and partners to be free of charge.

However, a large majority of the enterprises and technology poles on hand are willing to contribute individually to specific services which are tailored to their individual needs. Services are chosen if they are regarded as useful and if compensation is regarded as acceptable.

5.2.2 Services and activities

A successful network has to be geared towards bringing the greatest possible benefit to as much partners as possible. In order to realize this objective, it is necessary to make business support services available to the individual companies.

The readiness of companies to pay for services with recognisable use must be met by the publication of the service offers. Above all, the advantages of networking must be communicated to companies.

The following or a similar division of services and activities has been applied in various regional networks:

- Information and communication;
- Support of cooperation projects;
- Support of qualification;
- Support of internationalization;
- PR and marketing.

5.2.2.1 Information and communication

Most fundamentally, every regional network serves as an information and communication platform for the network partners. The enterprise notions regarding the information services in a network are related to the fact, that the main advantages of participating in an enterprise network are the opening up of new markets and technology transfer. Both aspects require the transparency of know-how (i.e. sound knowledge about market conditions and new technologies).

The enterprises and technology poles under consideration primarily consider those information services as necessary which fall into the categories of

- Economic trends (market requirements, products, services, etc.);
- Technological trends:
 - Information on latest technologies,
 - Information on the availability and applicability of technology;
- Enterprise information:
 - Enterprise profiles for the facilitation of match-making,
 - Survey of competitors with their strengths and weaknesses,
 - Survey of the regional supply chain (Which products are produced regionally? Which are the strengths of these products?);
- Public including European funding opportunities.

5.2.2.2 Support of cooperation

Cooperation projects between different companies and technology poles have proven successful to facilitate the transfer of technology to the enterprises as shown by the results of the enterprise survey. There are strong indications that cooperation projects are the single most important and successful method to foster enterprise networking and technology transfer. However, the companies need assistance.

According to the survey, enterprises and technology poles under consideration primarily consider those cooperation support services as necessary which are helpful in facilitating the initial stages of a cooperation between partners:

- Project initiation;
- Partner identification;
- Match-making services/ cooperation partner exchange;
- Establishing connections to partners;
- Concrete structuration of the measures to be implemented in consultation with the companies;
- Allotment of tasks and responsibilities;
- Drafting contractual safeguards;
- Support of the application for supplementary public funding (aid to groups of companies to encourage co-operation), etc.

Bringing together partners, however, should not be limited to merely exchanging enterprise names. With respect to efficient design of business processes it appears necessary to revise ingrained practices, especially considering the differences in corporate culture. This requires for analytical and methodological support.

5.2.2.3 Support of qualification

In the framework of a regional network, qualification can be understood as making available a wide range of educational possibilities which are focused on the specific skills and capabilities required by that cluster (e.g. thematic seminars on relevant economic and/ or technical issues, training for professional qualifications; organization of workshops with company representatives, inter-company learning, visits to partner enterprises, etc.). Qualification and training opportunities may be also be provided by opening internal seminars of leading companies to partner companies on a mutual basis.

5.2.2.4 Support of internationalization

When companies go abroad, they have two core objectives: Profit improvement by applying different costs levels from different regions and growth by market extension. The firm profiles from our survey show a high international share of turnover and procurement. The focus on special products and key-regions turns out to be particularly successful.

When companies go abroad, they usually follow two basic paths. The first is to follow a customer, and subsequently, to expand in the foreign market. The second is to achieve operational readiness on an interesting foreign market without being led by a customer. Both approaches cannot be realized without the implementation of joint

activities, the scope of which can range from loose cooperations restricted to single projects to joint ventures or even take-overs.

Basically, according to our survey, companies expect two kinds of services facilitating their internationalization process. Firstly, they want more information which helps their orientation regarding foreign markets (enterprise profiles, foreign technological know-how, etc), secondly they want support in establishing connections to potential foreign partners. Moreover, they need assistance regarding the availability and applicability of funding opportunities.

Thus, for the effective assistance of companies in the internationalization process it is necessary that the home network participates in international cooperation exchanges and European programmes. An ability to process inquiries of partner regions and vice versa should be given.

