

Final Report and Proposals of the Knowledge Society Team:
From Information Society to Knowledge-based Society

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Introduction

The purpose of this report is to describe and shed understanding on the discussion concerning the knowledge society, especially with respect to employment, productivity and the quality of working life. In addition, we intend to point out mechanisms and measures that would help to promote the aforementioned labour political objectives.

As the subject matter is very broad, everything cannot be covered in this report. The report will, however, include some very interesting literary references. The studies referred to in this report do not represent the fully shared or combined view of the members of the team nor the exact views of any one member. Some of the studies and the points they emphasize did, nevertheless, stir up lively discussion within the group, and we hope this means that they depict the various phenomena truthfully enough, even if not comprehensively, to create further discussion also in the field of employment policy.

The main emphasis of the report lies on the generation of innovations, because success in business and employment can be seen as a direct consequence of the ability to generate innovations, or value-added thinking. The very core of innovations are people and their value-added thoughts. Generating innovations is first and foremost a social process the prerequisites of which can be improved. This mechanism can be understood with the help of the concept of intellectual capital, meaning the individual capital that can be utilized commercially. This same principle can also be applied to the public sector.

The central theme of the report will evolve around increasing the usage of individual knowledge and innovations at the workplace. In the long run, it will generally create the best results in sustaining employment, productivity and the quality of working life. It is believed that innovations benefit not only their immediate generators and those who apply them but also those who apply them with a delay and those who get to enjoy the results through the allocation mechanisms of the society and the economy. The report looks at the subject from the point of view of compensated work and enterprises, and it relates to the wider infrastructure of the society through knowledge.

The sections of the report that present research results are based on the intermediary report of the team and concentrate mainly on Finnish and Nordic labour markets. The report looks at working life as a whole and makes generalizations rather than detailed classifications between different segments of personnel, sex, education, marginal or central labour force, forms of flexibility in staff policy, lines of business, or the competitive circumstances of the different areas of the global economy.

Though the report concentrates on compensated work and enterprises, the team is well aware of the importance of other forms of work (e.g. home, voluntary, social, art-related etc.) on the individual level and to the national economy. The scope and dynamics of other forms of work is, however, such a broad subject that it simply could not be included in this report.

Chapter I describes the labour political aspects of the knowledge society on a general level. Chapter II characterizes the nature of knowledge based on source literature and business experiences, and the mechanisms of acquiring and applying knowledge. Chapter III also uses research and business-related material to describe the social systems that support individual and organizational intellectual capital. Chapter IV is a compilation of labour political suggestions that support the knowledge society.

I. CHARACTERIZATION OF THE KNOWLEDGE SOCIETY

This report looks at the knowledge society from the angle of work. It covers employment, the quality of working life, and the results and productivity of work. The concept of knowledge will include a theoretical discussion involving knowledge which has common points with social and individual issues as well as the nature of work and economy. The purpose of this report is to bring forward those characteristics of individual thinking, activities and business operations that are closely connected to the development of the knowledge society. In addition, the report includes recommendations for measures that could contribute to sustainable employment and business and improve the quality of working life.

1. Value-added Thinking

The central concept of the intermediary report (1999) of the knowledge team is value-added thinking that can be characterized by concepts related to innovation. Value-added thinking represents growth in knowledge and a change in the way of thinking. Knowledge is present only in the human mind and it is partially socially divided: It can be apparent or function as a guide for the thought process and actions as so-called tacit knowledge with no apparent structure. Producing and applying knowledge is a central feature of modern economy and therefore an essential prerequisite for employment. Value-added thinking is always measured by the customer.

Generation of knowledge can be enhanced at the workplace level by innovative organization of work and functional labour market flexibility. This implies improvements in the work environment, and supporting human contacts and origination of ideas. Technology can also be employed to support the thought process.

2. Creativity

When discussing work and employment, the concept of knowledge is related to the framework of human activity. When work concentrates on problem solving and producing the necessary knowledge for it, creativity becomes the most essential factor. Creativity means the ability in a cultural and functional environment to perceive the relative connections between things and to change those conceptions in a functional or sometimes even unsustainable way. Ultimately, this also involves value-added thinking. In the knowledge society, ideas, views and wants may transform into productional solutions. Such immaterial factors as professional versatility and know-how of employees, business ideas, copyrights, customer and supplier relations, and even artistic creativity are the most genuine resources in this respect.

3. Knowledge

The theory of human capital emphasizes the shortcoming in the evaluation of the profitability of an enterprise that accounting measures observe only material capital whereas the success and actual value of the enterprise is determined by its intellectual capital. The determined value of an enterprise often comes up to only a fraction of its actual value, because there are no tools to measure its intellectual capital.

The concept of human capital differs from that of the material capital. The intellectual capital cannot be bought or transferred in the same way material capital can. The intellectual capital of an enterprise or work organization can be developed and used in production, but to do so successfully calls for combining the operational and social processes. It means giving individual work

performance a chance as a form of creativity directed to the social and material environment. This can be supported with the help of the technical systems of the workplace and by organization of work.

Creativity (which has also been referred to as Innovation Capital) can be defined as a form of organizational, structural and intellectual capital. Working life changes so that the strategic centre of capital moves from material and monetary capital towards individual capabilities and social networks.

However, intellectual capital is not totally immaterial capital since it also involves physical factors. It is not advisable to limit the usage of intellectual capital only to an enterprise or a workplace. The broad utilization of intellectual capital also involves examining the potential of the social subsystems that have traditionally been part of cultural, educational, labour market, social, and economic policies.

4. Social Aspects

The report emphasizes that it is not advisable, either, to limit the concepts of knowledge or the knowledge society to information systems, because knowledge and its growth are human processes that are connected to both social and technical systems. This statement has a special meaning as regards working life: Production that aims at generating knowledge and innovations must, in addition to considering the features of its information systems, pay special attention to the way work is organized at the workplace. This involves not only the internal relations within the work unit but also external relations to customers and related groups. This creates the knowledge society the challenge of integrating social capital to intellectual capital.

5. The Learning Process

Learning is, or at least it should be, a continuous process. It is about both personal development and adaptation to the continuously changing environment. To perform one's job functions one needs to learn more and more and also have the ability to apply the newly acquired knowledge. Tools for work, the way work is organized and networks can be structured so that they support the growth of individual and collective understanding. Working life requires management of immediate tasks, capability for operational improvements and skills to develop the quality of functions. It is a timely challenge for not only enterprises but also for the educational system to generate these skills in individuals and groups.

6. Employment

The knowledge society team forecasted in the intermediary report that the utilization of information technology would increase, whereas the implementation of process technology would decrease employment. In the intermediary report (Information Highways, pp. 32-33 and 44-56) was presented the common view that there is no alternative to the application of technology. The effect it has on employment depends on the way it is done, and also on business strategies and their strength in the competitive environment. The utilization of technology, nevertheless, always seems to sustain employment.

Empirical research done on Finnish enterprises in the 1990s indicates that pursuing efficiency on market conditions, generating product and process innovations and cooperating with the social and customer environments are all related to an increase in employment. It has been found that

developing the organization and implementing new ways to organize work have similar effects. In addition, the so-called functional labour market flexibility, which means improving employees' terms of working and increasing their chances to influence and learn more, appeared to be a key factor increasing employment.

Factors relating to a decrease in employment are competition primarily by means of marketing or favorable pricing, ignoring external relations, and personal job functions which do not allow room for development--generally speaking, numerical labour market flexibility.

The nature of innovation can be studied at the enterprise level or in the society at large. The social aspects of intellectual capital and the internal innovational aspects of an enterprise are the same. This is true even though the concepts of intellectual capital and innovation are not totally alike due to intellectual capital being composed of more than only innovative factors. Although it is very difficult to implicate the immediate connection between the social structures and the structures of well-being and the generation of innovations at the enterprise level, the connection is so clear that it is necessary to cover these structures here, too. Innovation on different levels is part of generating innovations in the society as a whole.

