Development of cooperation with other sectors and creation of INNOMET clusters

Work package 8.2

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Contents

1. Introduction

Cluster is a system of marketing-based and non-marketing-based relations between geographically concentrated (usually in regions) enterprises and other institutions. The nature of a cluster is based on daily relations (both business and personal), which mostly require geographical proximity, durability, formal and non-formal contact channels.

Components of an industry cluster are following:

- Research & development (R&D) of public and private sector
- Skilled work-force;
- Training centres and institutions for further education;
- Support structures of innovation (agencies for technology transfer; patent bureaus, chambers of industry, business unions and associations etc);
- Local governments; physical and social infrastructure;
- Financial institutions;
- Intermediate- and end-consumers.

Cluster is the expression for open business model. Through cluster development one can achieve the efficiency and competitiveness of institutions belonging to the cluster. Despite of many positive aspects of cluster development, it is also important to take into consideration some weaknesses and dangers, which may occur by unfavourable conditions.

2. What is happening in industry

Production from viewpoint of modelling looks like represented on Fig. 1. Opinions about the impact of the present and future developments in manufacturing technology diverge widely. In this regard, predicting the exact nature of future manufacturing strategies with any certainty is difficult. However, the future of manufacturing will most likely be a smaller workforce with a higher-order of multidisciplinary critical skills in management and labour process to respond radically to the opportunities and the constraints. Competence in the optimal use of information and communication technologies supporting a global co-operation of enterprises will be the future key to industrial countries remaining competitive, in both the race for bringing new products to the market and sustaining a profitable presence in that market. A frightening statistic is that 'in some fields', 20% of an engineer's knowledge becomes obsolete every year. It was reported that the globalisation of engineering education required further characteristics of the modern degree programme, particularly as the year-of-study abroad becomes an increasingly popular choice with students exchanging further a field and in greater numbers than ever before. This led to a suggestion that the basic engineering degree program should be extended to include: team skills, communication, international relations, marketing and economics. This program should include greater use of project-based, group 1earning, and the use of multimedia technology in the classroom.
Industry is facing with the fact that on the labour market there is not enough qualified labour force and that working has to be evaluated on the topic of skills' level. Hence, there is a clear need for a tool for active cooperation and coherence between enterprises (demand) and education providers (supply).

The likeliness of material supply chain and knowledge supply chain is accepted. As a result a knowledge supply chain is created.
A knowledge supply chain is an integrated process that uses the core competencies of industry and academia to provide an enterprise with the information and wisdom it needs to run its business profitably, and to educate and train its workforce. A competitive enterprise will depend on continuous access and efficient distribution of knowledge. Its supply chain will include industrial, academic, and governmental knowledge-generation systems in addition to its own internal systems and processes.

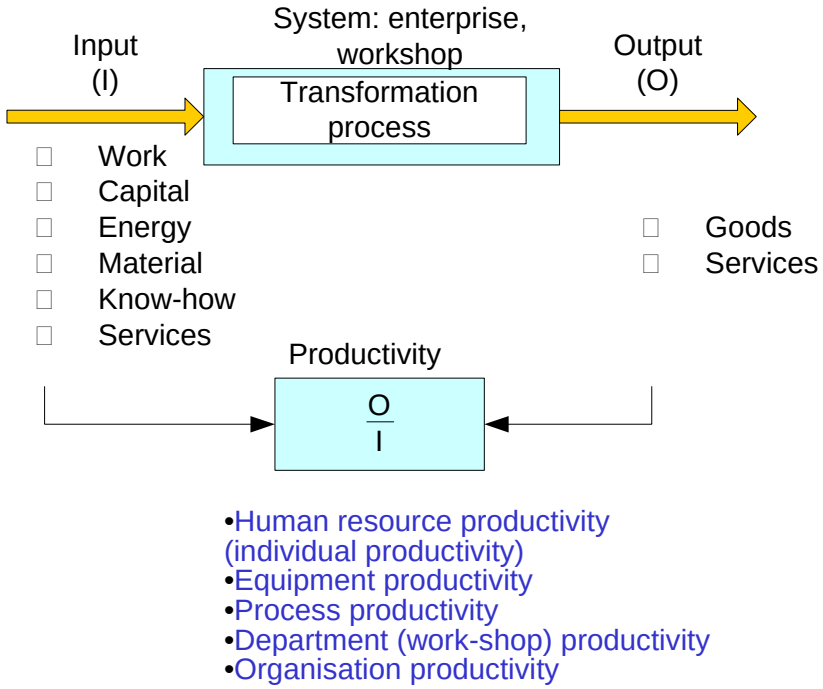

Fig. 1 Production is a transformation process where inputs have been changed by the system to outputs