5.2.2.5 PR and marketing

Every regional network has to promote itself in order to attract new members, to create confidence and a positive attitude towards the industry in the region and, importantly, give the member companies a common identity. In this regard, the development a cluster logo proved very effective in most of the networks we studied.

PR activities to be applied include the provision of information material, the positioning of the network both nationally and internationally, presentation of the cluster on the Internet, placing articles on the network in relevant newspapers, etc.

5.2.3 Know-how and communication management

Regarding the quality of the above listed information and support services, a regional network has to perform continuously well. To ensure a high quality, a systematization of the know-how communicated to the partners is necessary. The transparency of the know-how should be safeguarded by the implementation of efficient information services based on modern information technology.

A regional network needs a communication platform where a) information between the partners is exchanged and b) where the available know-how is systematized and communicated to the partners. Such a communication platform has to be easily accessible and allow the partners to retrieve information according to their wishes.

In order to systematize know-how and communication, the following questions have to be dealt with:

- Which kind of know-how is made available?
 - At a first hierarchic level, information which can be easily retrieved from existing data is provided, e.g. data on consultants, experts or other enterprises;

- At a second level, a more extensive advice is given, for example the description of the know-how and the experience of a specific research institute;
- At a third step, access to research and analytical work is provided; figuring expert assessments on different topics ranging from country reports to the assessment of the use of specific technologies and investigations concerning the most appropriate location for an investment. Regulatory issues may also be dealt with.
- Which methods are employed to ensure the accuracy and the timeliness of the data?

During the start-up period of the network, a know-how base must be installed (databases, etc.). Basic information may be collected e.g. by an enterprise survey. Once implemented, the respective participants of the network are obliged to update the respective data (e.g. offer and demand of cooperation requests, economic and technological profile).

- Which possibilities to access the information pool for the partners?

Regarding the different information technology standard at the level of the partner enterprises, communication in writing, by fax, by telephone enquiry and by e-mail is to be made possible. An internet-based solution allowing for a shared work space is also possible.

- Which information technology tools are essential for the successful operation of the network?

The basic data regarding enterprises and cooperations (economic and technological profiles of regional companies, survey of experts on certain topic, survey of cooperation projects, etc.) is to be stored in relational databases in order to be able to retrieve the necessary information in any given combination.

5.3 A well-established approach for the initialization and management of networks

In most cases setting-up and running a network is a complex project. This process, which leads through the different stages of a network, can vary according to the

- participants in the network;
- the goals of the network;
- the frame conditions the network has to live in;
- the network management.

Nevertheless, a principal procedure has been proven to help in most network projects as a kind of basis for network initialization and management. Chart 45 shows this procedure including five main steps.

Step 1: Goal, Potential and Strategy

During this very informal step of bringing together the keyplayers of the future network, the basis for success of the network has to be laid. With the commitment on strategy and goals of the network the heart of the network begins to beat.

Step 2: Starting the Network

Now the operative schedule in which the network has to be implemented ought to be elaborated by the chosen team for network management. Professional project management outputs, as there are project structure, project time schedule, cost budgets, staff demands etc., have to reflect the frame conditions in which the network will be implemented. As important as these hard facts are the rules, which clearly describe the codex of behaviour between the participants in the network.

Step 3: Implementation of the Network

First goal of this step is the set-up of an adequate information and communication platform connecting the network management with all participants and the outer world. The activities run by the network management have to satisfy the demand of the network participants. Providing events and support with top quality is essential for creating confidence.

Step 4: Management of the Network

The management of the network should orientate its activities on the following five fields:

- information and communication;
- qualification;
- innovative projects as a cooperation between several companies and experts (RTD-institutions, universities, consultants);
- internationalization;
- marketing and PR.

The network manager has to use highly sophisticated methods of multi-project management to guarantee quality, costs and time schedule of the single actions and the wider network.

Step 5: Evaluation of the Network

According to customer relation management a periodic auditing of the network actions, gathering feedback of the network participants, is necessary to implement a continuous improvement process and a change management in the network. Both

tools are necessary to keep the network actions in touch to the developing market, participants and framework conditions.

The time to finalize each step is dependent on:

- the goals of the network;
- the size of the network (number of participants and regional size);
- framework conditions (size of the network management team, financial budget for network management available);

and the preparation of the network in an informal period, in which the vision of the network has to be taken up by some key persons.