There are two consecutive waves in the discussion regarding knowledge and innovations. As far as **innovation** is concerned, they concentrate on utilizing existing knowledge as emphasized by Nonaka, and when it comes to **knowledge**, they concentrate on determining the total value of the enterprise as well as generating knowledge and innovations as emphasized by for example Sveiby. This report sees the kind of policy that promotes the utilization of intellectual capital and allows innovations to grow as a prerequisite for innovation.

Emphasizing innovation alone may lead to elitist solutions and isolation of talent. The model followed in Finland and Europe is that of creating a wide basis of intellectual capital which utilizes both "waves" of thought and nurtures broad-based innovation. Creating and sustaining a wide basis of intellectual capital is to be considered a suitable solution for especially small nations.

Employment and social services can be alternatively based on:

- technical innovation and self-service
- market price, low taxes and, in general, the market mechanism of supply and demand
- services which are practically free for their users (the Nordic solution) and in which employment is based on a model solution and a broad system of public services

This report considers employment always to be based on innovation. In the aforementioned situations, the forms of innovation differ from each other. When discussing employment and innovation, it is not the team's intention to criticize the idea of the well-to-do society as a social innovation.

The team wants to draw attention to the fact that innovations are in the very core of employment. In sustaining overall employment and the quality of working life, it is very important to make sure that those employed stay and develop in their careers and will not become unemployed or disabled. The problem of the labour market at the beginning of the year 2000 is that Finland has, depending on the method of assessment, a labour force reserve of up to 500,000 people and there is no demand for people in this reserve. Their problem as regards the labour market is age, place of residence, or profession. Each case has to be considered separately to determine how active employment political measures and the related economy policy could utilize innovations and the knowledge strategy to benefit both the unemployed and the potential business environment.

Growth strategy based on knowledge and innovations is a conclusion in a situation in which the scarcity of natural and capital resources and, in the long run, the decrease in the input of domestic labour are factors that clearly limit the options. In these circumstances work opportunities based on knowledge become a most prominent growth factor. Increase in productivity cannot be based on one-sided elevation of the productivity of work but it has to include an increase in the productivity of capital and natural resources, which results in an increase in productivity as a whole.

7. Statements

In total, twenty-one offices, universities or institutes, research institutes, labour unions and companies gave their statements on the intermediary report of the knowledge society team. They took a very comprehensive look at the knowledge society. The statements emphasized the way the development of the knowledge society is closely related to the operations of enterprises, workplaces and the labour market system. What they also brought up was the issue of sustaining intergration in a way that would allow different regions, age groups and sexes to take part in the social change. Education and lifelong learning were also seen as important factors.

The Ministry of the Environment emphasized the importance of ecology as a source for employment and business operations, and stressed the importance of the principles of sustainable development. The University of Vaasa pointed out that we should make the best effort to utilize all latent areas of knowledge and talent reserves of our five million people. The Helsinki School of Economics and Business Administration brought up the social and cultural aspects of innovations and the importance of commercial utilization of them. The Academy of Finland expressed the opinion that the intermediary report did not discuss the nature of creativity to a satisfactory degree. The Finnish Institute of Occupational Health did not see any contradiction between productivity and organizational well-being.

The Central Organization of Finnish Trade Unions emphasized the importance of the development of working life and the cooperation between enterprises and educational institutions. The Finnish Confederation of Salaried Employees was of the opinion that knowledge and the ability to live in the middle of constant change are extremely important. The Confederation of Finnish Industry and Employers thought knowledge has become a production factor and a source for growth. The Employers' Confederation of Service Industries in Finland forecasted in their statement that services will partially be transferred into information networks which will result in a change in the structure of employment.

The knowledge society team has done its best to take these view points into consideration in the final report.

II KNOWLEDGE AND LEARNING

1. The Concept Of Knowledge

The employment political objects of the knowledge society policy are determined on besides administrative grounds, first and foremost also on the grounds of suitability. It is essential to describe and understand the active environment that is called the knowledge society, and utilize the existing technical and social tools to develop working life. It is very important to understand which factors with which mechanisms and methods can sustain productivity, employment based on real economy, and the quality of working life in the environment we call the knowledge society.

In the intermediary report, knowledge is looked at from the point of view of work and employment, and thus seen in the framework of activity, because work means the evaluation of phenomena and it is goal-oriented activity. In addition, work changes the environment and the phenomena that are the object of knowledge. What becomes particular knowledge depends also on our activity. The concepts that relate to knowledge can be set in structural hierarchy. This creates different levels of knowledge giving knowledge a structure.

Knowledge and awareness are individual in their intermediate forms, but they are also cooperatively formed and shared. Knowledge can be seen to derive from data and information. Data is a series of characters that can form information when the characters are combined in a conceptual system. Sentences are but characters and information, until someone, who is familiar with the system, reads the characters and interprets the sentence by understanding the thought that the characters and sentences express. The thought has thus been transformed to awareness, and knowledge has been conveyed by information. The transformed piece of knowledge may be new to its recipient, but this does not mean new knowledge would have been generated. Generating knowledge is a more complicated process in which previous pieces of knowledge are combined and structurally changed, and the new structures either directly or indirectly produce or enlighten structures regarding phenomena or ideas.

When a single thought has been understood, a human being evaluates the meaning of knowledge and how it relates to his technical and moral objectives. The most essential element of work is often choosing and evaluating information and knowledge and relating them to objectives for taking action. (cf. Zuboff, 1990, p. 90, p. 337., Kevätsalo 1999, pp. 163-165., Giddens 1984, p. 71, p. 73.) Knowledge is accompanied by technical and moral implications, preferences and objectives as guiding processes of human activity. This refers to the formation of will.

The nature of work involves perceiving the environment and being able to have an effect on it. Objectives combined with knowledge can lead to managing the environment. Understanding knowledge and its technical and moral implications, and combining this to activity, may represent wisdom. (cf. Building...1997, pp. 15-17., Zuboff 1990, pp. 335-344.). According to Pekonen, symbolic representation of reality is not only about reflecting reality but it is about creating meaningful reality. (Pekonen 1989, p. 23.) (Table 1.)

Knowledge can be defined as an individually and socially determined conception of the state of affairs which is structured by information. Knowledge is a construction of reality closely related to individual and social objectives and the use of it can have an impact on the state of the environment. (From Information Highways To Sources of Creativity 1999, p. 18.)

Table 1. The Hierarchy Of Knowledge Related To Individual Objectives And Activity

THE STRUCTURE OF KNOWLEDGE	THE NATURE OF KNOWLEDGE	THE SYSTEM
VIII Legitimacy	Process acceptance	Social environment Institutions
VII Experience Wisdom	Guidance and corrective action	Social environment
VI Activity Management Change Growth = knowhow	Utilizing knowledge at work, in strategy and in politics	Social environment
V Objectives	Man and community prioritizing meanings, formation of will	Social environment
IV Technical and moral relevance of knowledge = understanding	Expressive and wordless knowledge and valuation - Man and the community give meaning to or find the meaning of knowledge at hand	Social environment
III Knowledge	Knowledge as awareness - the cultural context of knowledge, i.e. knowledge in relation to the environment - Social organization of tacit knowledge towards articulation	Psychological environment Physiological environment
II Information	Coded and formal raw material of knowledge	Technical environment Social environment
I Data	Technical characters, symbols, rules of interpretation	Technical environment Social environment
Environmental and natural	Living environment	Physical environment

phenomena		Natural environment
Cultural heritage, genealogical inheritance		Cultural environment

The above table shows that knowledge is not only a social but also a deeply cultural matter. Social environments guide the formation of knowledge, because moral codes and historical environments are not the same. Information systems and technology are part of the social system, but they have also been mentioned separately in the table, because they have their own principles that derive from natural sciences.