With the objective to create the knowledge repository the project INNOMET was initiated.
The user interacts with the control module, the role of which is to work out the search strategy on the basis of initial data given by user, via user's interface.
The knowledge base connects in a certain field manufacturing enterprises, consultancy firms, educational organizations and universities to handle local resources for larger subcontract orders and production volumes. Such a network increases directly the competitiveness of enterprises located in periphery regions. In long-term, the system can also provide comparative know-how and practical examples how similar issues are dealt in different European countries.
The sectoral co-operation system and networking model helps to activate the labour market, transparency of labour force demand, lack of qualified labour force and links between all the different organisations of the sector locally and internationally. Pooling sector-wise information from different parties – companies, education institutions, students, and trainees is a very innovative approach. In implicit way, proposed system provides a set of tools: dynamic web-based sectoral job and trainee information (demand in private sector), dynamic profiling of sector companies for analyzing existing qualified labour force quantitative and qualitative level and human resource needs with current situation.

The integrated database system (see Fig. 2 – a picture of information flow between different databases enhancing cooperation) for educational and industrial needs in the sector includes also a database of existing educational opportunities – different levels of study programmes, and industrial needs for human resources based on the employee qualification standards.

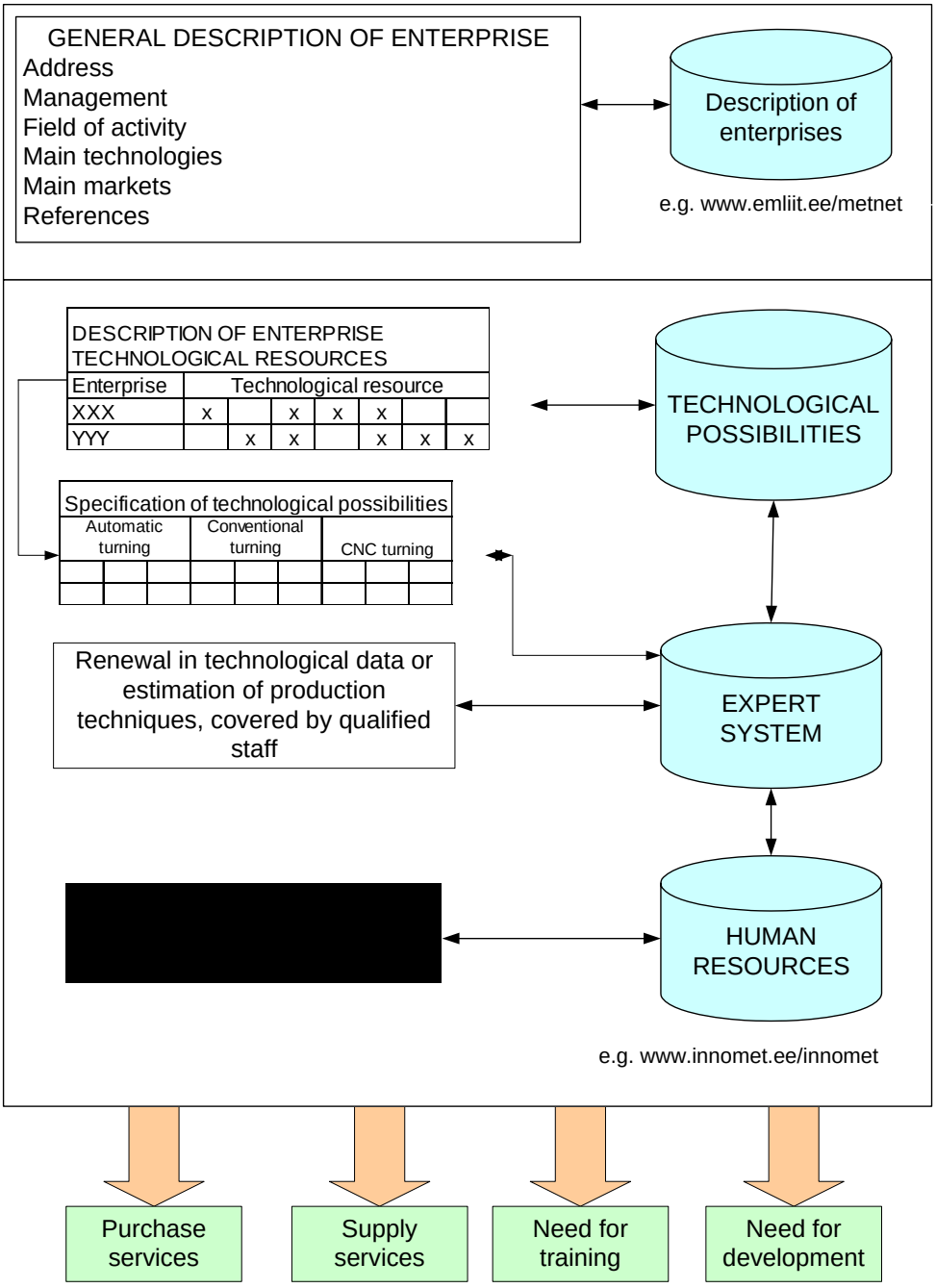

Fig. 2. Information flow in virtual database solution for development of technological resources network

It focuses on enhancement of the competence of students, employees and industry to act successfully on the European market in order to strengthen the competitiveness of the European industry, especially the manufacturing industry. This will bring together a critical mass of

"customers of education" and "suppliers of education" for resolving above-mentioned shortcomings. Such a system increases directly competitiveness of the enterprises located in periphery regions. Elaborated model is usable with minor changes in any other industry field.

