

EVALUATION OF NETWORKING MODEL EFFICIENCY IN NANOTECH CLUSTER BETWEEN FINLAND AND RUSSIA

Case: The Jyväskylä Region

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Abstract <p>This bachelor thesis evaluates the existing cooperation between Russia and Finland in Nanotech cluster territory of the Jyväskylä region. In addition, it explores various networking models that can be implemented in this region. This information can be used for the future ideation of the knowledge networking hub in nanotech cluster. The research was initiated by Jyväskylä Innovation Oy and intended for the implementation in the arising cooperation in Nanoscience industry between Russia and Finland. The reason for conducting this research study is an attempt to explore the most appropriate and optimal networking model for accelerating the transformation of technologies into profitable enterprises.</p> <p>The study is built on the extensive theoretical basis, which was further used for the implementation of results and drawing conclusions. The information was collected using Literature, Printed materials and Internet resources. The research strategy consists of observations on the practical networks in the region and qualitative data, gathered through interviewing the nanotech cluster representative.</p> <p>The research may help to reconsider the networking politics for Finnish and Russian Nanotechnology industries, putting a special emphasis on networking obstacles and hidden barriers. The findings of this study give a lot of ideas for the further research in this field.</p>		
Keywords Networking, hubs, cooperation, nanoscience, personal interview.		
Miscellaneous: Business clusters, innovation centers, knowledge hubs, qualitative research		

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1. INTRODUCTION

1.1 Topic introduction

The purpose of this research work is to understand the nature of networking hubs and their implementation in Finnish-Russian cooperation in the sphere of nanotechnologies. It's a well-known fact that networking plays an essential role in the development of modern business relationship and global collaboration. An appropriate and correctly chosen networking model can lead to successful cooperation of various business units and research institutions world-wide.

Nanotechnology cluster was chosen as the key research area, because it seems to be one of the most promising industries, with a good potential for the future development. Author's practical training in Jyväskylä Innovation Ltd gave a supplementary interest and motivation for conducting this research work.

This thesis is built on the extensive theoretical basis, which was further used for the implementation of results and drawing conclusions. It includes valuable information about basic networking concepts, innovation centers, hubs and description of nanotechnologies industry both in Finland and Russia. One of the strongest sides of this research work is a detailed and well-grounded personal interview with the representative of nanotech cluster. The critical viewpoint of interviewee is a good way to enrich the practical utility of this research work.

In addition, this thesis gives a review of the current situation in the nanotech cluster both in Russia and Finland, the state of cooperation and the outlook of this partnership growth. This empirical observation helps to form a clear vision of the chosen research area and industry. Moreover, it gives a chance to propose author's own vision of networking models and efficient communication, along with ideas for the future research in this area.

1.2 General Facts of the region and Nano Cluster

Before this research can be conducted, the author would like to give a brief description of the Jyväskylä region and its developing innovation system, putting a special emphasis on the nanotech cluster.

Historically, Jyväskylä Region has been well known throughout Finland for its advantageous, from the business and trade point of view, location on the crossroad of main trade routes, right in the heart of Finland. Nowadays, it offers a rich variety of educational institutions with various research and development facilities. In addition, there are several organizations working on the business and technological development of the region, such as The Centre of Expertise Programme (OSKE), Jyväskylä Regional Development Company Jykes Ltd and Jyväskylä Innovation Ltd. Their major activities and their importance for Jyväskylä will be briefly described below.

Jyväskylä Regional Development Company Jykes Ltd was established for the promotion, growth of entrepreneurship and various business related activities. Its activities are pointed at developing and supporting new knowledge and technology based companies. Besides, Jykes Ltd is playing the role of the mediator between regional players, universities, state institutions and vast network of partners throughout the world. “The Jyväskylä Region is one of Finland's five centers of growth and an important industrial area. There are over 7 500 companies in the Jyväskylä Region. The traditionally strong branches of industry, such as technology, printing, communication and wood products industry flourish in the Jyväskylä Region. In addition, wellness and nanotechnology constitute new sectors of business and expertise”(Jykes Ltd website, 2010).

According to Jykes Ltd website (2010), there was a launch of a new concept -“the Human Technology Region, which combines top-flight information technology with the human perspective, in a unique, trailblazing manner. Pooling our strengths and know-how makes for a varied, flexible and idea-rich platform generating new, leading edge technologies and services for an ever more successful future!”

This concept includes a long list of business support activities for those, who are interested in expanding their company's presence in the Jyväskylä region or creating a new enterprise from a sketch. They also provide business consultancy, idea evaluation and incubation services.

According to Jykes Ltd booklet (2010, 3), Central Finland's specialty is innovative technologies. The region has a centre of expertise in some industry sectors, such as: ICT technologies, paper making technologies, nanotechnologies and energy technology. These are the areas, where Jyväskylä Region is operating, and claiming to provide opportunities for business development, commercialization of the products and networking.

The following figure shows the main fields of expertise and main working areas.

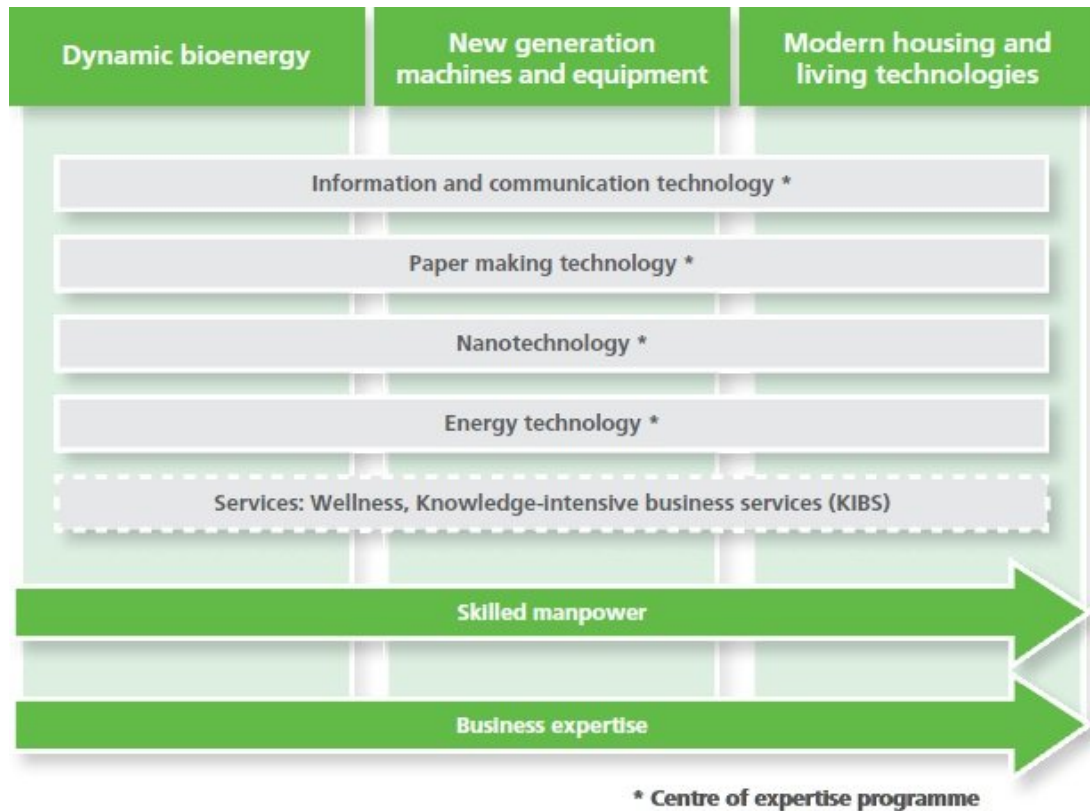


FIGURE 1. Center of Expertise Programme Activities (Jykes Ltd booklet)

The second major organization is called The Centre of Expertise Programme, which is shown on the figure above. This intersection of terminology and names proves the cooperation between all these organizations and programs. This synergy is mutually beneficial, and can lead to the efficient collaboration.

The Centre of Expertise Programme (OSKE) is a state programme, which has developed a national innovation strategy, aimed at the local enterprises development, cooperation between them, as well as internationalization and commercialization of technologies. The centre is composed of 14 state competence clusters. Each of the clusters contains from four to seven local Centers of Expertise.

The Jyväskylä region implements five national cluster programmes:

- Energy Technology
- Ubiquitous Computing
- Nanotechnology
- Forest Industry Future
- Tourism and Experience Management (affiliate members)

Jyväskylä Innovation Oy also coordinates the national Nanotechnology cluster programme (The Centre of Expertise Programme OSKE website, 2010).