The discussion concerning the formation of knowledge and the operation of different models of the knowledge society is generally referred to as sociological discussion. The dynamics of modern society according to Giddens (1990) or the characteristics of network society according to Castells (1996) enable the formation of identity in a way that does not tie it to a certain geographical environment or even a certain environment in time. This creates more interaction between informational foundations and also allows their transformation, more versatility in the phenomenon defined as knowledge, and possibilities for both deeper integration and disintegration. When cultural premises for the generation of knowledge increase, the critical questions concern the degree of utilization of knowledge capital and the basic values of different cultures, such as the relationship to nature and the concept of the essence of man as such, in relation to social structures. These cultural premises guide and develop innovation and other social forms of renovation.

2. The Significance Of Knowledge In Working Life

Latest studies and experience of innovations implemented at the workplace level show that in the functional environment called the knowledge society, it is necessary to take a wider, more collective angle to processing knowledge at work. The concept of tacit knowledge is also part of the versatile structure of knowledge, and it has become more and more important to understand these aspects when planning education and training.

When discussing the management of knowledge, knowledge can refer to either the object or the process. The object generally means information management systems, reorganization, group ware, etc. In this sense, knowledge is an object that can be defined and that can be managed within an information management system. If the focus is on interactive human activity, the assessment of individual behaviour and the improvement of individual skills become critical. In this sense, knowledge is a process that consists of a complex set of skills and know-how. This process is constantly changing. (Sveiby 1999.)

The development of an organization and the fixed characteristics of a modern enterprise include mechanic, organic and dynamic aspects. Ståhle and Grönroos (1999) state that in a modern enterprise, these three aspects are present simultaneously and form various operational fields within the enterprise. Knowledge capital takes different forms in different fields, and therefore the management of knowledge differs from one field to another and may even become contradictory between different fields. It is necessary to understand this three-dimensional nature of the enterprise if the enterprise wants to manage its knowledge capital. Different types of organizations correspond to different forms of customer and internal relations and have different needs for knowledge and

know-how. The relations can be either controlled or spontaneous, and knowledge required in the process may be either predictable or unpredictable. (Ståhle & Grönroos, 1999, pp. 65-71.)

The mechanic organization or the mechanic part of an organization tends to remain stable, and the knowledge they use is predetermined and explicit. Relationships are determined by hierarchy, information flows one way only, and the directions given by the management are the law. The organic organization is characterized by a tendency toward controlled change. It is understood that knowledge can be derived from experience or it can be latent, the relationships are reciprocal and strive for a consensus. Information flows both ways and processes are managed through discussion, agreed upon modes of operation and self evaluation. The dynamic organization operates in a dynamic environment as described by its name. It is in the middle of constant innovation and the nature of the organization may suddenly change in a quantum leap after a crucial innovation. Processes use intuitive knowledge. Ståhle & Grönroos are of the opinion that the dynamic organization may rely even on potential knowledge. Relationships are spontaneous and form networks. Flow of information is chaotic and it is managed through networks and knowledge is conveyed by contact surfaces. Knowledge management is supported by the use of information management systems. The operation of a dynamic organization is based on the assumption that chaos can organize itself and entropy may be considerably reduced through innovations. (Ståhle & Grönroos, 1999, pp. 72-107, cf. Niiniluoto 1997, pp. 19-20.)

Table 2. Environments Of Intellectual Capital

	Mechanic Business Environment	Organic Business Environment	Dynamic Business Environment
Objective	Stability	Controlled Development	Continuous Innovation
Knowledge	Predetermined Explicit	Based on Experience Latent	Intuitive Potential
Relationships	Determined by the hierarchy of the organization	Reciprocal, strive for consensus	Spontaneous, networked
Flow of Information	One-way	Two-way	Chaotic
Management Tools	Directions from the management	Dialogue, agreed modes of operation, self evaluation	Network readiness

(Source: Ståhle & Grönroos 1999, 107.)

3. The Operational Environment That Supports Innovation

Earlier it was thought that the generation of innovations was an individual process, but economic history has brought about a change, making broad-based cooperation a more and more important factor in the process. This cooperation may be pre-commercial and involve even random contacts. At the beginning, it is often unofficial and very loosely structured. Most often the motivation for the

innovation process is a need or an interest that makes people and groups initiate the exchange of information by, for example, activating their old networks. The following represents how Miettinen etc. (1999, pp. 18-21.) have characterized innovation networks that have stabilized their operation:

- institutional actors with complementary resources
- the need for cooperation of the actors is created by earlier activity
- innovation is a polyphonic process in which everybody has their own interests and point-of-views
- networks and their actors change in the course of the process
- the synergy and uniqueness of knowledge explain the success

Innovations can also be described through the concept of information. Information (as a system) can be described as negative entropy. In this sense, information means the organization of material systems, or the ability to create organization. Information is either physical or lingual, i.e. based on the power of expression and use of the human created language. (see Niiniluoto, 1997, p. 20, p. 48.) The relationship between thoughts and innovation can be described using the concepts of entropy and organizational characteristics as suggested by Ståhle and Grönroos. They believe chaos can organize itself. This makes enduring the chaos as one of the prerequisites for innovation. The dynamic organization collects a vast amount of unorganized information which leads to increased entropy. The information compiled through thinking and realization will be reorganized at the time of the innovation. Entropy will decrease significantly at this point, and the organization and its principles of operation will transform into a new state in an unsustainable way.

According to Ståhle and Grönroos, to manage the chaos created by the flood of information an enterprise has to be able to:

- regulate its limits by itself
- build two-way dependencies
- manipulate and crystallize meanings (Ståhle & Grönroos, 1999, pp. 123-128.)

Innovation has often been considered unique and its structure could be based on for example the discovery of the similarity or analogy of scattered information. This can be described using semantic triangles:

A sign represents (semiotically) something in relation to someone. Thus the sign has an object, and a reference, which it refers to, and an interpreter in whose mind is created a conception or idea (interpretation). (Niiniluoto, 1997, pp. 23-24.)

Signs can be divided into three classes depending on their reference:

- an ICON shares a property with its object (eg. a metaphor).
- an INDEX is causally dependent of its object (a grimace indicates pain).
- a SYMBOL or an arbitrary sign refer to an object and their meanings have been agreed on within the language community (eg. sentences of a natural language or the Morse code).

If the innovation process is described in semiotic terms, it refers to objects perceived by an interpreter, which objects, when combined, generate a new or previously undiscovered idea that is described by a reference. The perceived or discovered interdependent or inner characteristics of ideas are given a sign that can be either an icon, an index or a symbol. This refers to focal knowledge. If the object has a known reference but no sign, it is tacit knowledge.

It seems that discovering similarities in different environments and objects is characteristic of the innovation process. Similarity here does not mean external similarity based on matter or already organized information; it rather refers to internal similarity based on form which, nevertheless, often also appears as external similarity. The meaning of discovering this kind of similarity or correlation to innovation is in their realization. Their realization can for example offer possibilities to modernize or improve an old method (eg. electron tubes – transistors) or transfer the form of an old method into a new environment, thus creating a whole new product (eg. smoke signal – radio broadcast). It is essential in this process to be able to differentiate forms and structures to be able to discover their inner similarities. This ability to differentiate signifies knowledge. This means that, for instance, in education we would have to as early and systematically as possible start employing curriculums that concentrate on classification of internal characteristics of forms and phenomena. This emphasizes the significance of geometry, mathematics, arts and physics – in general the significance of physical and social logic and methodology. This also favours work environments that strive to use different methods to present a comprehensive layout of their work processes and product lines so that their internal forms and structures are available to all employees. As a rule, innovations seem to be backed by a "social" structure.

The EC Commission's "Green Paper On Innovation" describes innovation as a production-oriented process in both the process and the result. It is essential in the process to "turn an idea...into a product or service, a method of production or social service." Later innovation is seen as part of all lines of business and the "service sector" that refers to the functions of the public and the so-called third sector. Innovation is brought about by "changes in the social behaviour and ways of living". Innovation is not a synonym for technology but it refers to "the combination of known factors." Progress cannot be based on technology alone even in product development. As an example of a wider innovation concept would be combining design and engineering. (Green Paper On Innovation, pp. 12-13, cf. Miettinen et al., 1999, p. 3.)