INNOMET database could also serve as a dynamic and constantly up-dated study on human resources in the sector if a relevant pool or so called critical mass of companies is included in the system. Companies will be motivated to renew information in certain periods, as INNOMET tool can be effectively used for companies' own human resources evaluation and development. The system can also be made use of in the development of trans-national skills' passports in Europe.
One of the effects of the system is that company can define the level and list of competences related to the job as well as has the exact overview about the competences of the employees. This output is for good use for the educational institutions as well for there strategic planning.

For the overview about the nature of cooperation of an enterprise with each of partner group following parameters is analysed:
- number of contacts per year;
- manner of information exchange;
- nature of cooperation;
- importance of cooperation/communication timely;
- evaluation of cooperation;
- initiator of contact;
- opinion about how to develop cooperation;
- main hindrances for cooperation development;
- opinion about the development of special-purposed cooperation networks.

Nowadays, in the world of rapid development cooperation plays an important role. Relatively low intensity of cooperation with the surrounded organisations proceeds mainly from two aspects:
1. The knowledge about the possibilities offered by the enterprise-surrounded organisations is quite low. Positive impact has been poorly generalised and informed to others, even the websites of corresponding organisations are quite informative.
2. Companies have mostly small-numbered management board and engineer-technical personnel, whose work-load is heavy. Everyday business routine does not give possibilities to deal with "untypical" problems and therefore searching for new solutions or possibilities will be left behind.

3. Regional cooperation

The most important areas in the field of metal-, machinery- and apparatus industry in Estonia are:
1) Tallinn-Harjumaa;
2) South-Estonia;
3) East-Estonia (Lääne- and Ida-Virumaa).

The areas above have the biggest concentration of metal-, machinery- and apparatus companies and their share of total industrial production makes more than 80%. At the same time one can say, that the contacts between these areas are relatively low. Activity-based and informative axis

between areas is almost totally missing and enterprises in these areas are operating quite isolated. Cooperation network of toolmaking enterprises is introduced on Fig. 3. The enterprises are SMEs, INNOMET system enables them to order needed courses and thus achieve better competitiveness in global market.