The above mentioned development company Jyväskylä Innovation Oy is the place where the author did his practical training. The key idea of the organization is generating more business with a strong presence of Finnish expertise in nanoscience and business development.

The company constantly develops its business network and attracts financial support from local partners and research institutions, such as Nanoscience Centre (NSC). This centre is organized in cooperation with the University of Jyväskylä. It is organized with the help of the approach of interdisciplinary structure. It means that NSC combines the expertise of biology, physics and chemistry in order to get an expected output from perspective nanotech solutions and commercialize them (Jyväskylä Innovation Ltd, 2010).

The distinctive feature of all these institutions is their constant cooperation between each other, which can enable the innovation system to stay efficient and up-to-date. Every year these three institutions organize different business and technology related events, such as working seminars, nano forums, press conferences, financial panels and so on. Finnish delegates also visit various international events in this field of activity. One of these events is the annual international Nanotechnology exhibition and forum Rusnanotech Expo, which takes place in Moscow. Russia is one of the most strategically important partners of Finland in the sphere of Nanotechnologies, it will be thoroughly described.

1.3 Nanotech industry in Russia

Nanotechnology industry in Russia is still in its infancy, though we can observe the positive dynamics in last 5 years. It has all started on the 19th July 2007, when “the Federal law of the Russian Federation of the Russian Corporation of Nanotechnologies” was issued by the Russian government (Rusnano OSJC website, 2007).

Later on, the state organization - Russian Corporation of Nanotechnologies was renovated and reorganized into a joint-stock company Rusnano in March 2011. “Rusnano's mission is to develop the Russian nanotechnology industry through co-investment in nanotechnology projects with substantial economic potential or social benefit.” Russian government is the only shareholder of the company, owning 100% of its shares. Anatoly Chubais, the former head of the state electrical power monopoly “Unified Energy System”, is the CEO and chairman of the Executive board of Rusnano (Rusnano OSJC website, 2010).

Let's take a brief look at the current state of affairs in Russian Nanotechnology sector. Nowadays, Russian Nanotechnology market share is still less than 1%, which is a miserable amount comparing to world leaders. At the same time some of the industries remain to stay on a decent level, commercialization of technologies is the weakest point. Open joint-stock company Rusnano made a very optimistic five years forecast, indicating the immense growth of the Russian share in world nano market in amount of 3% by 2015 (Russian business newspaper website, 2010).

TABLE 1 shows the ambitious seven-year plan for revenues from the Nanotechnology industry in Russia.

	2008	2009	2010	2011	2012	2012	2014	2015
Total investments	\$0.73bn	\$0.86bn	\$1.03bn	\$1.03bn	\$1.05bn	\$1.13bn	\$1.25bn	\$1.48bn
Sales of Russian nanoindustry products	\$0.71bn	\$2.86bn	\$5.54bn	\$8.57bn	\$12.14bn	\$16.79bn	\$23.21bn	\$32.14bn
Share of world market of nanoindustry products	0.07%	0.25%	0.45%	0.80%	1.25%	1.85%	2.4%	3.0%
Volume of exports of nanoindustry products	\$0.14bn	\$0.93bn	\$0.68bn	\$1.11bn	\$1.86bn	\$2.89bn	\$4.43bn	\$6.43bn

**TABLE 1. Market Share Growth Plan for Every Seven-Year
(Nanowerk website, 2008)**

According to gross domestic product (GDP) ranking, Russia is in the 6th place with an approximate Purchasing Power Parity (PPP) of \$2,218,760,000,000. (Economy, Investment & Finance Reports website, 2010) This is a relatively good result, though in this case it doesn't affect the intensity of Nanotech industry growth.

For many years, countries, which were not among the top 10 or even top 20 biggest economies, were steadily investing in nanoscience, technologies and nanotech businesses. Russia is just making its first steps on this difficult route. All the governmental controlling institutions, most of the educational units and the industrial base needed a fundamental renovation or even building from the very beginning. Moreover, the procedure of actual commercialization was unknown, therefore not working. In April 2007, the president of Russia Vladimir Putin has signed off the public policy paper, which was about launching a multi-billion dollar program to breathe life into the Russian nanotechnology industry and bring it on a new level in seven years, by 2015 (Nanowerkwebsite,2008).

The open joint-stock company Rusnano is in charge of the chosen approach and strategy. The main idea of the corporation is the implementation of the plans and gaining the world leadership in the field of nanotechnologies. Though it works in tight cooperation with

many governmental economic institutions, like Joint Stock Company 'Special Economic Zones or Development and Foreign Economic Activity Bank, Rusnano has a priority and the leading role in all nanotechnology issues. The company pays special attention to these key industries: energy, nuclear and space development. In addition, Rusnano tries to support technology development from the first early lab stage to further incubation, acting as a Venture Capitalist. Rusnano believes that in future these technologies and projects will be financed both by the private sector and by the local players and foreign investment programmes (Nanowerk website, 2008).

To sum up, Russia has chosen its distinctive, unique and centralized model for the development of the nanotechnology cluster and other nano related industries. This approach is very different from the models in most of the industrial nations and big players in the world. The chosen strategy will develop according to the scenario, which is very different from the European and U.S. models, where the role of the private investment capitals is much more significant (Nanowerk website, 2008).

According to the Nanowerk website, Rusnano has defined a long list of key tasks with the highest priority for the industry development:

- Foresights and road mapping
- Infrastructure programs.
- Research and development projects.
- Intellectual property
- Educational projects
- Development of market conditions and relations
- Certification, standardization and metrology
- Safety and risk management
- Public awareness
- Nanotechnology related information
- Participation in the legislative process
- International Co-operation (mainly concerns the high-tech products export and growth of the international cooperation)

Establishment of an international forum for the exchange of ideas and discussion
As we can see, the Rusnano company projects cover most of the key sectors of the Nanotechnology industry that play a crucial role in its future development and commercial success. The company pays special attention to the development of international cooperation, experience exchange and networking.

Every year Rusnano publishes its annual results, describing all the internal and external activities, international agreements, investments evaluation, request reviews and so on. The annual report 2009 contains information about two important agreements that have been signed between Russian Federation and Finland. First of all, it concerns the cooperation with the Ministry of Employment and Economy of Finland. Moreover, the two sides have agreed on the common design of the new program plan for following years. The second agreement concerns the investment program with the Finnish Funding Agency for Technology and Innovation and Finnish State investment fund Tekes(Rusnano OSJC Annual Report).Both documents are important to this research, because they directly affect the development of an effective communication model between Russia and Finland.

As for the project activity of the company, we can observe that Rusnano received 76 applications for project financing in 2009. These requests came from 22 foreign countries, including Finland. Rusnano states, that the number of applications has doubled, compared to the figures from the last year. (See FIGURE 2) Project type distribution can be seen in the additional chart. (See FIGURE 3)

Figure 2.
Distribution of requests by foreign country
and administrative region.



Figure 3.
Distribution of requests
by project type, 2009.

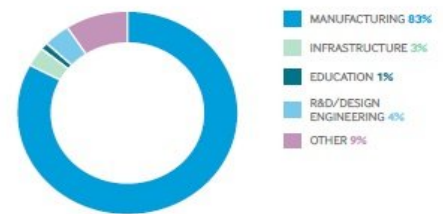


FIGURE2. Distribution of the Requests by Foreign Country and Administrative Region (Rusnano Annual Report)

FIGURE3. Distribution of Requests by Project Type (Rusnano Annual Report)

Thus, we have received a basic vision of the current organization of the Nano cluster in Finland, with a special emphasis on the Jyväskylä region, along with the basic idea of the promising Nanotechnology industry in Russian Federation.

1.4 Motives for the research

Due to the practical training in Jyväskylä Innovation Oy, the author became interested in nanotechnology industry and all kind of nano related businesses. In addition, he got acquainted with a vast international network of professionals, working in the nanotech

cluster. Surprisingly, the lion's share of the contacts was from Russia. These factors have directly affected the choice of the research topic. The personal motivation for the research is related to the author's activities in Jyväskylä Innovation Oy and their possible impact on the development of the Russian-Finnish Nanotech collaboration.

1.5 Research problem

For the purpose of creating a networking concept for the commercialization of Russian technologies along with the enrichment of the Finnish innovation system and economics, there is a certain necessity for establishment of correlation between nanotechnology industries in Russia and Finland.

1.6 Research Questions

Based on the above mentioned research problem identified earlier, the following primary research questions are assigned:

- 1) What is the definition of the networking hub along with the efficient networking model?
- 2) How to implement and adopt this model in the Jyväskylä region Nanotech cluster?