4. Learning, Education And Creativity

Human activity is based on creativity. Creativity means meaningful activity in a cultural environment and developing this environment. Learning means acknowledging and understanding the cultural environment. Education should support the kind of learning and understanding that would facilitate fruitful utilization of the cultural environment. It is to be noted that education or its curriculums at their best are only raw material for learning and the manifestation of creativity.

4.1. Standard Education As Basis For Professional Knowledge

The society is responsible for supplying standard education, a function that cannot be transferred to enterprises. Standard education must convey new generations the cultural inheritance which serves as a basis for nations to build their future on. The vast quantity of information available and the continuous increase in new information accentuate, on the one hand, the importance of subjects that help analyze information and, on the other hand, learning to acquire necessary information by oneself. Instead of giving answers and demanding memorization, it is important to encourage curiosity and teach pupils and students to find information at their own initiative. These objectives already make it necessary to offer broad-based standard education, but it is important also for the reason that when working life is quickly changing, people must have the aptitude to change professions and to utilize lifelong learning. Narrow and specialized basic education will lead to problems, because the changes in working life will crumble the value of this kind of education fast.

The conceptuality of broad-based education is unavoidable: theories, abstracts and models are needed to understand the structures of societies, enterprises, and other social organizations. The functionality of applications, and sometimes theories themselves, are tested in practice at work, which makes it necessary to get working life involved in the top grades of standard education. Work experience tied to education is very important to any profession. When more and more knowledge is required at work, it also increases the demands for managing the conceptual side of work. The curriculums of standard education plays an increasingly important role in this respect, too.

Changing work processes is always met with resistance at all levels of an organization, not to mention changes involving the whole work organization or requiring totally new skills. A broad basis will create basic security. It gives people tools to actively participate in the change process and makes it easier to accept constant changes in working life. Good education is very essential in creating a secure feeling amidst change.

4.2. The Culture Of Curiosity And Questioning

Already during the early years of education it should be borne in mind that man's natural curiosity will only grow deeper with education. If education does not in structure and content support this development, the important prerequisites of innovation, initiative and the spirit of enterprise, cannot develop the way they should. Therefore, it would be most important to give people chances for searching and finding information at their own initiative, instead of only distributing information and answers, and maybe even make it a more central part of education. However, we must keep in mind that working life increasingly calls for good social skills, and having people search for information on their own does not mean that they should be left alone with their problems. Instead, they should be met with constant support and help from their fellow workers. Information technology can turn into a big help when planning this side of education, and what is good about it, is that it can easily later be transferred to working life.

4.3. Learning At Work

Learning at work can happen on three levels. First comes learning the traditional way of doing one's work, i.e. one learns to do what is required to accomplish the daily tasks (basic knowledge and ease). The second level refers to the joint effort of continuous improvement by the work organization (development). The third level of learning happens when the work organization generates functional transformations which result in totally new modes of operation. Often learning at work is thought of only as learning a basic set of skills, as happens in apprenticeship training, but to reach the level of a learning organization all members of personnel must be included in the activity and learning processes that take place on the second and third level. While educational systems may offer good enough skills to adapt to the basic level, they do not offer support for organizational learning.

As processes in the economy become faster and more complex, productivity and sustainable employment become a more central objective and continuous training and lifelong learning even more important. Creation of new jobs runs parallel with timely progress in learning. The substance of work most often dictates whether learning and sources for innovation develop in a competitive enough way. Tight cooperation between education, research and working life is imperative in order to have education develop in the direction of supporting employment. It would be important to modernize ways of working toward more interaction and networking to utilize the learning capacity.

Promoting lifelong learning can be broad-based, too, and it does not have to be about education policy alone. Learning can support the ability to take the challenge of the changing working life, modes of operation at the workplace can enable both learning at work and organizational development, and allowing flexibility in working hours can support the learning process. (cf. Työpolitiikka ja elinikäinen oppiminen - Labour Policy and Lifelong Learning, 1.) Enterprises and work organizations can also themselves develop models that allow innovative work and promote learning. What also should be done is widen and further develop the use of learning a profession at work, i.e. apprenticeship. The relation between continuous education and the spirit of enterprise is quite apparent. The belief that the future might turn out better through one's own efforts is a decisive element in the development of an environment favorable for enterprise.

4.4. The State Of Learning

The virtuality and communication in today's working life mean that more versatility is emerging in the techniques to generate knowledge and work is done both in place and space. This space can be physical (e.g. conference room), virtual (eg. email, phone conversation) or cognitive (shared experience). (cf. Vesalainen & Strömmer 1999, p. 117.)

Workplaces are often designed for immediate work at the workplace. In Finland only the top companies and corporations design their workplaces "transparent" to support conversation, assessment, and unofficial innovation. It is well-known that very important conversation takes place in cafeterias and corridors. International conferences are known to allow a lot of time and a variety of places for unofficial conversation that anyone can take part in according to their interests.

It is actually surprising that workplaces do not generally have a space reserved for personnel for reflection and self-evaluation. If an organization wants to progress to levels two and three in its learning process, a room equipped with regular meeting accessories and a computer connected to the internet is well worth the investment. A comfortable and well-equipped space would meet the minimum technical requirements set for the generation of knowledge and would offer a chance for the innovation process to get started.

III THE SUPPORT SYSTEMS OF INTELLECTUAL CAPITAL

It has been determined that intellectual capital at the enterprise level comprises individual human capital and structural capital. This capital is a necessary prerequisite for the generation of innovations, which process again is a prerequisite for competitive and job-creating business in the increasingly global economy. Numerous social and labour market practices have their effect on the quantity and quality of intellectual capital. It is quite clear that both physical and mental security is elementary for innovative activity.

1. The Support Systems Of Occupational Safety And Health, Quality Of Life And Well-being

Occupational safety and health are examples of systems that help support the sustenance and development of intellectual capital. The traditional and still very important role of occupational safety has been to prevent accidents and to repair hazardous conditions. Calculations showing the actual cost of absences due to work-related injury or sickness have proved it is economically more beneficial to prevent these causes of absence. Latest news on the problem of burn-out and weariness show well how there is an organic relation between health and the social institutions that maintain well-being. Generally speaking, health and sport education, education on a healthy way of life, living and eating habits are all part of the support system. If this support system is lacking, the environment is not strong enough to facilitate the generation of innovations.

Environment can also promote innovation. Good examples of conditions that can influence the development of innovation are the social structure of the community, the potential the lines of business have for development, the ways work is organised, degree of wealth, attitudes, regional investment on education and science, and structures that develop internal and external spirit of enterprise.

2. Negotiation Systems

Though business is these days characterized by increasing competition, it has also been found that the competition can often be cooperative by nature. The nature of the negotiation systems between the parties of the labour market has been described as a system to regulate the differences between the employees and the employers. (Savola 1969.) In the past few years the interests of the parties have become closer like Savola predicted, and nowadays the labour market system could be considered a cooperative system that develops working life. It has become a business institution, and the direction for the development of its rules is under much discussion, but nobody questions it anymore. One good example of how closely negotiation systems relate to knowledge are the EU employment guidelines that require the parties of the labour market to look after the development of knowledge by mutual agreements.

Maintaining good negotiation relations between the parties is also seen as a value closely related to the EU information society policy. Organised labour market activity has a significant role in the formation of social cohesion. (Green Paper; Reorganization of Work Through Cooperation.)

It is hard to over-estimate the stabilizing and protective effect of the negotiation systems. They give working life the continuity that serves as a cornerstone on which the innovative change can be built and based on.

3. Organization Of Work

In the knowledge society, the surplus value of a product, method of production or service is based almost solely on knowledge input. Materials become of secondary importance. Product may be material only in a marginal sense and their reproduction, distribution and use occurs in totally new ways.