Referring to the presented automotive cluster in Germany and Austria Step 1, Step 2 and Step 3 were done in one to two years. Step 4 can continue for years (VIA NRW for 6 years). Step 5 should accompany the described process.

6 A model of transnational technology networking

The following model to establish a transnational technology network was informed by interviews and developed in workshops with the managers of the European cluster organizations and leading companies visited during the conduct of the study. It is thus based on their recommendations as well as on the expertise of agiplan and designed to maximize the benefit of such a network for the main beneficiaries, the partner enterprises.

A fundamental trait of the model concerns the role of the regional technology networks in its structure. The model presented here is based on the conception that a transnational technology network is being superimposed on existing regional networks which will be interlinked through the transnational network. This means that a working transnational network presupposes existing regional networks as constituent elements. In order to participate the latter have to fulfil certain minimum requirements.

In terms of its institutional status, the transnational network is not fully autonomous and independent of the regional technology networks and cluster organizations. This is in line with the subsidiarity principle. Thus, the transnational network can build upon regional institutions and efforts by uniting them on an European level. The services of such a network will be offered by mutually drawing on the resources of every partner organization, i.e., to a large extent, no new services will be invented but the already existing services of each of the regional networks will be harmonized and opened to the enterprises of the partner regions.

Another characteristic feature of the model concerns the sequencing of the build-up of the network. In order to focus on manageable steps and not to frustrate too high initial expectations on the part of the main beneficiaries, we recommend to apply a phased approach towards transnational technology networking.

In a first stage, the construction of the transnational technology network involves primarily the regional network managers. They collectively have to establish the necessary infrastructure for transnational networking. This process, however, is difficult to initiate without an external body instigating the process and setting the incentives which compensate for the transaction costs incurred by each of the regional cluster organizations in harmonising and opening up their networks. The European Union might be well placed to assume the role of such an external change agent as the surplus value which is generated by such a transnational network is primarily realized on an European level.

In a second stage, these networking structures will be put at the disposal of the enterprises. The second stage will be characterized by the integration of the enterprises in the network, by the promotion of pan-European enterprise relationships and by the active use of the services of the network by enterprises seeking new business opportunities.

6.1 A phased approach towards transnational technology networking

6.1.1 Phase 1: Construction of the network infrastructure

In order to maximize the benefit of such a network for the enterprises, and especially for the SMEs, we recommend to start building the transnational network on the level of the regional cluster organizations by transnationally interlinking these organizations. Such a proceeding serves to build up trust and mutual relationships between these organizations as a foundation upon which the transnational network can rest.

Being logical in terms of the establishment of the network, it also helps creating acceptance of the network on the part of the target group by involving those organizations from the start which have a direct self-interest in participating. The cluster organizations can directly profit from the transnational network in gaining a forum for the exchange of experiences, for learning from each other and for benchmarking with comparable other European cluster organizations.

Prior to that step, however, it is advisable to upgrade existing regional cluster organizations to a level where they can contribute to the transnational network as an equal partner of exchange. Defining certain minimum requirements as prerequisites helps to render cooperation in the network mutually beneficial and is prone to stimulate enterprise participation. Only if the latter can seek new business opportunities with the help of the network, will they take actively advantage of it.

According to our findings, every European regional technology network wishing to participate in the transnational network, should have the following minimum requirements in place:

- a reasonable level of continuous activities;
- a permanently available and sufficiently staffed cluster office which is well entrenched in the region and has access to the regional key institutions and leading companies;
- a critical mass of regional partner companies available for match-making;
- a capability to provide detailed information on regional companies in order to deal with requests for partners whether to engage in cooperations with or to seek new business opportunities abroad with, e.g. maintaining a cooperation partner exchange;
- a capability to provide an overview of regional companies already engaged in international business activities or participating in European programs and their market dominances;
- a detailed knowledge of relevant European funding programs and capability to advise enterprises on their application for such programs.

As to the most appropriate design and service profile of a participating regional technology network, we would like to refer to the previous chapter on regional

technology networking. The recommendations given under that point, however, cannot be expected to be fulfilled completely by every partner network. Thus, the concrete stipulation of the details of the design and the services of the transnational network will have to be decided upon by the transnational partners themselves.