2. THEORETICAL BASE

2.1 The foundation of the network

We live in exponential times. Accelerating technological progress, globalization, severe competition, demanding customers are the biggest challenges that businesses face

nowadays. It is often said that firms need to be innovative, flexible, and adaptive in order to survive in a rapidly changing environment. Nevertheless, the organizations and individuals also become extremely interdependent in this kind of environment.

The concept of networks is not new for the 21st century. In the near past, local suppliers of power and gas were tightly interconnected. For instance, the telephone companies have established connections and started to cooperate for providing their local customers with communication outside their area. Today, the fast technological development allows businesses to connect and collaborate in such a way that these networks have become a fundamental trend in business along with the social life (David Skyrme, 1999, 21-25).

For the purpose of creating a better understanding of networking phenomena, let's try to go deeper and understand what networking actually is. In fact, this is one of these concepts, where you are able to get an endless amount of definitions and explanations from the infinite variety of sources. Everybody can try to imagine it, but it's extremely difficult to say that you are aware of its core meaning. Basically, the number of networking definitions can be compared with the population of the Earth. For instance, in the Merriam-Webster dictionary "networking" is described as: "the exchange of information or services among individuals, groups, or institutions" (Vermeiren, 2007, 20-21).

The term "networking" is often used for description of all your pre-starting procedures before the event, where people come together to do some kind of business. Nevertheless, this is just a small part of this concept. Networking is everywhere, meaning that it also includes helping each other in our private environment. Our everyday life is full of examples of networking, from recommending a movie or restaurant to lending a car to your friend. We are constantly involved in the processes of networking (Vermeiren, 2007, 22).

As cited by De Klerk (2009), a network could be seen as a set of nodes and ties. Where nodes are institutions, businesses or individuals, and ties are the relationships established

between them. Therefore, networking is the process in which different nodes collaborate with the purpose of achieving competitive advantage. Additionally, a networking organization may include independent professionals acting as independent nodes united by a common goal. Therefore, this kind of organization may have an informal character. Strategic alliances, such as joint ventures and working partnerships, are the examples of formal business cooperation in which partners share resources and commitment for a fulfillment of the common goal (David Skyrme, 1999, 7-17).

2.2 Deeper insight in networking concepts

Barabasi gives an insight in the theory of networking by following great mathematicians such as Renyi, Euler and Erdos. We are able to get acquainted with the foundations of graph theory and understand the way it has changed our vision of networking process. It is not a secret, that every one of us is a part of a huge cluster, the enormous social network, which covers the whole world. Evidently, we don't know everybody and don't have a physical ability for that, though we can be sure, that there is a path between any person in the world. It is exactly the same structure and organization, which we can observe between two neurons in our brain, various chemical elements in our body or the cooperation between two companies (2003, 6 - 19).

Sociologists say that we know the names of 200-5000 people. Our brain cells are connected to hundreds of others, sometimes even thousands. Every enterprise is a hub itself, continuously organizing links with distributors, suppliers, partners, agencies and so on. In human's body, the majority of molecules have tens of reactions, whereas water has hundreds of them. Nevertheless, all these networks are not just a web; they are highly interrelated, structured and organized. This is the reason, why there are no groups of people completely isolated from the rest of society and why all the cells in our body are so integrated forming the cellular map (Barabasi, 2003, 18-19).

Let's take a look at the classical networking experiment based on the following example. We are organizing a party for one hundred people going to have rest in the same

premises. The main point is that all these people are strangers and don't know any of the invited guests. Social ties will form, when the guests start to chat, clustering in small groups of 2-3 persons. Then, give a wine recommendation to a stranger from your cluster, but ask to share this information only with her/his new acquaintances. Very soon this information will start to distribute between other groups of guests. At first glance, nothing special is happening. Yet, we can observe the invisible social links between individuals from different clusters. As the result, after some time, everybody will enjoy the same drink that was recommended in the in beginning of the event (Barabasi, 2003, 14-15).

FIGURE 4 illustrates the process of the information distribution and links forming in the above considered experiment.

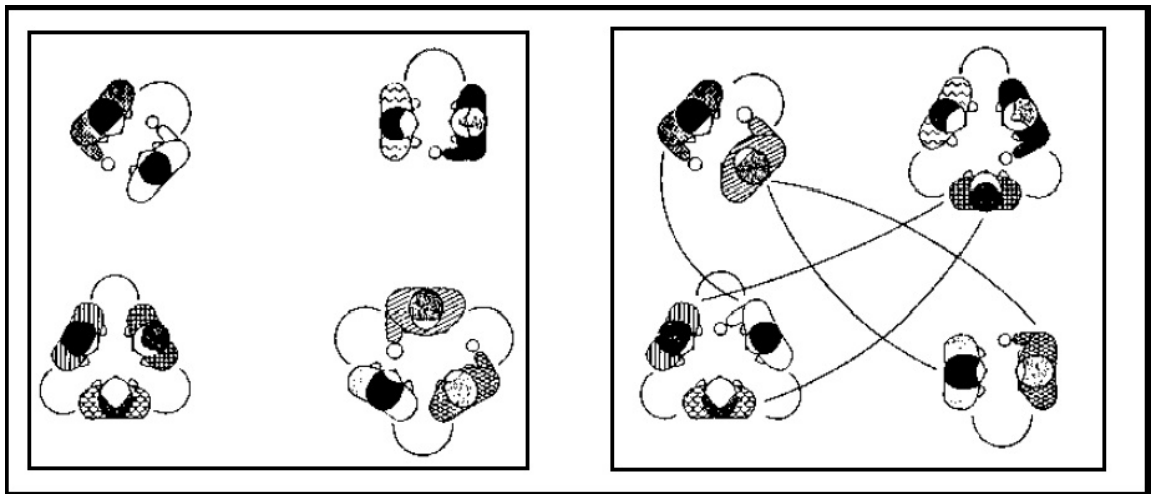


FIGURE 4. Formulating an Invisible Network at the Party (Barabasi 2003, 15)

This experiment shows us, that it is required to have only one link per node to organize the network and stay tuned. The great mathematicians Renyi and Erdos had the same point of view. Later, the existence of hubs was discovered and scientifically proved (Barabasi, 2003, 16).

Barabasi (2003, 35-40) has also highlighted one very captivating concept. First of all, it concerns the Six Degrees of Separation concept. The key idea of experiment was in measuring the distance between two random individuals, living in USA. They sent letters to random individuals to count how many steps it will take, before the letter will reach its target receiver. Surprisingly, it took them just six individuals to reach their goal. In simple words, it means that on average, there are only six individuals or links between you and any other person in the world.

FIGURE5 illustrates our ability to connect to George Bush.

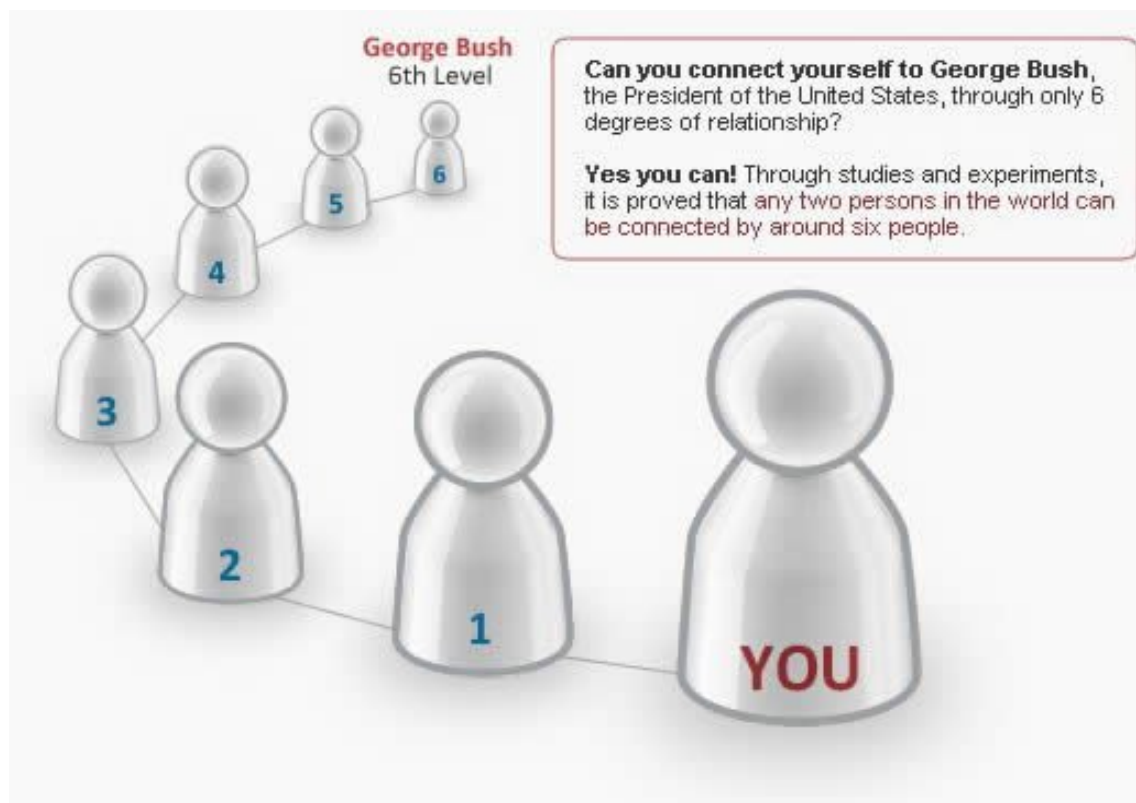


FIGURE 5. Six Degrees of Separation Experiment (Origin Organization tell6.com website, 2009)