The generation of knowledge is required for economic success. Knowledge at the workplace level means the ability to understand the operational environment, the personal and organizational goals, and to formulate activity toward reaching the goals. By promoting creativity, it is possible to generate value-added thoughts. The increasing utilization of individual knowledge is the core of employment. The actual value of an enterprise or the capability of a public community to function are based on both the material and individual capital at hand. The innovations generated during production are the value-added knowledge content of a product or a method of production. Thus, product and process innovations are basically value-added thoughts. (cf. Green Paper on Innovation 1996.).

What kind of a process is the generation of knowledge and how it could be supported? Should work, technology, customer relations, cooperation and education be arranged in a certain way to generate and apply knowledge?

The invisible balances of ordinary companies may be 14-fold compared to visible balances. (Sveiby 1998, p. 3.) There are many critical factors in promoting creativity that are connected to the questions concerning the management and assessment of human resources. Organizations can be divided according to these criteria. Growth and sustenance of intellectual capital seems to be systematic and spontaneous in organizations that are functionally flexible. About 20 % of Finnish enterprises fall into this category. (Ylöstalo 1999.)

Discussion points to a direction that forms of work and work organization that have the following characteristics support innovation:

- Interactive and network activity, and social skills
- Discussion and questioning
- Continuous education and application of knowledge
- Principles of continuous improvement
- Acceleration of the accumulation of knowledge through special techniques
- Sustenance of contacts between research and workplaces

It is essential to facilitate such activity that supports learning and the immediate application of knowledge. This is a very general factor creativity can be based on. The combination of creativity and work will generate various forms of innovation.

Work organization is a crucial factor when it comes to the use of intellectual capital and the productivity of the work process. It concerns both internal and mutual activities of organizations. It is a question of organizing people, tools, objects of work, customers and partners through organizational, technical and telecommunications systems so that production will become practical and efficient, and conform to the environment.

Sensible organization of work does not, however, guarantee long-term continuity of work and production. Part of the profits should be invested in further development of operations. This refers to both improving the technical infrastructure and providing potential for the growth of intellectual capital, including creativity. The need for the new labour force based on structural changes in

economy can be met only through learning at work. It is a technical process and solves the situation in a socially sustainable way. Therefore, we should be determined to develop models of work to support learning and creativity.

The development of the knowledge society makes it necessary to reorganize work, but the need for change is varied. When it comes to functional improvement of operations, it is paradoxical that the capability of people and organizations to implement the necessary changes is limited in the short term and rather resembles slow, continuous improvement. Modes of work or structures of work should be changed one by one rather than two at a time. Multiple simultaneous or continuous changes are bound to meet such strong resistance that there will be hardly any progress. Slowness of action is due to the human need for security, which again is based on secure income and health. Thus, questions concerning the security of the entire personnel, i.e. their position on the labour market, should always be involved in the innovation process.

In the long run, the exclusion of vast masses in the knowledge society will create a severe obstacle to positive development. Individual security means understanding the workplace environment as a whole. Resistance is an uncontested reality, and if it is disregarded, it may slow down or even prevent the improvement of organizational functionality. It has to be taken into consideration and this involves careful preparations and scheduling innovations at reasonable intervals. The following will concentrate on the characteristics of innovative productivity.

3.1. Discussion And Questioning

It is not possible to give a comprehensive explanation as to how innovations get started, because it is always a unique event. Innovations can, however, be supported in both individual and organizational ways. Organizations and their parts work towards innovations to varying degrees. Any changes in structures or operations can be feared for a reason, but in a dynamic environment, a real change is often a requirement for preservation and better security. This also concerns individuals working within the organization. Positive development requires tolerating controversies and calls for systematic questioning. It also requires that not only risks but also benefits are distributed among the participants, for example securing the position of personnel taking part in the change.

Innovation is not advanced by closed systems, hierarchy or other centralization of decision making, or limiting the actors' options to function. Innovations are supported by transparent decision making, diverse and open communication, delegated responsibilities and basic unanimity regarding general directions of objectives and methods to be used. What methods that support innovation clearly have in common is that they promote discussion to question things and to find answers to questions. Making and phrasing questions often proves to be the most fruitful part of the discussion. When a question is phrased correctly, it is more likely to be met with an answer, and finding the answer can lead to innovation.

Existing characteristics create an entity we are used to relating to the concept of a good human being. It can be safely assumed that the more complicated the problems are, the more significant role experience, knowledge, persistence or the ability to interact play. Good interactive skills are important, mainly for the reason that the more complicated the conditions are, the more efficiently a socially oriented person or organization can organize the generation of the required knowledge to reach the objective.

Information technology and the knowledge society can support the development of the conditions favourable to the innovation described above. Information technology can be used to support factors that strengthen the individual and organizational innovation process, provided that these possibilities are realized and there is effort to develop them within the system.

- interaction should be actively supported with the help of information technology: The "ease" of the exchange of messages and thoughts would be most important. The equipment of information technology are often too slow for this.
- The relevance of communication should receive special attention. Specific requirements could even be set on communication to cover this area. The sender of the message should evaluate the relevance and distribution of his/her message to make sure it would be as efficient as possible and would not be a waste of anybody's time.
- Communications technology can be used to speed up discussion and also to widen up the circle of participants. When developing the operations of work organizations, it would be advisable to examine the possibilities offered by the distribution and use of communications systems that are open or network-ready.

Table 4 exhibits some individual, organizational and social characteristics that promote innovative ways of thinking and acting.

Table 4. Factors That Increase The Innovative Nature Of Individuals, Communities And Organizations

Individual	Organization	Society
Self confidence	Organizational culture that relies on success	Empowerment of people
Questioning attitude	Assessment and development of own activity	Possibility of open discussion, many actors
Curiosity	Want to understand and develop the production process	Interest in own and surrounding culture
Thirst for knowledge	Want to understand and develop the production process	Broad-based standard and professional education
Knowledge	Ability to generate operational plans, a learning organization	Capability to free and organize individual assets, lifelong learning
Practical experience	Accumulation and organization of experience	Valuation of history and work
Capability for social interaction and sense of humour	Supporting the social skills of personnel and their organizational enabling	Extensive and organic participation in social discussion
Problem orientation	Ability to evaluate and solve problems	Capability to set political focus of activity
Sensitivity to possibilities	Positive organizational culture that strengthens actors	Support and encouragement of voluntary and organized activity of citizens

Persistence	Persevering organizational culture	Political stability and social continuity
Determination	Believable visions	Functionality of political process
Ability to simplify	Ability to make possibilities operational	Research, R&D, broad political interest gathering
Sensibility	Steady interaction with the environment and self evaluation	Open international intercourse, self evaluation and public discussion concerning it
Manual dexterity	Valuation of work	True valuation of different forms of work

3.2. Support For Learning

One solution to the challenges presented by the knowledge society could be lifelong learning closely connected to working life. It could go even as far as to cover the entire lifespan of an individual as well as different areas of life. To reach such an objective, work organizations should both allow and support learning and improving one's professional skills and be able to accommodate and utilize these improved skills in technical, social and contractual contexts. This is not a minor challenge, but it is strategically important.

It is important for the sake of understanding and developing operations to make the operation and structure of an organization more visible, and this refers not only to smooth production and economic numbers but also to the internal work process, and the factors enabling development should be brought forth. This can be accomplished with the help of indicators, open discussion, training and increased responsibility. Processes involved in decision making can also be simulated and demonstrated by means of information technology. Technology can also help in increasing transparency.