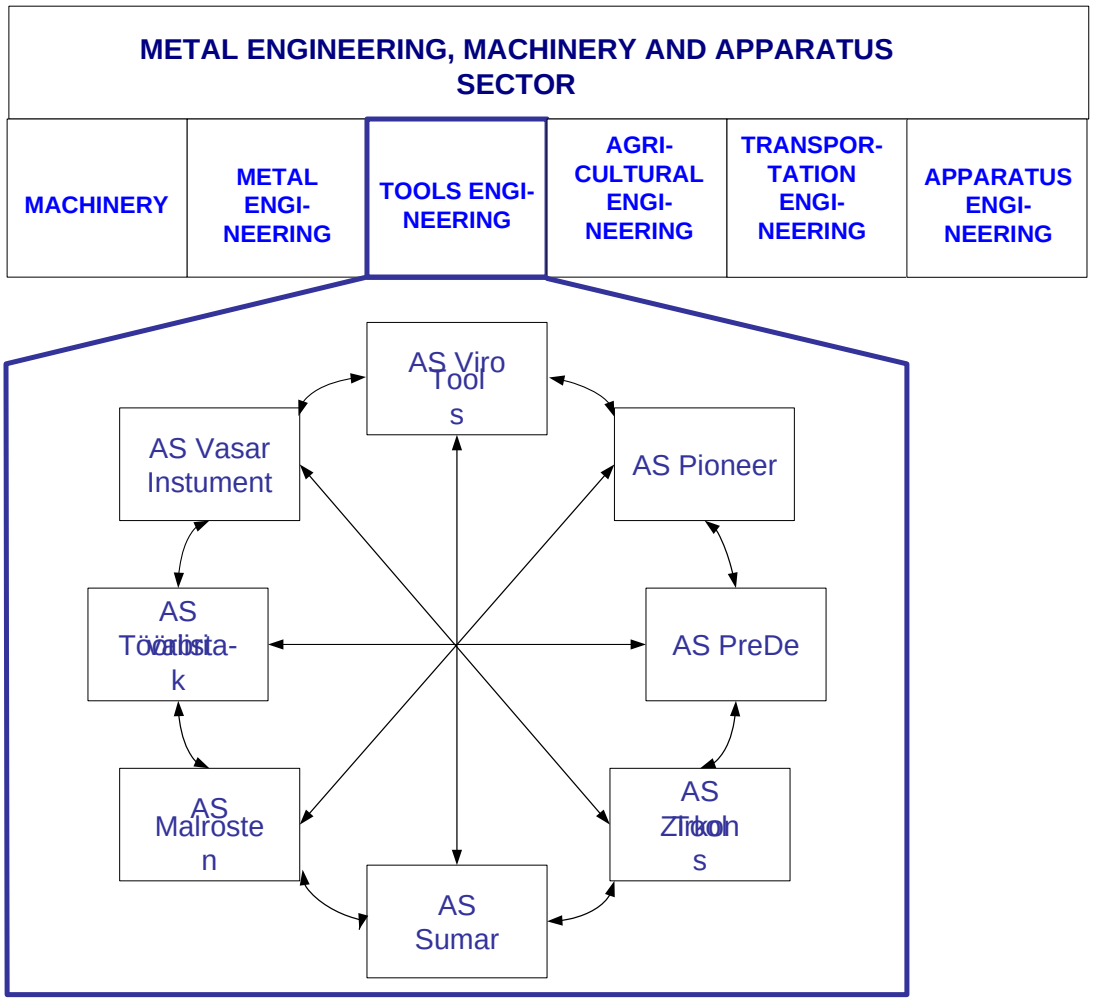

Fig. 3 Cooperation network

Activity-based and informative cooperation between areas could have following objectives:

1. Compilation and implementation of joint training programmes, especially in the fields, where there basis of local knowledge and skills is missing;
2. Exchange of information about customers and markets. Solid and impersonal information about problematic customers should reach all companies. Also, joint access to new markets of discovering of potential opportunities would be more fruitful acting together.
3. Organisation of cooperation in the field of R&D (purchase of new equipment or technology). Presentation and learning of technologies, if possible writing a development project, applying financing from some Enterprise Foundation.
4. Integrated cooperation between educational institutions and enterprises. One possibility could be to identify the needs and possibilities of work-force in schools and to offer places for apprenticeship. Different companies could concentrate on apprenticeship places in different field, with the aim to cover all the main fields for the industry branch by acting together.