Barabasi (2003, 39) pointed out, that this phenomenon is a product of our modern life, a direct result of our constant communication and desire to keep in touch with each other. In addition, the assistance of our modern ways of communication across oceans and over

long distances accelerates these processes. We are facing the new reality, living in a small village, where everything is at one's elbow and easily accessible. The world experienced a technological revolution in the 20th century, and nowadays we are facing another revolution – the Internet is blowing up. It's a well-known fact that we are 19 clicks away from any person in the WEB. All those links and connections, which cannot be maintained before, are available now. We can observe the dramatic increase of available links, links that can be available to every individual in the world.

2.3 Hubs and connectors

Let's try to understand how these links are organized and how most people are connected in a local cluster of nodes. Observing our everyday lives, it is easy to understand that some people have much more connections, than the others. Some web pages have millions of visitors daily, though some of them remain unnoticed. These active nodes with high number of links are the so-called "hubs".

Barabasi (2003, 55) gives a very impressive example of an experiment, which proves the existence of hubs. *The Tipping Point* test can help to evaluate how social you are. He presented a list of random surnames from a Manhattan phone book. Your task is to count the number of surnames, which are familiar to you with that name. Later on, the list of surnames was offered to random groups of people from different institutions: colleges, academies, etc. The results were very surprising. The income range was so huge: the lowest score was around sixteen surnames, whereas the top score was close to one hundred and eight. Approximately four hundred people participated in surname testing. However, few of them had high scores and large number of links. They were hubs.

These hubs are an essential part of modern networking processes. They play the key role in the development of networks. Connectors form the driving force; create different directions, trends, enterprises and workplaces. Additionally, these nodes with an irregular big amount of the links can be found in various systems, from molecular structures to

economies. They are the principal condition of networks in various sciences and disciplines (Barabasi, 2003, 56-57).

When it comes to the Web, we face the unlimited freedom of expression. There are a lot of ways to treat this phenomenon. Nevertheless, it is extremely hard to control the data in the Internet. The boundaries are blurred, equalizing the opportunity to be heard. However, it never happens, equality simply doesn't exist online. As soon as you uploaded any document or file to a public Web resource, it becomes immediately available to all the users in the Internet. Yet, the number of users, which will have an access to your file, depends on various factors (Barabasi, 2003, 57).

The World Wide Web structure is very similar to the society model, where few connectors know a huge number of people. These well-known hubs are the following websites: facebook.com, google.com, yahoo.com, amazon.com, ebay.com and so on. All these Web resources are very easy to get, there exist thousands of links pointing to them from other web pages. By the same token, these connectors hold all the rest, less popular resources and rarely visited links. Thus, these unpopular nodes are almost invisible, comparing with any of well-known hubs. Search engine's algorithm of work proves this simple fact. Search machines focus mainly on hot sites, ignoring less popular links (Barabasi, 2003, 58-59).

The World Wide Web is constantly analyzed and studied. There exist special Web resources, which give us an opportunity to search portal for their intranet or to help search the public Internet and to monitor this decentralized network. Figure 6 illustrates the example of live 'free world' network with pulsing hubs, made on the 29th of April 2011.

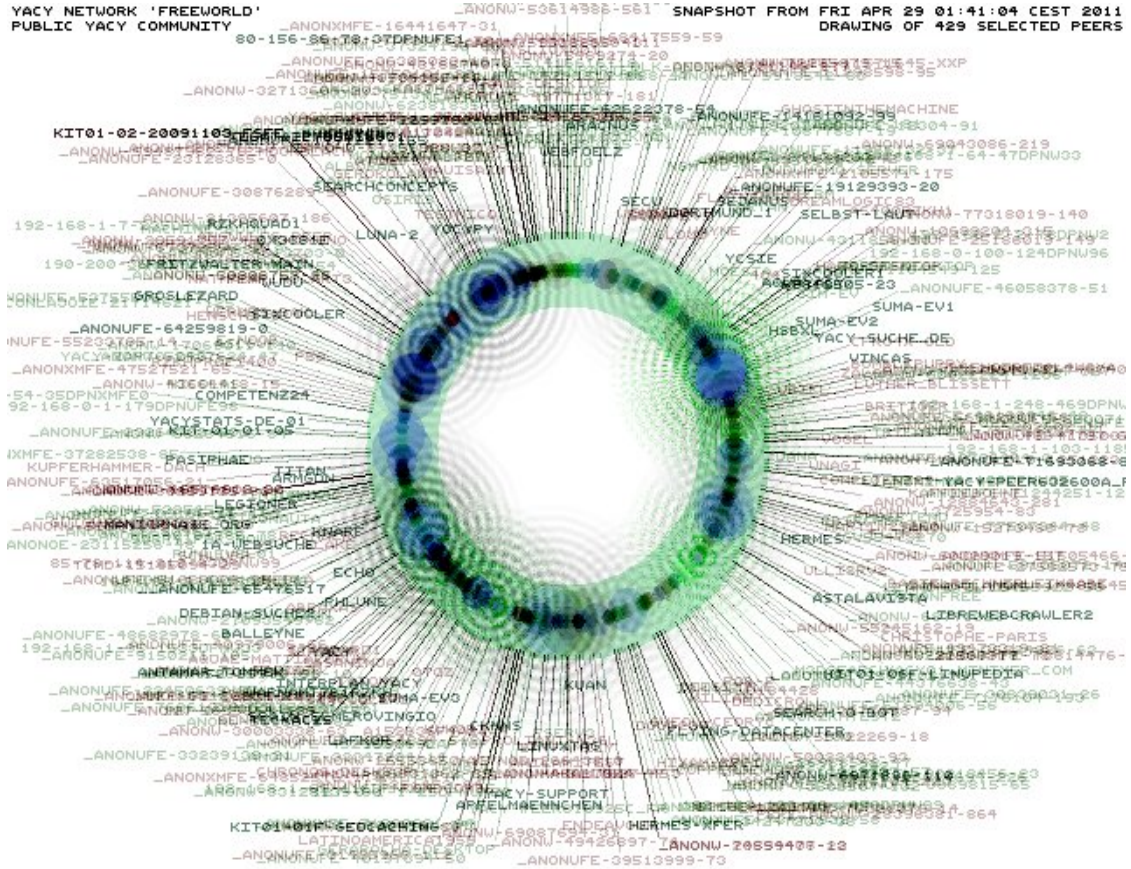


FIGURE 6. "Free World" Network (Yacy Decentralized Search Website, 2011)

To sum up, Barabasi (2003, 62-64) claims, that hubs are very important. Nowadays, they play the dominant role in the development and growth of networks. These hubs keep the network alive, drawing the shortest paths even between less connected nodes. As it was mentioned before, the average separation rate is six. Whereas between any node and a hub is usually from one and two. Surprisingly, connectors are not considered as rare occurrence, following strict mathematical laws.

2.4 Knowledge networking

Thus, we got acquainted with the key fundamental networking concepts and features. It's time to go through the ways of organizing business operations, creating clusters and various networking models. Knowledge networking is one of these models.

Knowledge networking is one of the ways of maintaining business operations. However, a simple one-sentence definition is hard to be formulated. Knowledge networking is about openness and collaboration, sharing knowledge and good practices, as well as relationship building for common benefits (David Skyrme,1999, 35-37).

In business the concept of knowledge networking can challenge the traditional management methods and have a great impact on its performance. A big challenge for many companies is the usage of the knowledge generated within one of its entities. In order to overcome this challenge, different firms that have concrete knowledge, expertise, experiences or human capital, can convert their resources and energy into profitable output. This kind of collaboration could be beneficial in many ways. In particular it can provide numerous communication channels, knowledge flows or access to different markets. Therefore, in a rapidly changing environment the establishment of such nodes and ties between separate organizations is essential, because it can distinguish them from competitors or cut costs (David Skyrme,1999, 40 - 42).