After the initiation of an exchange of experiences between the cluster organizations and in recognition of existing inter-regional and inter-cultural differences, it is necessary that all participating regional networks agree upon a minimum of common regulations, standards and procedures as rules governing the networking process. In general, all partners will have to comply with these rules, even if for some reasons linked to inter-cultural and/ or –regional differences, some partners should be given the possibility to opt out of a common undertaking in isolated cases.

- 1 Recognition of the cultural particularities of each of the partner networks and establishment of methods to deal practically with conflicts arising from these differences.
- 2 Regulations as to the design, management and moderation of the network, i.e.
 - a set of common technical standards concerning the electronic means of communication and data interchange used in the network, e.g. a shared work space on the Internet;
 - common procedures structuring the regular exchange of experiences in the transnational network, e.g. concerning the frequency of common meetings and workshops, who should host them, etc.;
 - regulations concerning the moderation of the transnational network;
 - i.e. who of the regional networks should be in the chair of the transnational network for which time period,
 - what should be the modus of alteration in the presidency,
 - if there should be a permanent head office of the network;
 - regulations concerning the financing of activities undertaken at request of a partner network.
- 3 Common standards as to the service profile of the network, i.e.
 - a set of common standards concerning the services mutually offered to all partner organizations and partner enterprises in the network (quantity and quality);
 - a set of services specific to the transnational network, provision of which is more advantageous in the form of a centralized service rather than by every network separately, e.g.
 - maintenance of an Internet-based database service for match-making,

- promotion of the network and provision of PR material on the activities of the transnational network for the main beneficiaries,
 - cluster-marketing (development of a Corporate Design concept);
 - common procedures as to how to deal with information and/ or cooperation requests (time frame; etc.).
- 5 Common goals concerning the future development of the transnational network, e.g.
- the use of the transnational network as a platform for benchmarking between the different cluster organizations with the aim to define standards for European clusters;
 - the design of qualification programs for SMEs to make them fit for globalization;
 - the development and testing of new methods tailored to transnational cluster management.
- 6 Common action plan to start up common operations

In addition, every cluster organization should name at least one manager responsible for keeping up the international linkage, maintaining contacts to the partner networks and providing support to both the partner organizations and enterprises. Financing of these officials from the scarce resources available to the regional networks, however, seems difficult. Especially for the initialization period of the network, alternative sources of revenue have to be acquired.

The implementation stage of the transnational network starts after the agreed upon structures of the network have been collectively realized by the partner networks.

6.1.2 Phase 2: Extension of the network to the enterprises

In the second stage, the basic infrastructure of the transnational network consisting of several partner networks is in place. The main emphasis now rests upon the promotion of relationships (cooperations) between the partner enterprises from the different regional networks.

The enterprises will be able to draw upon a wide range of services now available from the transnational network. Again, regarding the most appropriate service profile of the transnational technology network, final determination of the service profile is up to an understanding between the regional networks themselves. However, the dimension of services certainly has to be in the upper echelon so as to render participation attractive for the enterprises.

As demonstrated by the results of our enterprise survey, the following services specific to transnational networks are strongly demanded by the enterprises and, therefore, are highly recommended to figure among the possible key services:

- help in finding cooperation partners in the different European partner regions;
- provision of enterprise profiles and maintenance of a cooperation partner exchange;
- establishing connections to foreign partners through the intermediary services of the partner organizations;
- provision of information on selected foreign markets;
- provision of information on technological developments and the availability of technologies in the partner regions;
- provision of information on European funding programmes.

Of course, the transnational network should facilitate the enterprises' access to already existing European programmes in the field of cooperation support, such as Interprise, Europartenariat and IBEX. Every regional partner of the transnational network should be responsible of making regional enterprises aware of upcoming events and organising their participation.

Other European initiatives to which a transnational network in the automotive sector should link up include the European network of Innovation Relay Centres, especially the Innovation Relay Centres Automotive Group which is providing targeted assistance for transnational technology transfer to automotive suppliers.

Additionally, it has to be checked whether particular services of transnational network overlap with other European activities in the field of enterprise cooperation such as the Business Counsellors Net (BC-net) and the BRE (bureau de rapprochement d'entreprise) net.