The concepts of the learning organization and lifelong learning are included in the discussion concerning the knowledge society particularly when it comes to changes in the operational environment. The following presents conclusions that can be drawn on the basis of some European dissertations (see: From The Highways of Information... 1999.) On the one hand, the concept of the learning organization includes generating capabilities for learning the basics of a profession or trade, continuous improvement, and mobilizing the innovative process of changing the ways of operation. On the other hand, it is based on the inventory of human resources, setting them free and utilizing them while developing the way the organization operates. The process leading to operational improvements or changes in practices is more likely to happen, if the sense of trust and security can be preserved. The organization that manages this is aware of its human and technological potential, and is able to sustain operations that realize the results of learning. Knowledge without such an environment is seen as useless and a burden. The different levels of developmental thinking can be described as follows

- There should be interest in and an ability for learning on the individual level. In addition, there must be support for this improvement. This requires the consent of the organization or support for the development. In order to facilitate learning and development, the working tools and work processes should under control both conceptually and operationally.

- On the organizational level, learning requires a tendency to react to the challenges created by the market or other instances by improving operations in a way that utilizes and develops the skills of the personnel. This kind of activity must be made legitimate, and enough time and space must be devoted to it. It is essential to get the personnel to take part in it, and to get management to agree to realize such changes that support learning. The organization can seek assistance from outside the organization for its change or learning process, but as a rule, change cannot be bought but it has to be created from within the internal potential, which leads to the generation of organizational innovations. In the learning organization, learning becomes a continuous process in which learning and knowledge regarding the methods of learning and improvement are accumulated.
- On the level of the social system, the learning organization is a challenge to the education, economy and labour policies. It is also an issue regarding the principles of the political system, because a positive concept of a human being, belief in progress and preventing exclusion are also principles of the learning organization when pursuing deeper social sharing and material and intellectual development. Both national and international innovation systems pay attention to the use and development of human resources and consider it a strategic factor in the pursuit of higher productivity and employment.
- What relates the knowledge society and the learning organization to each other is, among other things, the fact that the technical changes faced in the reorganization of production not only constitute a challenge for learning but they also create possibilities for it. Information technology facilitates better management of work and a broader basis for learning. The consequences of the use of technology depend on the way it is used. More often than not work in the knowledge society is cooperative work. Work can be reorganized by utilizing technology and organizational innovations. It is a very important challenge for the knowledge society policy to provide individuals, organizations and networks the knowledge and the operational skills to utilize individual capacity in a productive way and to adapt to changes in the operational environment.

3.3. Continuous Operational Improvement

Above we discussed the internal structure of business operations and changes it is going through. But what are the internal and external conditions for the operation to continue and to change and improve to continue? Questioning is again an important factor, and it means that the solutions implemented at any given time are not believed to be the best possible solutions. Some factors that may change our views on the way the economy works and on the ways of conceptualization are:

- The transition to knowledge and know-how economy in which the position of an individual, an enterprise and a region is determined by their knowledge and learning capacities. The human resources possessing knowledge and know-how are increasingly important. Expertise includes several characteristics, even those of organic evolution, that are difficult to master and manage.
- The transition to an economic era of information technology, smart logistics and project organizations. The development of globalization and individualism are simultaneous. The production process will be squeezed into a smaller and smaller space in time and place. In conjunction with this development, technology, data bases, new ways of reorganizing work, and networks are being introduced. This demands top professional knowledge in many different fields.
- The transition to economy based on customers' expectations of quality and digital customer orientation. The expectations of quality the customers have are instrumental in the process of value assessment. Technology facilitates strong digital customer orientation and by

utilizing it, it is possible to integrate chains of production from subcontractors and work groups all the way to customers. Poor quality of service or weaknesses in the network may result in fast changes in customer relations.

- Meeting the challenge of lifelong learning. There should be more determined development of learning environments even outside the official educational system. This is very important considering individual career development, and also because the desired competence or work input cannot be generated relying on the official educational system only. The generation of innovations requires continuous learning. The subject matters of learning may involve areas in which formal education is not even available.
- Adoption of ethical knowledge. Individuals and organizations have to take responsibility for their actions. Sometimes ethical challenges are seen as an obligation or an additional expense. Yet it is more like an opportunity for business. Ethical investment funds in Britain yield even more than other type of funds. (Helsingin Sanomat, 13.7.1997.).
- Transition to knowledge and know-how policy that utilizes many social subsystems. Knowledge and know-how can often be organizationally developed. (Raivola ja Vuorensyrjä 1998, pp.80-84.)

These above-mentioned factors are present in the current knowledge economy and operations can be developed on these grounds. There is no way to give an accurate description of functional changes, because they exceed the visible structure of business conditions discussed above, and they are something "more."

3.4. The Appreciation Of Experience And Tacit Knowledge

Tacit knowledge is defined as knowledge that has not been articulated. For example, knowledge and values based on experience represent this kind of knowledge. Discussion concerning the relation between tacit and focal knowledge concentrates on the conceptual contents and the process of generating knowledge. The concepts involve understanding the structure of information and the generation of knowledge involves applying this process for example in working life. "The significance of a language is also in that an observation and its meaning become reality only through categorization and conceptualization." (Pekonen 1989, p. 28.). This statement refers to the nature of the process that systematizes observations and unanalyzed thoughts and finally leads to their symbolic presentation.

Raivola and Vuorensyrjä have characterized tacit knowledge as follows:

- Tacit knowledge often appears in the form of unconscious rules and norms that support focal knowledge.
- Tacit knowledge is constantly changing and forms a kind of a filter for knowledge. New experiences are related through the concepts that the individual already knows and has adopted from other users of the language.
- Crafts is a very typical example of tacit knowledge, but beliefs and interpretations of reality form a given and self-evident part of social reality. Only the shared cultural experience forms communication between people.
- Tacit knowledge has been embedded in social reality. The understanding, learning and conscious processing of tacit knowledge is most successful in practice through interaction or dialogue.
- The adoption of tacit knowledge happens mainly through model learning; learning by imitation, identification and doing things. (Raivola & Vuorensyrjä 1998, pp. 22-23.)

We are used to accumulating formal and focal knowledge through reading. Unspoken knowledge can be adopted by sharing experiences. One way of generating knowledge in working life is to utilize techniques that quickly transform tacit and unspoken knowledge into focal and formal knowledge. However, focal knowledge includes knowledge that at least at the beginning is unspoken. The process of knowledge generation can be intensified through personnel rotation and placement, and by means of formalizing focal experiences. (See: From Information Highways...1999, pp. 22-26.)

The accumulation of formal (focal) and unspoken (tacit) knowledge happens by moving on the chart of knowledge hierarchy. Focal knowledge describes the environment and visibility means it can be described and divided by means of technology or in the course of conversation. Formalization means either written or another form of describing one's thoughts. Tacit knowledge can be organized and made conscious only partially and it always depends on concepts. It does not take form only through formalized information, but also in practices, which means ways of thinking and acting, i.e. typical ways of reacting to the environment in different situations. Tacit knowledge may remain unorganized in form in the knowledge hierarchy on the levels of objectives, management and even wisdom. To transform it into focal knowledge to general consciousness requires current interpretation, and possibly also documentation, of its meaning. (see: Pekkola 1999, pp. 16-18.) In a way, this refers to the transparency of the generation process and its possible interpretations.

Formalizing tacit knowledge helps to understand the real nature of work processes and to generalize experience that has been found good. Accumulating focal knowledge promotes the application and development of knowledge again in unofficial and invisible ways.

Another way to generate knowledge is to formulate the processes concerning work, cooperations and customers so that they make it possible to generate knowledge regardless of organizational limits. More and more often work is done in a chain formation in value-added units that share a common interest. Work groups can even be given a virtual environment to work in, in which technical instruments support the elements of work. Work is based on flexible hours and is performed in a place that allows network access. Internet and intranet applications create a space where interactive forms of place, time, cooperation and interaction are waiting for their applicators. In this type of work, the physical workplace is the so-called interface, i.e. the correlation between the individual and the computer.

Working in value-added chains or virtual workplaces is part of operational objectives and management. Technical systems help actors outline the environment, document and shape information in standard format, and automate routine tasks. Cooperation leads to generating common knowledge which leads to reaching the common goal through the work process.