Collaborative innovation centers as an example of the knowledge network model.

The processes of globalization along with the reduction of trade barriers allowed many companies to penetrate foreign markets. At the same time the way of doing business is increasingly defined by foreign competition. Thus, foreign markets have become more important and attractive for many companies in comparison to domestic markets. The above mentioned means that firms need to possess functional networks of worldwide relationships (Wayne E. Baker,2000).

The concept of collaborative innovation networks comes as an example of such productive cooperation. This kind of networks can vary widely in structure, from small teams aiming to find a solution to particular problems to large innovation and development networks. The last seeks the growth of new products or services and access

to foreign markets. These networks would diminish national borders, cultures, and time zones. Key characteristics of collaborative innovation networks are:

- Participants share knowledge, ideas, and efforts in a pursuit of common goals;
- Collaboration with customers or competitors gives companies access to new knowledge at a lower cost;
- Participation in collaborative innovation networks allows focusing only on the competitive advantage, therefore allocating resources more efficiently;
- Companies can profit by exporting knowledge and ideas which other businesses can better commercialize.

(Bain & Company, Management tools website, 2010)

Business clusters

Another strategy for obtaining good business results could be the business cluster concept. As in the case of knowledge networking, a simple definition of the term is hard to be given. A common perception of a cluster is a group of businesses and institutions that are placed in a specific geographical region and gain benefits through cooperation (Vom Hofe, R. & Chen, K., 2006,1-3).

According to Rosenfeld (1997, 3), the key features of business clusters are:

- Proximity of customers, suppliers and competitors;
- Existence of specialized resources and technological advances;
- Facilitated flow of information, trust and openness among the members.
- Participants compete and cooperate at the same time.

Additionally, clusters could be distributed within a single city, state or region, whole nation or spread across national borders. They can also vary in size and scope as there are clusters that consist of small and medium enterprises, which involve large and small

firms. Some clusters establish research centers or create connections to universities (Rosenfeld, S.A. 1997, 5-7).

The general perception is that the companies in the clusters are more productive and innovative than those in isolation. This happens, because clusters are provided with physical infrastructure, reduced interaction costs, movement of skilled labor, inter-firm collaboration and networking. Furthermore, clusters strengthen and improve the economic development of the regions in which they are located, along with the economic performance of the firms (Ketels, C.H.M. & Memedovic, O. 2008, 9-12).

High-tech and nano clusters

Probably the best example of an innovative high-tech cluster is the Silicon Valley. This complex network comprises some of the world's biggest technology corporations, universities, research centers and a broad range of service intermediaries, such as financial and law firms (Ferrary and Granovetter, 2009, 326)

As mentioned by Ferrary and Granovetter (2009), in the innovative cluster like the Silicon Valley, every company is dependent on the presence of other companies. What is more important, in this complex system of nodes and ties, the absence of a single agent affects the efficiency of all others, and as a result the efficiency of the whole system. Moreover, innovation as well as competitive advantage is derived only when the network is complete.

2.5 Nanotech Industry description

As pointed out by Kaku (2008), "nanotechnology is the ability to manipulate atomic-size structures about a billionth of a meter across". It could be said that the concept of nanotechnology was first put forward by Nobel laureate Richard Feynman in 1959 with his famous lecture "There is Plenty of Room at the Bottom". In that lecture Feynman

speculated about the possibility of manipulating individual atoms, as well as the invention of the smallest machines. His statements were almost impossible for the level of technological progress of that time. However, a major breakthrough was made by scientists in 1981, when Gerd Binnig and Heinrich Rohrer won the Noble Prize in Physics for the invention of scanning tunneling microscope. The device itself enabled the manipulation of individual atoms for the first time in history (Kaku, 2008, 29-31).

Nowadays, nanotechnology is still classified as an early and emergent industry, yet it has already found various applications in fields as medicine, diagnostics, drug delivery, tissue engineering, waste recycling, electronics, energy production, construction, etc. Improved products such as nano-enhanced tennis balls, nano skin care and other cosmetics, aerogel hotbeds, syperhydrofobic sprays, dental adhesives, side by side with faster-burning rocket fuel additives are already being. Still the potential practical implications of nano science in the future remain tremendous (Mark & Daniel Ratner, 2003, 3-11).

FIGURE 7 gives us a good comparison of nanoparticles and various small objects. It can give us a clear vision of how small these particles are.

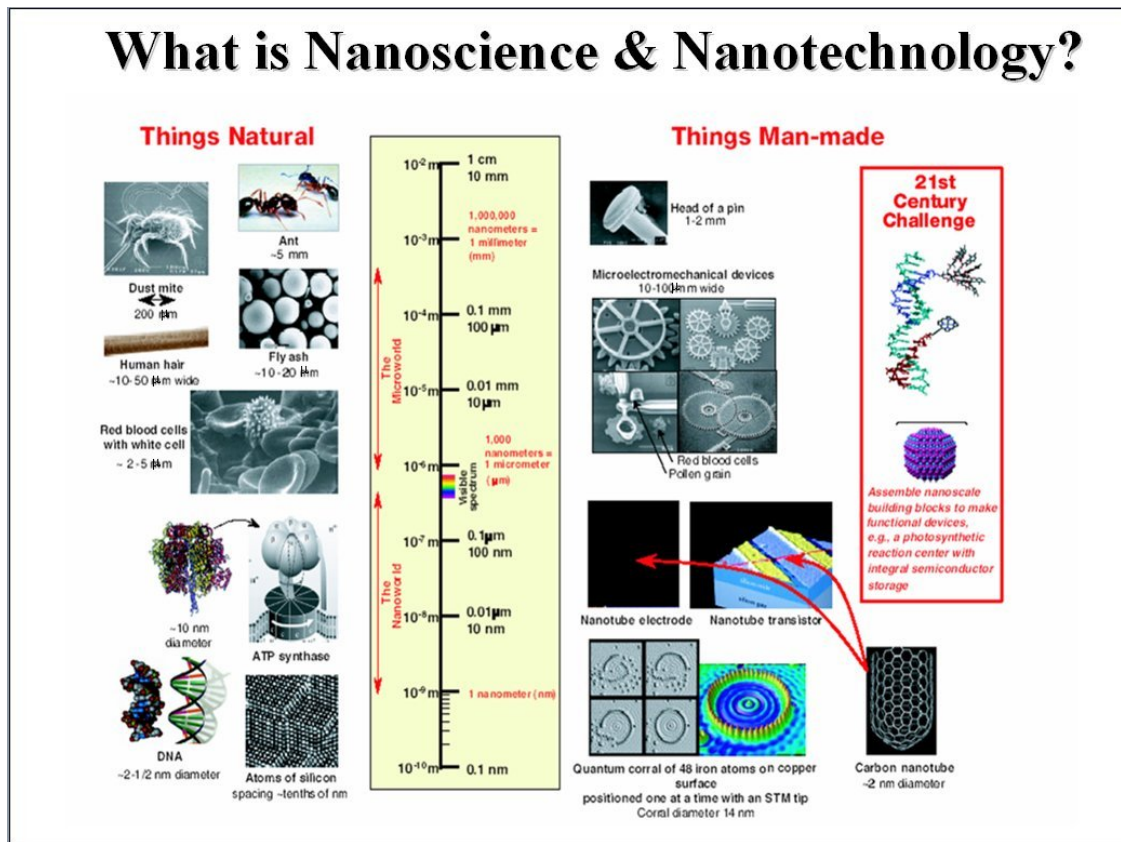


FIGURE 7. The Scale of Things- Nanometrics and More (understandingnano.com website)

There are different classes of nano effects that can add value to materials or consumer products. For example, scratch resistant products can be made with the utilization of the interface effect. The incorporation of quantum mechanical effects can create unique electrical or optical properties of various materials or products. Moreover, different product innovations can be achieved with the help of nanoparticles or improved water repellency. All these aspects of nanotech give a possibility to create an extensive range of business opportunities in future. As a matter of fact, many companies have already recognized nanotechnology, as a powerful and promising source of innovations for their businesses (Nanoforum report, 2006).

Mark & Daniel Ratner (2003, 2-6) pointed out, that according to National Science Foundation estimations, nanotechnology has a potential to become a trillion dollar

industry in the next few years. However, one should bear in mind that the science-based character of nanotechnology requires significant knowledge base in physics, biology and chemistry, which makes its commercialization a slow and costly process.

Nevertheless, there are a lot of serious obstacles preventing the commercialization of nanotechnologies. They are: high R&D and production costs, lack of sufficient investment capital and skilled personnel and intellectual property rights issues and so on. Moreover, the recent financial and economic crisis had its negative impact on nanotechnology industry, because many companies and research institutions were forced to reduce their R&D expenditures (Milmo& Sean, 2010, 23-26).