These services are of primary importance for the main beneficiaries of the network in achieving the main objectives they pursue through transnational networks:

- opening up foreign markets;
- gaining access to latest technologies.

In parallel to the integration of the enterprises in the network, common events and workshops bringing together different partner organizations and partner enterprises on selected topics of common interest serve to consolidate the network.

Visualization of the sequencing of the different stages of the construction of the technology network

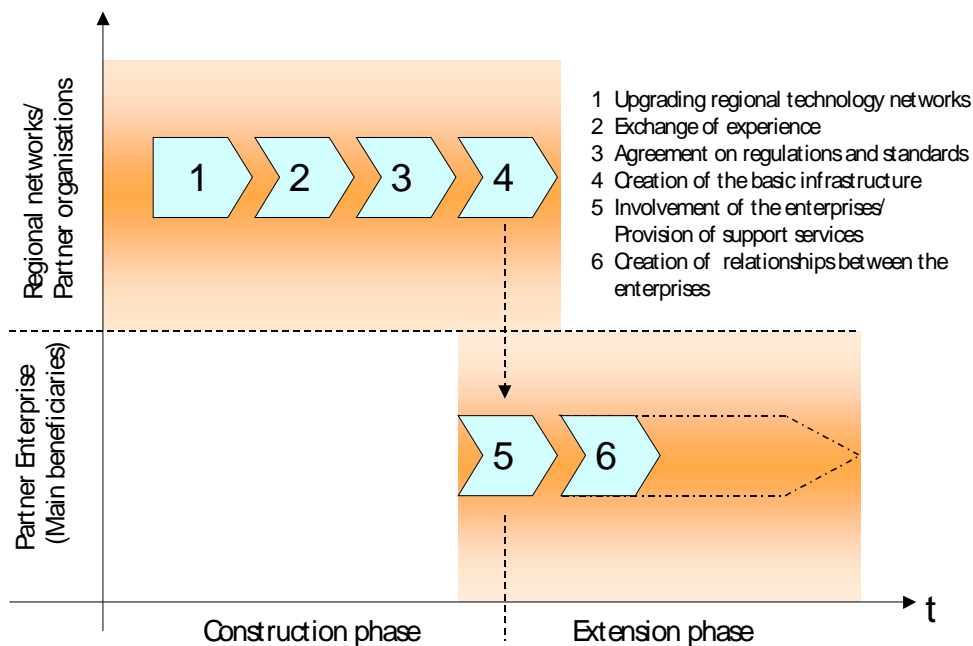


Chart 46: Sequencing of the built-up of a transnational technology network

6.1.3 Common action plan – A blueprint for transnational network managers

Common action plan to establish a transnational technology network:

- 1 Establishing and/or upgrading of regional technology networks up to a minimum level, e.g.
 - setting up an information and communication platform;
 - installing a database containing the economic and technological profiles of the partner enterprises;
 - shaping the identity of the regional clusters, etc.
- 2 Initiation of an informal exchange of experiences between the cluster organizations, e.g.
 - organizing a kick-off event;
 - setting a communication agenda;
 - joint participation in European programmes, etc.
- 3 Achievement of an agreement of all partner organizations in the network on common regulations, standards and procedures such as mutually available services and common goals, i.e.

- adopting a basic agreement on minimum standards with which all partners will have to comply;
 - adopting a more comprehensive agreement on standards and future goals of the network which only the more advanced partners will have to comply.
- 4 Setting up the basic infrastructure of the network.
 - 5 Involvement of the enterprises in the transnational network by offering multiple support services, e.g.
 - provision of enterprise profiles and maintenance of a cooperation partner exchange for transnational cooperations.
 - 6 Creating relationships and cooperations between the enterprises and technology poles from the different partner regions by using European programmes and drawing on European funds.

6.2 Inter-cultural particularities: Implications for transnational technology networking

The collaboration of different enterprises in regional and transnational partnerships and cooperation projects demands communicative skills from the participants. When establishing a regional network behaviour patterns tinged by regional particularities are to be observed.

Transnational networking requires:

- detection of culture-bound behaviour;
- observation of the culture-bound conduct;
- measurement of the effects of the encounter of different cultures;
- development of comprehension for the differences;
- a practical problem-solving ability.