3.5. Keeping In Contact With Research Institutes

Production is diversifying and product life is getting shorter. The production of value-added services and products needs fast and continuous product and process innovation. One way to keep up with generating innovations is to keep in contact with research institutes. The application of the research results and methods of natural and social sciences in product development and work organization creates special potentiality to utilize national and international innovation systems. We should support especially groups and institutions that are oriented in long-term research and development.

Judging by the experience with successful innovative projects, a good preliminary form of cooperation could be a network of consultation. It has to be noted that the successful projects have always been implemented on a long-term basis. Nobody can just "go and buy" a product or process innovation from a research institute.

An enterprise may have defined generating knowledge as one of its competitive advantages. It means the capability of the enterprise as a whole to generate and spread new knowledge and include it in products, services and systems. Tacit and focal knowledge form a correlation, become one another and expand. The extent of innovative potential and know-how to manage and utilize knowledge is a crucial factor in the formation of the knowledge society. It is a question of systematic cultivation of associative knowledge and interaction. Fast introduction and marketing of new knowledge and product innovations is the key for continuous growth in employment. The interaction between work and education - learning by doing - and new forms of networked work will become more significant in this sense.

It is important to keep in mind that in business and industry, product and process development often requires such vast amounts of capital that enterprises cannot afford it. For this reason, keeping in close contact with research is part of the network that is becoming indispensable for more and more enterprises. These contacts are beneficial for the research, too. It does not have to be about top-of-the-line research or knowledge. What it refers to is that research institutes can help to guide the utilization of relevant information where the operation of the enterprise needs it at any given time. Network of cooperation is practical also in the sense that it can help to exploit diversity. Universities may not necessarily be the best examples and a business enterprise may run into problems in assessing the research and operations. As the interest of the university includes publicity (of science) and the interest of the enterprise include the preservation of business secrets, open consultation is the recommended way of approach.

4. Technology, Human Resources And Employment

The relationship between employment and the knowledge society was also discussed in the intermediary report of the knowledge society team. It stated that it is necessary to utilize technology to sustain employment. When considering the effect technology can have on employment at the workplace level, the most crucial factor is the way technology is used. It can give a competitive edge or enable the strategy of either increasing or decreasing intellectual capital. The best way of reaching long-term effects on employment is competition by developing intellectual capital. Employment is affected in different ways in different professional groups. Demand is usually greatest for educated people who can manage digitalized instruments and processes, whereas there is diminished demand for purely physical labour.

Table 5. shows an empirical analysis of personnel and technopolitical solutions related to employment, and the way of organizing work. It seems evident that rearranging the elements of intellectual capital and introducing telecommunications technology will increase the number of people employed at the workplace level. There is especially strong correlation between product and process innovations and employment. Rearranging intellectual capital and utilizing it in a way that leads to generating value-added thoughts and implementing them in production will have a strong increasing effect on employment.

Table 5. Factors Related To The Numerical Growth In Personnel At The Beginning Of The 1990s

Characteristic	Importance for the growth in personnel
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- Efficient production, competitive product of good quality, product innovations	- Extremely important, very difficult to compensate with other factors
- Active and broad cooperation with customers, educational institutes, etc.	- Very important, mere productional cooperation may be a limiting factor
- Introduction of new technology	- Negative effect on the number of personnel
- Development of organization	- Very important
- Introducing reorganization of work	- Very important
- Functional flexibility, opportunities for personnel development and interaction	- Very important
- Ample overtime	- Limits the growth in personnel
- Education/training	- Very important, if the need has been systematically analyzed and clarified

(Source: Ylöstalo 1999.)

4.1. Properties Of Information And Telecommunications Technologies

The purpose of information and telecommunications technologies is to store, transfer and refine information. Information work also involves understanding and problem solving. (Engelbart 1962.). Information technology can serve as a means to improve and make it faster to understand various concepts, and it also enables us to understand concepts that without this aid would be too complicated. It can also help solve problems better and faster, or help solve problems that otherwise would have been too complicated. According to Engelbart's theory, information technology is a good instrument when it is combined with basic individual skills. Engelbart states that these instruments should be connected appropriately to human concepts and methods.

The theory is aiming at describing improving human intelligence, which means better ability to handle complicated problems, increase specific understanding and formulate solutions. Improving human intelligence is not a technical "gimmick," but it really makes it possible to utilize cultural means to improve thinking. The means to be used could be language, artifacts or instruments (eg. computers) and methods. (Engelbart 1962.)

Empirical research conducted in the USA came to the conclusion that investing one monetary unit in information technology (computer capital / IT) will produce a 10-point appreciation on the market. Investments in information technology generally give a better yield in quality than investments in other types of capital, because other investments are assessed to be worth about as much as their original capital. Researches explain this phenomenon by saying that investments in information technology not only create noticeable additional value on the market but they also complement the use of human capital, reorganization of operations and business strategy. They also facilitate the accumulation of additional value related to programs. In a way information technology paves way to organizing intangible assets, though the structure of enhancing this side of operations seems vastly unknown. (Brynjolfsson and Yang 1999.)

Brynjolfsson and Yang (1999) conclude that of the 10-point appreciation the share of information technology itself is one point, and bought and customized programs is 3-4 points. This leaves 5-6 points for other intangible assests, such as new business strategies, new organizational structures

and new marketing structures. (p. 26.) The traditional way of thinking is that information technology does not aid in the production of old products with old methods but it helps to produce new products with new methods. Information technology enhances the operations by decentralizing decision making, supporting independent teams and extending responsibility. IT-investments can promote significant changes in the structure and operations of an organization. IT-investments may be small in economic terms but the strategic operations of the entire enterprise may rely on them. (pp. 26-27.)

4.2. Smart Machines Or Systems

While automatic data processing has been developing, one standard theme and question has been when the first thinking or smart machine will be built. The regular task-oriented program is not smart, it is only a series of logical deductions and related series of commands. Human intelligence is logic, but it also is a lot of other things. It is a combination of realizing, associating, shaping, guessing, social skills, musical skills, linguistic talent, ability to remember, etc. Although the capacity of the equipment used when building systems has increased tremendously, and is still increasing, their capacity and speed are still minimal when compared to the human brain.

Systems have traditionally been employed in routine tasks, for example bookkeeping. When the system works according to pre-set rules, the result is always correct. As calculation capacity has increased, simulators have been built to mimic reality where all the rules are not known and events may be unpredictable. Examples are nuclear and flight simulators which can enhance and replace some difficult testing and training processes. Meteorologists have always had the problem of utilizing vast masses of information in complicated patterns. Nowadays the visualizations of daily forecasts are done with the help of simulations, advanced algorithms, and enhanced methods of acquiring information. It is also possible to create exact forecasts for entire continents as well as farming regions comprising a couple of farms.

The globalization of information networks has brought processes practically endless possibilities to gather and distribute information. Today an upper-grade teenage student has in his/her use the kind of systems of information gathering and publication that Einstein could not even have dreamt of, and most often they have been bought with pocket money. The speed of locating and transferring information has increased the efficiency in developmental and creative work.

Various methods have been used to make programs and systems smarter. Sometimes it has been called artificial intelligence or fuzzy logic, and lately the most talked about have been solutions based on neural networks. All these models have brought systems closer to a thinking machine. Fuzzy logic can guide for example a washing machine that can independently determine how dirty the laundry is and then ration detergent according to that. Subway trains are also guided by fuzzy logic. Neural networks are currently being researched and they will progress the development. Their capabilities to learn will create countless new ways and possibilities to model and manage processes.

4.3. Telecommuting As A Technical And Social Innovation

Information and telecommunications technologies facilitate transferring work from the category of a place to the concept of a space. Information technology is important especially in integrated (seemingly decentralized) team work, which changes the concepts of workplace and working hours. Work processes, and especially the generation of thoughts and knowledge, will encounter less obstacles and gain growing technical and social support.