On the other hand, we should always remember about potential safety and health hazards, related to modern technologies. While most of the people consider nanotechnology as the next industrial revolution, naturally it also faces a lot criticism. In addition, many emerging technologies still hide some uncertainties about potential health and safety risks. Nanotechnology is among them. On the one hand, this lack of knowledge about potential risks can possibly increase R&D costs. While on the other hand, these concerns may reduce the demand for nanotech products in a medium or long term (Milmo& Sean, 2010).

To sum up, the dynamics of nanotechnology industry growth shows that it will probably be millions of times more advanced in the next twenty-thirty years. Moreover, its development will inevitably improve the quality and expectancy of our lives. Some scientists speculate that nanotechnology will give us a chance to invent electronics, which does not require any traditional source of energy and uses the energy of human movements or even heart beats. Human imagination might be the only limit for the future development of nanotechnology (The Telegraph website, 2011).

3. RESEARCH STRATEGY AND METHODOLOGY

The general strategy of the research process can be described as a combination of different techniques and methods. Qualitative research was chosen as a primary and a principal method. At the beginning of the research process, it was planned to interview several representatives of the nanotech cluster, in order to get an objective and realistic vision of this industry. Unfortunately, only one of them was available at the given period of time. The output of this interview gives us an inside view of the nanotech cluster in the Jyväskylä Region. The received information develops the ideation in the research field, though doesn't allow drawing final conclusions, due to its subjectivity. Additionally, observations on practical operating networks and field work in this industry were used for the enrichment of the research work.

3.1 Research design and approaches

Qualitative research – an overview

Qualitative research could be seen as a synonymous with the term *insight*. The main objective of qualitative research is to understand the meaning of individual or groups behavior to get some insight into a particular topic or problem. Different methods and techniques could be used for the purpose of implementing the qualitative research. Here are just some of the possible methods: interviews, observations, documentary analysis, etc. Qualitative research could be successfully supported by some quantitative investigation. Its key difference from quantitative research is that it does not target on solving particular problems, whereas it goes deep inside a topic and aims at in-depth description (Cooper, Shindler, 2005, 76).

Survey method

In order to improve the analysis and answer the research questions, the research work is designed to explore professional opinions, positive and negative experience, attitudes,

and find an optimal networking hub model between Russia and Finland in the field of nanotechnologies.

This qualitative research will be conducted through analyzing the already existing infrastructure, organizations and agencies operating in nanotech sphere, working links between the stakeholders, strengths and weaknesses of the whole system.

The survey method of the study is personal interviewing. This communication approach secures a good researcher-subject relation, thus leaving the author a chance to improve the quality of the information collected. Additionally, comparing it to other research techniques, it allows the author to explore the topic in greater detail as well as collect the supplemental information through observations.

The interviewee:

Mauno Harju
Director, Ph.D.
Technology Transfer
Nanotechnology Cluster Programme
Jyväskylä Innovation Ltd.

Individually prepared questionnaire was used for the personal interviewing.

The information received from the interviewee and the observation of his workplace behavior may not seem to stand as a significant research data. However, it is still valuable for further ideation in the research topic. The received information can at least give the author the interviewee's vision of the networking process and help to find answers for the research questions.

However, the fact that the participant is a Finn, working in nanotech cluster for several years, gives his responses a specific meaning as he is located in a socially binding environment. This cultural restriction enables the data to be interconnected and could

suggest that the overall attitude and concerns of the Finnish representative of the local and regional nanotech cluster is similar.

4. RESULTS OF THE RESEARCH

4.1 Interview summary

One of the strongest parts of this research work is a personal interview. Face-to-face contact between a researcher and an interviewee enabled to get a high quality output data, which played a determinative role in the understanding the research problem of this study. A special questionnaire was prepared for the representative of the nanotech cluster, working in the networking sphere, developing the cooperation between Finland and Russia. Let's look through the professional viewpoint of the director of Technology Transfer in Nanotechnology Cluster Programme, Mr. Mauno Harju.

There are five OSKE programmes, operating in the Jyväskylä Region at the moment. Mr. Harju is responsible for all of them, including the nanotechnology cluster. All these programmes are the subdivisions of the official Finnish innovation system. The key strategic goal of this organization is assisting companies in the process of business development in the Jyväskylä Region. Remarkably, even though the business is global in most of the cases, the companies are expected to be Finnish. The interviewee claims that the key idea is establishment of export oriented enterprises in the region. The scale of the country stimulates entrepreneurs to create globally oriented companies from the very beginning. At the moment, the turnover of the whole system is around 2, 5 billion Euros, though it should be 3, 5 billion, in order to reach the figures before the regress.

Mr. Harju states that networking plays a significant role in their organization. The vast network of global partners is always at their disposal. In addition, the network acts as a live organism; it constantly grows and decreases at the same time. That is the reason, why nobody can evaluate the exact size and location of the existing network. Centre of

Expertise Programme OSKE operates with many companies and research institutions in the world. Most of them are concentrated in Japan, China, Croatia and Russia. There is a lot of interest in cooperation with Russian partners, especially with Technopark Ingria in Saint- Petersburg and Finnnode representative office. The form of cooperation can be very different, from the development or partnership in marketing to the search for potential partners. The open joint-stock company Rusnano is still not very active in terms of funding Joint Ventures between Russia and Finland. Obviously, this kind of collaboration and assistance will require some years, preparatory to optimization and functioning of the whole system.

The questionnaire also covered weak and strong sides of the Russian –Finnish cooperation. Mr. Harju gave basic characteristics of networking processes, starting from the beginning of their global cooperation. First of all, the Finnish Ministry of Employment and the Economy (MEE) chose the wrong partner for collaboration. Later on, the open joint-stock company Rusnano was changed to a different partner. As a result, the whole situation stabilized and considerably improved after this strategic move.

The next challenge is the large market size both in Russia and European Union. Mr. Harju thinks that the development of cross border cooperation is mainly the question of time. Eventually, more and more professionals will be involved in this cooperation, creating new international businesses and research centers. Surprisingly, cross cultural differences are not so important anymore. Russian businessmen learn foreign languages and try to adapt their businesses to start operations in Finland. At the same time, Finnish networking organizations try to create favorable conditions for their existing and foreign partners. Russia possesses a huge technological capital and potential for future growth. Various companies and research institutions are constantly introducing these technologies to the market. Sooner or later, all these processes will lead to the establishment of new businesses and growth of the international trade.

The lion's share of the interview was dedicated to networking hubs and special techniques, which are used for the development of Russian- Finnish cooperation. The

interviewee explained the difference between the modern trends in networking and outdated communication models. One of the key features of new networking models is the dynamics. The classic of networking is establishment of bilateral partnership and communication with associates, which are already known. Unfortunately, this model of communication is not valid anymore. We live in exponential times, where everything develops so fast and continuously. There is no dynamics in keeping in touch with your old partners, browsing the same network all the time. The new model is much more dynamic and efficient. We should bear in mind, that there are no limits or borders in global business. It was not a big deal, to create a vast global network of partners for the Finnish innovation system. The representatives from the Jyväskylä Region have partners in eight different locations in Finland. All stakeholders of this network are constantly browsing their databases and lists of contacts. If somebody needs to find somebody, he/she can always ask the colleagues from different locations, thus expanding the network.

Moreover, Mr. Harju explained that things are supposed to happen on the institutional level. It means that cooperation between two business units or research centers remain, even though the personnel change. Nevertheless, business mainly happens between people. Different partners are active in offering their technologies or ready products. Mr. Harju says that they are always willing to negotiate, ask about the company's business strategy, specific features of the proposed technology, as well as what kind of cooperation they are looking for.

One of the last interview questions was devoted to the interviewee's personal wishes for the development of networking hub in the Jyväskylä Region. Mr. Harju proposed an idea of stimulating stakeholders' collaboration. Jyväskylä Innovation Ltd is closely cooperating with JAMK University of Applied Sciences. According to interviewee's opinion, JAMK is so far the most international university in the region. The future and perspectives of JAMK cooperation is clearly visible. More and more students from the Mechanical Engineering and the International Business should be attracted to this work. In addition, they are supposed to work together to create synergy and reach higher output.

5. DISCUSSION

The analysis showed that it is very hard to define the optimal networking model for the individually selected region or industry. There are a lot of different efficient models of communication and networking, such as: knowledge networking, business and high tech clusters, collaborative innovation centers and so on. All the proposed methods have strong and weak sides, as well as capability for improvements and adaptation to local business conditions. It is worth noting, that we can observe a mixture of different networking models, which are currently used in the Jyväskylä region.