Until now no practical research has been done on the relationship between the respective culture of a country and the potential willingness to collaborate and to participate in building a transnational network.

Thus, the principal and most typical national cultural features regarding collaboration in transnational networks were analysed, firstly upon the basis of document and literature analysis, and secondly, by investigative interview in the countries visited during the conduct of the research.

The results presented here are tentative starting points, which must be re-evaluated and refined in the course of transnational networking.

6.2.1 Austria

General attitude:

- Meetings and discussions take place in a formal atmosphere. However, they often serve to legitimize a decision which has been taken beforehand;
- Decisions often result from informal agreements and result from a consensus among acquainted decision-makers;
- Personal relationships are very important in that they are suited for relieving formal hierarchy.

Effects on cooperation and alliances:

Due to the importance of personal relationships, transnational networks have to start by the building of mutual trust among the participants.

6.2.2 France

General attitude:

- Teamwork, a prerequisite for cooperation, is hardly implemented in French companies;
- The incentive structure prevailing in the enterprises is biased towards individualistic competition. Team-oriented behaviour is hardly rewarded.
- Decisions are taken in a more centralized and bureaucratically manner, rather than being the result of a consensus in a team;
- Organizational structures are very formal and hierarchy is stressed.

Effects on cooperation and alliances:

Without personal relationships, cooperation is difficult and often limited to the surrounding region. The fact that making key-decisions is a prerogative of the top-management slows down or makes cooperation between companies difficult. Even if all parties to a cooperation strive to achieve a common objective; a non-standard and individual procedure is followed by each individual party.

6.2.3 Germany

General attitude:

- Meetings and discussions take place in a very formal atmosphere and leave no place for last-minute changes;
- Decisions are taken in formal meetings rather than being the result of informal agreements;

- Discussions are centered on topical issues and leave no place for the expression of personal affection and emotions;
- Strictly rule-bound behaviour requires that all agreements and regulations are laid down formally;
- Preparation, planning and respect of deadlines are imperative.

Effects on cooperation and alliances:

Cooperation is less effected by personal relationships than in other European countries. Participants of networks attach a great importance to the formal regulation of all aspects relating to the cooperation.

6.2.4 Great Britain

General attitude:

- Usually, communication is very clear and can be applied concretely;
- Generally, personal interests are taboo. There is a greater reliance on rules;
- The decision-making process relies on meetings and formal conversations;
- Compromise orientation eases the finding of common solutions;
- Organizational structures are less hierarchical and shaped by strong delegation;
- Preparation, planning and respect of deadlines are imperative.

Effects on cooperation and alliances:

Cooperation is being shaped by rules and discipline. Because of the acceptance of personal initiative of others and due to a firm concentration on rules, unexpected incidents and irregularities can be handled successfully at any time. Reaching a consensus through open discussion enables partners to express their own interests, thus paving the way for a successful cooperation. However, when establishing a cooperation, loyalty to ideals can win through against goal-oriented pragmatism.

6.2.5 Italy

General attitude:

- Management of the companies is bound by strong family and regional ties;
- Small companies are often characterized by autocratic leadership, which is adopting a perspective of muddling through alone;
- A historically grown network of dependencies may prevail (services rendered as favours) over efficiency considerations;

- Formal meetings rather serve to have a discussion than to define objectives. The decision-making process takes place behind closed doors;
- Communication is based upon the spoken word and has a very personal touch. The personal contact is decisive;
- In order to build trust, much time is devoted to the business-partner.

Effects on cooperation and alliances:

Due to the strong orientation towards personal relationships and the importance of personal trust, networks based on strong regional ties are better accepted. When addressing a business-partner, one must consider the habit that decisions are taken by the individual and not by the team. Thus, transnational networking has to start by establishing personal relationships.

6.2.6 Spain

General attitude:

- Management is predominantly based on oral communication and relies on strong family ties;
- Personal contacts are crucial and becoming acquainted with each other constitutes the basis for decision-making;
- The personal appearance and the avoidance of a loss of face is important;
- Personal identification with the company is very strong. This has to be taken into account when contacting network participants.

Effects on cooperation and alliances:

Due to the predominance of family structures in the companies, cooperation and networks can mainly be achieved through the reinforcement of personal trust. Thus, transnational networking has to start by establishing personal relationships.

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