Development of cooperation has been happened so far quite spontaneously without clear visions and cooperation. There are two principal possibilities, how to organise cooperation:

1. Cooperation between functional groups (see Figure 4).
2. Cooperation between geographical communities.

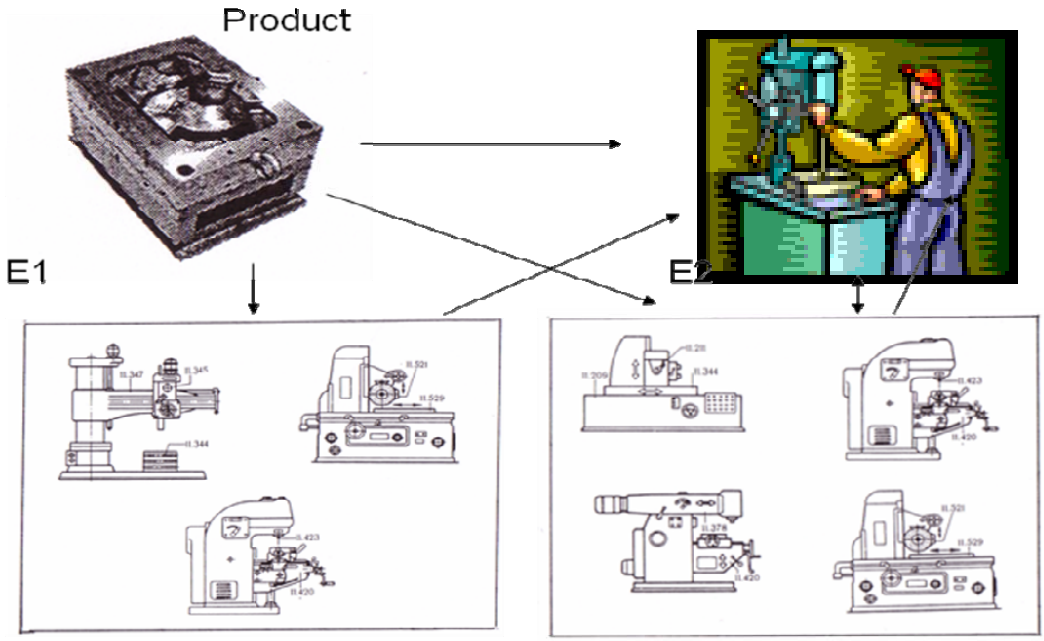

Fig. 4 The analysis of technological capabilities for producing certain type of workpieces. Similar technologies need also workforce with corresponding competence – a good task to solve by INNOMET system

Both schemas have their own advantages and disadvantages. It is definitely easier to organise cooperation between geographical communities, as the number of global connections is smaller. But, the cooperation between geographical communities is limited to general exchange of information, not much to raising and solving essential issues. For the innovative progress it would be rational to exploit cooperation between functional groups. Here the engines and initiators should be the functional groups themselves. Every functional group should define its goals and tasks to achieve them in a joint environment. General forums could have coordinating and analytical character.

4. Integration cluster

Besides business environment, where the company functions, he has to be in cooperation with many elements of business chain. Business chain is a connection, which, resulted from the strategy and goals of the company, will be implemented through the organisational structure.

Following activities will create a business chain of a typical machine building enterprise:

- marketing;
- R&D;
- purchasing activities;
- preparation for production;
- production;

- sales;
- delivery;
- after-sales customer support.

If junctions and connections between them are defined and they are located on a specific area, a structure is formed. A structure is a closed, fixed system, a network an open system.

To enhance competitiveness and productiveness it important to have integrated production and cooperation networks. The vision of a cooperation network has been described on Figure 5.
Integration means cooperation and co-effect between different structural (internal) or network (external) elements.

General objectives of networks are following:
- to divide actions or activities – cooperation for better achievements;
- to divide knowledge and/or information – cooperation to strengthen competitiveness;
- by dividing goals, tasks, actions – achievement of higher professionalism with shorter time and less costs.