The author has also studied the cases of top business hubs, well known in the business community world-wide. One of them is so-called Swiss Business Hub USA, a member of Swiss business community. This agency is operating in the same field of networking and cooperation, offering “one-stop-shop” business solutions for its partners in different countries. The target market of this organization is the USA, which operates on a completely different level, comparing to our research area. The competition on this market is so high, that Venture Capitalists invest much more aggressively and actively, comparing to Russian opponents. Nevertheless, if we will compare Swiss Business Hub with business support agencies in the Jyväskylä region, we will find out that it offers a quite similar set of tools and services for the development of global cooperation and business.

However, there are some significant differences in these organizations. First of all, it is the scale of the companies and markets, amount of funding and number of people involved in the process. For example, the Swiss Business Hub has seven regional offices in the United States of America. At the same time, Finnish agency has only one regional office on the territory of Russia. Of course, the number of regional agencies is directly affected by the current demand and the actual size of the target market. However, Finnish professionals should act ahead of the curve and predict the future demand and the bloom of the Russian Nanotech market.

The Russian nanotechnology industry had a very late launch, which naturally caused a big time lag. Nevertheless, we should not forget about the nature of nanotechnology, which is mainly based on the research works in physics, chemistry and biology. This fact proves the huge technological and knowledge foundation at the disposal of Russian research and science centers. In addition, lack of governmental support and funding, along with an uncertainty in their scientific or business future stimulates more and more companies to look for commercialization opportunities abroad. Russian businessmen start to adapt and prepare their products and technologies for the international market. As a result, we can observe the appearance of an extensive source of business opportunities in Russia, alongside with the willingness to cooperate.

At the same time, the Jyväskylä region has a potential for the development of this promising cooperation. Local infrastructure is presented by the synergy of the following organizations: Centre of Expertise Programme (OSKE), Jyväskylä Regional Development Company Jykes Ltd, Jyväskylä Innovation Ltd and some other local players. All these institutions work in the field of global business development and the expansion of their network of partners.

On the one hand, there are needs, which are the companies, interested in nanotechnologies, transfer of technologies and R&D. On the other hand, there is a potential of getting “seeds” from Russian companies and research centers. “Seeds” can look like technologies or knowledge, needed to receive the technology. This kind of structure allows proposing a new model of networking between Russian and Finnish business units and research institutions.

We are living in the information era, as well as in the information society. Information transformed to knowledge is the key to success. One of the ideas of the successful knowledge hub creation is tightly connected to data processing. The Jyväskylä region has the needed assets and resources, needed for creation and efficient work of this networking database. It is important to mention that the ability to process and evaluate this data plays

a crucial role in the process. One can have an endless amount of information, which will be absolutely useless without skills for data mining, processing and analysis.

The Jyväskylä knowledge hub should have extensive database, containing strictly classified information about its international partners, their technological or any other offers, detailed description of the proposed technologies, as well as the current state of business progress. Moreover, the information should be regularly updated, in order to assess the current situation. This method can give an opportunity to stay in touch with the stakeholders of this knowledge hub, evaluate the current state of the network and react quickly, if there is a demand for some technology or a product.

For example, some Finnish company expands its production line and needs powerful gas lasers. Right after the company's request the needed data is found in the database. If there are no cooperators, working in this sphere, there is a high possibility to find a partner who is familiar with powerful gas lasers.

While at the moment, one of the core projects of this synergy is the business incubator Protomo. It is a "melting pot" for generating and sharing business ideas, developing concepts and prototypes. This project works smoothly regarding local and most of the foreign entrepreneurs, though it is not the same for the Russian participants. On the basis of the experience, we can realize that cultural differences play a major role in this issue. For example, Russian entrepreneurs are always concerned about the questions of ownership, shares and costs for the services. In this case, the communication model should be more simple, clearly visible and understandable. This improvement will probably lead to the acceleration of the business cooperation and growth of the interest from Russia.

6. CONCLUSIONS AND THE IDEAS FOR THE FUTURE

This bachelor thesis presents the case of cooperation between Russia and Finland in nanotech cluster on the territory of the Jyväskylä region. The key idea of the study is concentrated on the analysis of various networking models and ways to improve the current cooperation in this field.

The above stated theoretical information gives a clear understanding of networking as a concept, and its role and importance for various business operations. Moreover, this knowledge basis can be used for the further research work in different business spheres and industries. As far as, business is done between people, successful networking will stay among the most valuable assets of any enterprise.

This study stimulates the future ideation of the networking concepts and the optimal networking model for various research fields. With regard to the nanotech cluster, more qualitative data is required to draw conclusions. Moreover, it is necessary to get information from the Russian partners, in order to be objective and realistic. This additional data can affect the author's vision of the knowledge hubs and perspectives for the future work in this field.

In conclusion, it is necessary to mention that this research work has a high practical value, as its extensive theoretical basis along with the received data cover a wide range of business needs and of use. As a pioneer research work in nanotech cluster networking, it may help to open new horizons for the further research work in this direction.

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8. APPENDICES

Full text of personal interview with:

Mauno Harju
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Skype: mauno.harju

S: Good morning, thanks for coming, I guess we can start the interview. Please introduce yourself, explain your role in the Finnish Innovation system and OSKE (Centers of Expertise)

M: Good morning, well, we really don't know if we have an innovation system here, but we believe we have one proper way to work, but I don't know if it's a system. OSKE is also a part of official Finnish Innovation system, and at the moment I am working as a director, responsible for technology Transfer in the Nanotechnology Cluster Program and also all the OSKE programs, run in Jyvaskyla.

S: Do you mean Jyvaskyla region?

M: Right, we have five programs here; mainly I work for the Nanotechnology.

S: All right, and what is the key strategic goal for the organization (meaning OSKE)?

M: Ok, its help the companies to develop more business.

S: Meaning the companies inside Finland?

M: Finnish companies, anywhere, doesn't matter where the market is. It's always a global business

S: It's global, but the companies are in Finland, right?

M: Yes, in central Finland our work is aimed to help the companies to develop more export business. The turnover should be 3.5 bln Euros, and it's the moment it's only 2.5 bln Euros, so we need one more billion, that was the situation before the regress. So we have a lot of zeros here, one billion more and this Nano which is 10–9 nanometers.

S: Though in different sides, right?

M: That's basically easy, we can just change minus to plus!

S: Ok, as far as you mentioned that this is a global organization, I guess the role of networking is really high, could you please describe what kind of role does networking play in your work.

M: Yes, it's our main work to help people we work for, meaning the companies, to find the right people from other companies or research institutions. This is also a global work, we are developing this work gradually and we do not know how large it is in the moment.

S: Is it so hard to evaluate it, because of its constant growth?

M: Right, it's constantly growing and constantly dying. We don't want to keep everything alive. Once we have met somebody, we know what he or she was doing, so can contact them later.

S: So, we found out, that networking plays a great role in this organization, which is a global organization; I guess you have got a lot of partners. Who are your main partners, collaborators?

M: In fact, it is very limited, because the levels of activities are changing all the time. In Finland we work a lot with Tekes, ELY-keskukset, and certainly with these local partners, like Nanoscience Centre in the University.

S: As I know Tekes is a Finnish Funding Agency...

M: You're right, it is the main funding organization for the innovations.

S: Well, you've mentioned different global partners; can you where they are operating, geographically?

M: Yes, the countries where we are mainly operating, starting from East: Japan, where the activity level is quite low at the moment and there is no main partner, except this Finnnode. Then is China our main partner is in Sucio, Bayobay Ltd business incubator and investor, in addition to Finnnode. We have been working with Finpro and there will be Finnnode in India. Actually globally best partner is IIT Karaquell, one of the most

respected technological institutions in India. We also have some partners in Russia; Finnnode is certainly one of them, in addition to Technopark Ingria, which is the best Russian partner at the moment. We've got some activities with them. Then, we also have different partners in Croatia. Probably the main partner is Ruder Innovation Ltd. The owner of the company is Ruder Boskovic Institute. We also have different partners in US, though at the moment we are just starting. These are my partners, but certainly we are working in 8 cities, in Nano cluster we've got 12 people, who have their own contacts.

S: Since my topic is tightly related to cooperation with Russian partners, I want to ask you what is the strategic role of the Russia in this collaboration?

M: There is a lot of interest in cooperation with Russia, as we are creating the network for the companies, the direct cooperation between companies has been quite small, but we expect grow. It seems that mostly what we can do is help Russian companies to find partners in Finland. It may be a technology development or partnership in marketing. What the Finnish companies are doing at the moment, to get a nanotechnology in Russian market is not very easy.

S: Seems you've already partially covered the next questions, about the current operations between Russia and Finland..