Returning to realisation of business chain in the company, it is extremely important for manufacturing company to organise procurement and supply. Both procurement of goods for manufacturing and delivery of products to consumers are the components of logistics.

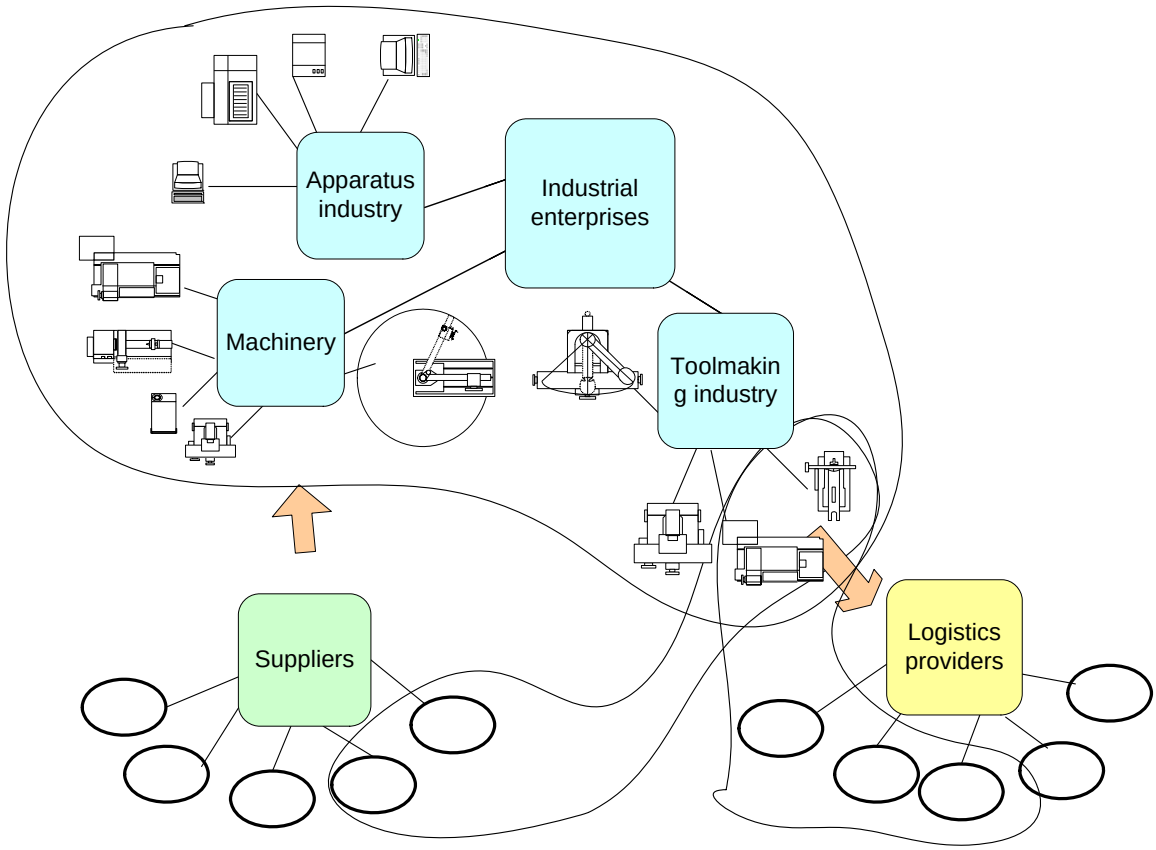

Figure 5. Vision of cooperation network

5. Integration between industrial enterprises and educational institutions

Production-related expenditures in company can be divided into three main categories:

- regular costs of the plant (costs of production premises, equipment, communications etc);
- expenditures for materials;
- salaries.

Current production can be characterized by the pressure on all these articles. This requires putting more focus on higher productivity, where qualified workforce plays an important role.
Training of personnel plays an important role by development of human resources in the company. For organising a training cooperation with training institutions is needed. It is also important to fixate and to inform schools about the main training fields.

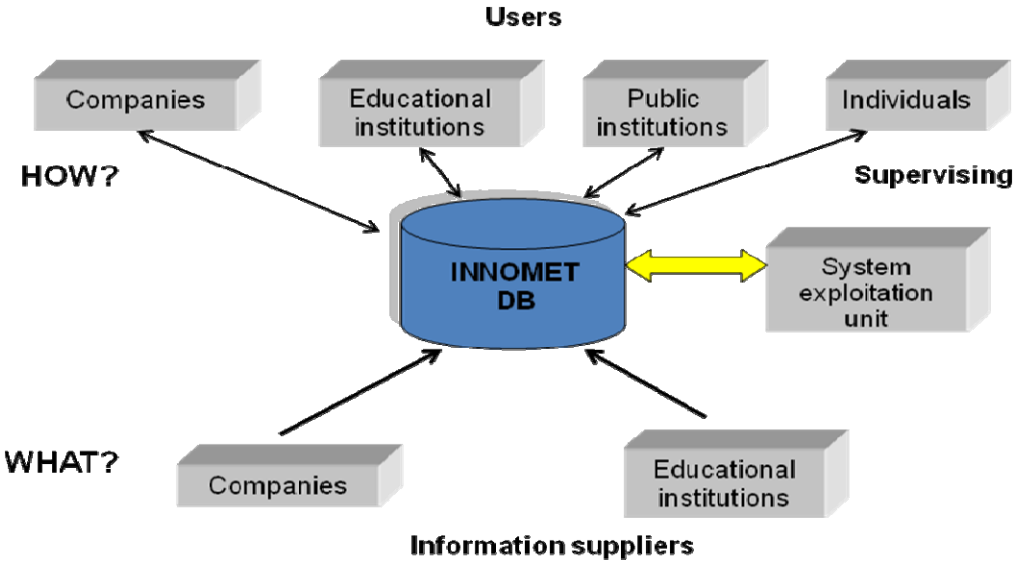

Figure 6. Information flow in virtual database solution for development of integrated human resources network

6. Analysis of cluster development in automobile industry

Automobile industry is one of the most innovative and fast developing industrial branches in the world. There is a hard competition between car manufacturers. Main levels of the competition are:

- Number of car models;
- Duration of the launch of a new model;
- Innovativeness of a new model:
  - User-friendly;
  - Functionality;
  - Safety;
- Price for consumers;
- Quality.

From the point of view of manufactures competitive advantages are:

- High quality;
- Low manufacturing cost;
- Short production cycle;
- High flexibility.

To profit from these competitive advantages all car manufacturers have to solve constantly following strategic issues:

- Level of automation (i.e. balance between human capital and machines);
- Level of labour professionalism (development of human resources);
- Level of flexibility (how many car models can be produced together on the main production line and how fast could the equipment be readjusted from the production of one model to another one);
- Length of stroke (time unit, after which new car will be completed on the production line);
- Use range of new (expensive) materials (how long is the planned life cycle of one car part);
- Level of quality insurance (quality lies on car safety, smoothly running, comfort, aesthetic look and its persistence);
- Level of product development and range (what is the difference between old and new model and how long is the life cycle of one product);
- Optimization of supply chains (what is the relative importance of the products manufactured by base company and how the subcontracting system is organised).