M: yes, there have been a lot of expectations about the Rusnano Funding, but as these investments should be in Joint Ventures between Finland and Russia, it will take some years to develop this cooperation, as its limited to Nanotechnology.

S: What are the pros and cons of the cooperation between Finland and Russia?

M: Well, at the beginning the Finnish Ministry has chosen the wrong organization to discuss the cooperation. Rusnano is mainly investment, and also some R&D company. Tekes was the negotiator with some small companies working close to it and the structure was wrong. Now Tekes is discussing with a different partner, some governmental institution.

S: All right, you've mentioned the weak sides, and what are the benefits of the cooperation between Russia and Finland?

M: Obviously, it's a large market size on both sides: the Russian market and the EU market. It should be.

S: So, it's just the question of scale, right?

M: Yes, because these markets are so large, that crossing the border should create a new business.

S: What kind of approach you are using for the development and growth of the cooperation between Finland and Russia?

M: Basically, we are focusing on networking. We help people in networking Russian companies, working with the similar organizations in Russia. Private consultants who contact us and ask if we know somebody, this is person to person communication.

S: Can we also add exhibitions, seminars, all kind of networking events as a part of it. Though I guess it's not the main part.

M: Certainly it's a part of it, but not the main way to work, because you can easily find the contacts, but how to work further? You might remember how you collected a lot of Rusnano contacts, but I wasn't able to do anything. The process isn't known and clear, what is actually the next step. It's easy to send an email saying: "Thanks", but it doesn't lead anywhere.

S: Right, there is no visible output...

M: Yes, it's a problem actually. At least for Finnish companies it is quite typical, for example If I go the fair or exhibition somewhere, I leave my contact information there and they say that they will contact me, but most likely they won't contact me. Maybe they don't select the contacts well or they just don't work as they are supposed to work.

S: Well, what are the existing barriers, regarding these cross-border business operations between Finland and Russia?

M: I believe it only takes time. The progress is always slow. It takes three times more time, than you expect.

S: So is it only the question of time?

M: Time and continuity.

S: What about the cultural differences?

M: Certainly, there are some, but they also exist inside one country and different countries. Inside EU we've got so many different cultures. Though it's not so bad on both sides: Russian businessmen know how to operate in Finland and Finnish know how to do that in Russia. They don't talk about it; they just need to know how the decisions are made in Russia. Who makes the decision? When they make this decision? How do you

know, that there is a decision. So this is different in Finland and in Russia. Though, in Finland we also have different cultures in different organizations.

S: I guess we are coming to the most important questions, what can be done for the improvement, for the accelerating the system?

M: Well, I don't know how to accelerate it. Certainly it means more people involved in this work and we need to develop continuity for this purpose, so that the people don't change too fast. Meaning when they know something, they should continue to work. The problem of language usually skills doesn't exist. English is used on the both sides of the border; in EU it's the same, except the areas where French is spoken. It takes time. Certainly, if there is a place for a new business somewhere, if it really exists, then soon there will be somebody doing the business. So if there is no business, even when we think that it's a great potential that there is a business, we are wrong. It's easy to measure, if nothing happens- there is no potential.

S: It reminds me what you've said before: "When there are no customers, there is no product"

M: Yes, we need to think about it. Does it really exist? But anyway there are a lot of interesting technologies in Russia, companies and institutions introduce the technologies, and we try to find somebody interested in the technology in Finland or in the EU, except us. Though, existing business infrastructure prevents the start of new businesses, this is one of the issues. Certainly, it is always about financing the new businesses and so on. It takes time, later something will happen. Somebody will start a new business. In addition, some Nanotechnology business exists between Russia and Finland.

S: As I have mentioned before, my thesis topic is closely related to networking. Sociologists say that an average person knows between 200-5000 people. For me it's a crucial difference between these two figures. What do you think about attracting this kind of "hubs", people who already have a lot of contact and networks? Can it somehow accelerate the process?

M: Yes, there is kind of old way of working, but you are bilateral partner, and you partner with somebody whom you already know. For example in Jyvaskyla we have people who work with certain partners in Russia. On the other hand we've got similar people working in Russia. Both sides are connected and correlating, but does this create? It doesn't create

anything new. There is no dynamic in this situation, stagnation I can say. The same people operating in the same geographical area. Basically, there are no limits and borders in business. It hasn't been a large work to create a global network, as we have 8 cities in Finland, we can always ask, if somebody knows about this. Our main work anyway is to help these networks to develop technology transfer programs or research programs. So just need to keep browsing our network all the time. If we meet somebody, we can ask: "If you know something about this, or anybody who knows about this?" If it is in a certain geographical position, we have to know why this place is interesting. For example in USA, there seem to be a lot of connections to Venture Capital, it doesn't exist anywhere. They are very active; they are looking for the new companies to invest in. This is what happens in US, if we contact somebody, in few weeks there will be emails from Venture Capitalists, who are looking for new opportunities. This doesn't happen in Finland, we have some consultants, who are active. Typically people offer us technologies and we are active in discussions with the companies about their technology strategy, what kind of technologies you are looking for. So, we need to be more global and dynamic. Making friend is not a network, it's a different issue. We want things to happen on the institutional level, when people change- the connections remain. Certainly business is done between people, but it cannot be only between them. In some serious business, there must be some strategy to follow and then find the solutions.

S: You've mentioned the case of USA. I guess the competition is very high there; it's a country of entrepreneurs in my point of view.

M: It is, yes, you are right. They invest earlier. They invest more money on the earlier stage. Typically in Finland companies, that get these investments in USA, the Finnish investors won't even discuss it with them. They will have a plan or idea what to do, even if they don't even know that this technology works. This is what should be done in Finland, maybe also in Russia. As far as I have understood Rusnano isn't investing in small start-up ideas, they want to invest in businesses and large scale production facilities. They claim that they do, though they do not.

S: Maybe, that the consequence of the scale and size of the country?

M: Yes, though from the small ideas, these big businesses grow. They can also attract businesses from other countries if they have invested in start-up ideas and also if they

have kind of mindset, that the business is not only in the Russian market, rather it's global. I don't know if you agree that the companies on the Rusnano2010 were mostly for Russian companies.

S: I have also noticed that!

M: Yes, it's kind of a pity, because we know that the technology, developed in Russia, can be also sold globally. In Jyvaskyla we are in a position, when start-up companies have this global mindset from the beginning. They want to know where the potential markets are and then they select. Not so, that they start to work on the local market, because they can easily develop a wrong product. It is funny how it's hard to change the color of the product? I've met that several times. Early meeting the global customers is what Jyvaskyla companies are doing now. The young people are very experienced in global business, so they start from the globe and then they find the first customer.

S: That probably how they can get more chances to succeed in future!

M: Yes, friends can buy your product even if they don't need it or even if it doesn't work at all.

S: I remember one proverb about friends. It says something like friends and money are as good together as oil and water.

M: Yes, in the States the early first investors are friends, fools and family. We have to attract capital to the companies on earlier stages, like it happens in USA, but it also happens after these three F's. Anyway, if somebody is interested in us or spying as we have already been in these situations. Several companies and institutions were spying on us, we are really interested in what are they spying on? Then, we can try to sell it. For them it is easier to buy it, than to spy on it.

S: Of course, these spying will indicate the fact, that you've got something significant.

M: Yes, we were very proud of this, when they wanted us. Could you tell us more?! In Finland the working process is very open; sometimes it's even too open. So it's very easy to get information and to understand what's going on.

S: All right, we are coming the last question, which concerns your personal wishes for the development of this cooperation. What are they and what are your personal expectations?

M: I've got a small plan. JAMK is the most international University so far, comparing the sizes of these two universities. In the future we wish to have the continuity of our

cooperation with JAMK. We can offer a lot of different subjects for the studies of the students. I want the students from the Mechanical Engineering and the International Business to work together, because they will create synergy. We've got a lot of work to do, this is kind of data mining, finding the information in different databases, countries and languages and also the internet is large enough as a source of data. We should also think how students will benefit from this work, which means companies should be closer to the students to get better references for the future applications. In the CV's more companies should be mentioned and so on. I think we can live with so much more information, than we have lived with so far. People tend to limit the amount of information they want to know. They don't want to know how much information exists. At the moment, large and medium size companies are able to handle the information, but the smaller ones start from the idea they have and start developing the technology. They don't start from the existing technologies, which is stupid. They waste a lot of time and money.

Next thing I will do is getting the second passport. In Finland we can have 2 passports. Then, I will give it to Jykes to make a new visa for Russia! Then, I am ready for the next game. You need to have a license in sport, too. Be ready, the system is on!

S: Thank you so much for the great discussion and your time!