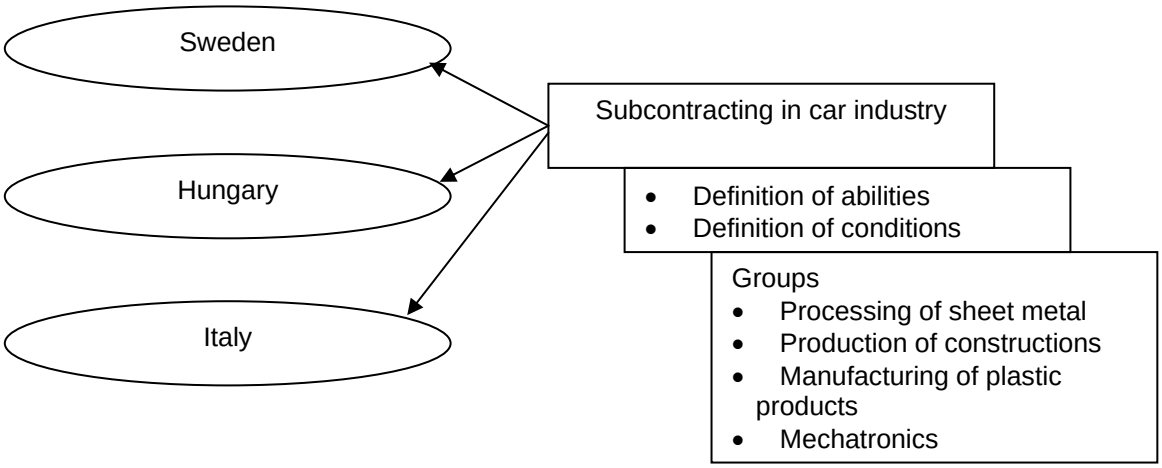

Figure 7. Cluster development

To be part of car industry subcontracting network, certain ability requirements should be fulfilled by applicant. Most important among them are:

- infrastructure;
- production volumes (to produce details or products in bigger volumes, 100 000 per month or more);
- qualified personnel (qualification certificates or other documents proving competence);
- company-based certificate (ISO 9001:2000, QS 9000, ISO/TS 16949:2002, etc);
- guaranteed punctuality by fulfilling orders;
- required quality of products and mechanisms for its verification;
- flexibility.

Proof for ensuring corresponding criteria are usually so called „other party" audits, which will be carried out by representatives of manufacturers. Company, who wants to participate in subcontracting network, has to prove his ability to fulfil those criteria mentioned above. From the point of view of ensuring quality of products, it is important for manufacturers to have quality management certificate ISO 9001:2000 or other certificates for standards. Conceptual model of ISO 9001:2000 can be found on Figure 8.

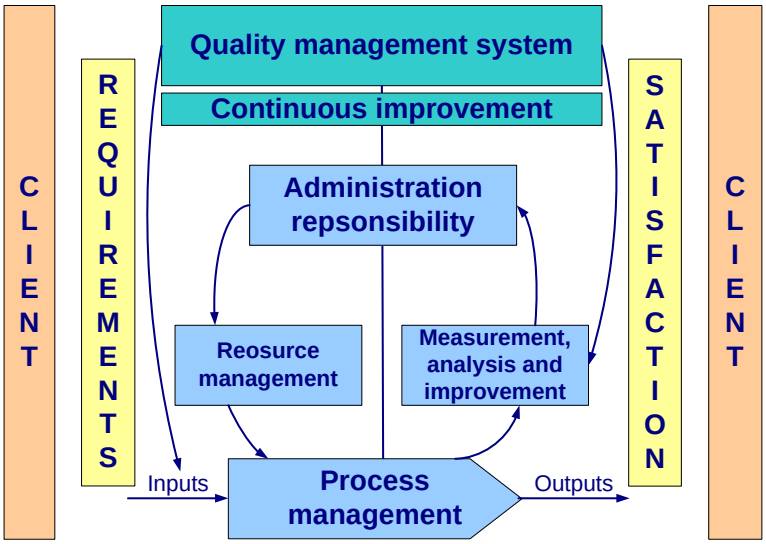

Figure 8. Conceptual model quality management ISO 9001:2000

The model is targeted to demands of clients, their wishes and their fulfilment (taking into account quality functions). Activities from the client requests until their realization should be covered by quality management system, which will be realized on the basis of corresponding model.

There are three main components by quality management system:

1) Structure of quality management system (harmony between organizational structure and quality management system` s structure);
2) Management of resources with activities to evaluate, measure, analyse and improve the results);
3) Process supervision.

All listed components have quite complicated nature, whereby each of them has its own structure, based on tasks.

Innomet has had positive effect in all partner countries, enhancing clustering and contacts between SMEs. The tool engineering industry has been most active in participating, as seen in Estonia and Portugal. Automobile Industry has a big potential as user of Innomet as shown in the report. There has been initiated national project in Estonia for implementing INNOMET system also into five new sectors: Building, Electronics, Information Technology, Woodworking and Automobile Industry.