Access to networks becomes essential when work is supported by technical systems and the common object of the phases of work in integrated groups or teams is virtual. The workplace and the instruments consist of the interface, i.e. the connection to an information system. This link can be in alternate places or travel with the person. Working towards value-added chains will increase organization-based individual or project-oriented cooperation. Work can be done at points instead of fixed workplaces, and these points are connected to the workspace. This kind of work is governed by law and contracts, and also by consideration and general ethical principles.

Depending on the method of assessment, over half of Finnish people work in professions involving information and knowledge. In this type of work, it is important to generate thoughts and ideas fast and distribute them using networks. Communication is best done by telecommunication rather than physically going from place to place, because this will save time and costs and burden the environment less. It is becoming more and more common that only telecommunication will meet the requirements of the work process. Telecommuting does not mean that the worker is being cast out or located in a distant or isolated place. It rather means a way to organize work by adding possibilities for people to choose suitable workplaces and hours. Work can more often be done without the limits of a fixed workplace.

Telecommuters work in jobs requiring professional skills and their number in Finland according to a survey published in 1999 amounted to about 17% of the labour force. (EcATT 1999) It must be noted that telecommuting is not an "either-or" situation. Most people work only a few hours a week away from their regular workplace. This is a changing trend in which mostly professional and responsible people arrange their own working hours and workplaces in a way that suits themselves and the substance of work. Heinonen (1998) estimates the percentage of potential telecommuters would be 20 % - 40 %.

Telecommuting suits the kind of organizations that are interested in developing work and management, and productivity. It does not suit to organizations that emphasize external and formal control. Main reasons for telecommuting are increased efficiency, better management of working hours and improvement in the quality of work. Other reasons might be acquiring necessary skills or work input, or motivating personnel.

Telecommuting offers regional possibilities to sustain employment. A good work environment can also be a natural or otherwise ecological living environment. In Finland telecommuting can be facilitated through extensive telecommunications network and public services. Telecommuting can support local business and industry and create networks for it. It can also utilize several basic investments, such as residences or summer cottages, and traffic connections. Telecommuting can only be done by means of information and telecommunications technologies, but the central idea of telecommuting is, nevertheless, that it is a better way to organize work.

Telecommuting correlates the worker with a better than usual position on the labour market and elevated quality of work, and the main reason for this is a measure directed to organization of work. This phenomenon proves it is an efficient way to organize both individual and structural capital. Information and telecommunications technologies reorganize the structural capital of the company and its customers and speeds up thinking and other processes. (cf. Pekkola 1997.) Thus, telecommuting, too, serves as innovative use of intellectual capital.

On the international level, the effects telecommuting has on the positions people have on the labour market also depend on the nature of the labour market system. In systems including areas where

contractual activity has not been established, labour force is poorly organized and labour laws vary, a person with poor professional skills or a person in a bad social position may be forced to work on terms that trade unions might not agree on. In systems where contractual activity and parties are established, the use of human resources is more rational. In other words, in telecommuting, too, we can see the effect of the support systems of the labour market and intellectual capital.

5. Employment Based On Sustainable Development

All human activity, such as economy, is based on the existence and preservation of the ecological system. Technology and organizations have given man instruments to manipulate nature, which in many cases has exceeded the tolerance of nature. Technology and knowledge must be used to bring individual processes and especially economic activities under the principle of sustainable operations, i.e. that are possible to realize even in the long run.

6. Customer Capital And Added Value Of Customers

There can be several streams running between enterprises, or any work organizations for that matter: information, knowledge, materials, services and money. Operations are based on value-added chains that are sustained by the network of people working in these organizations. It is increasingly important especially in the business operations of dynamic organizations to build connections and networks. Boundaries between organizations become less significant when objectives become strategic or project-oriented. Cooperation policies form temporary systems for cooperation, for example virtual organizations.

Competition exists no longer only between individual enterprises but also between different value chains. A value chain is a value-added system that comprises suppliers, resellers, those who supply services and manufacturers. Local value chains between organizations can, and they also often should, join other chains in the same environment and international value chains. (Information Society...;1998, p. 5.)

Information technology can help to improve the operation of value chains within and between organizations. This can happen by means of identifying and shaping the details of organizational operations and planning the processes between enterprises. Added customer value is based on both the knowledge it includes and the revenue received from customers. The importance of knowledge will increase in this respect. Most important is, however, that customers measure the innovation potential, or the state of creativity, of the organization in a reliable way. The possibilities of this measuring should be acknowledged from this angle, because it may be that traditional "customer satisfaction" does not adequately measure this aspect.

6.1. Customers And Networks As Resources For Innovation

The interaction between innovation and an organizational structure has not yet been studied in great detail. It is known that organizing innovation requires taking into consideration different operational environments. Technological environment requires the development of technology, knowledge, coordination between enterprises and sharing the risk. Economic exploitation of innovation in a competitive environment requires vertical intergation or hierarchy. By means of organizational solutions the enterprise can ensure that the benefits of knowledge will be channelled back to it. Besides interrelations between enterprises, organizing an enterprise involves three different aspects: production, transaction and innovations. (Paija 1998, p. 36, p. 38.)

Enterprises that are capable of designing and launching products fast and have short and accurate delivery times, will succeed. This is often very demanding and has led to external operations and networks of cooperation. Network solutions are often based on three factors: Even big companies may not have enough resources for extensive research and development. Knowledge and know-how are the most important factors in production, and they always have external aspects that are being utilized by using networks. In addition, it must be noted that the market does not operate in all fields of business. Networking involves internal specializing and dividing work increasingly on the basis of knowledge. In a network organization employees communicate directly with the cooperative organization. The most important resources the enterprise has are often immaterial and tied to the knowledge and know-how of the personnel. More often than not innovations are developed at the intersections of intertwined technologies that are on top of each other. (Ylä-Anttila 1998, pp. 115-125.) At these intersections it may be possible to see the similarities innovations share within different entities.

Enhancing the chains of business operations creates additional value when the emphasis lies on the technical integration of processes, work methods, culture and individual views and professional skills. Increased cooperation has been found to generate value-added benefits to customers. Operational changes within organizations should increase flexibility, continuous generation of innovations, decrease formal management and promote the introduction of lean production in a way that benefits customers. This leads to the application of the model of a networking, and these days more often also virtual, organization. The systems have to comply with ecological modes of operation and responsible economic principles of operation. (Information Society...; 1998, pp. 5-6, p. 11.)

Customers function as one element of the business process and network. The generation of innovations may also be a network or teamwork process. Customers are of special importance, because the added value of innovations is always determined from the customer's point of view and it will be manifested in a demand for innovations.

6.2. Trust As Part Of Customer Capital

All social activity is based on trust. Trust gained is directly proportional to the possibilities an organization or a person has to operate. (Stähle & Grönroos, 1999, pp. 127.) Sveiby considers a continuing customer loyalty to be based on actual trust and the corporate or company image that developed during previous common projects. (Sveiby 1999.) Trust could be defined as mutually accepted rules of play regarding how knowledge created either in cooperation or by one party only is used in business operations.

The use of knowledge must benefit both parties both on the short term and in the long run. Trust is also an important factor in creating and distributing knowledge. If any party within the organization or between organizations has any doubts about the use, creator or distributor of knowledge, it is not realistically possible to have proper exchange of information that would support the operations. So-called contract games and slowness in the flow of information that pertains to the interests can seriously affect the operation of an organization. Negative effects fall on productivity and atmosphere. The bigger the problems concerning generating, distributing and using knowledge, the more difficult work requiring knowledge and the operation of organizations will become. When developing networked cooperation, the ethics of cooperation are facing new kind of demands.

Social and production environments are becoming more complicated and knowledge consists of smaller and smaller details. Albeit knowledge should always be organized in entities and structures,

it is becoming more difficult to keep track of the details. Relations between the producer and the customer are also more often than not based on trust. The breaking of this trust can lead to a break-up of valuable cooperation. Trust as such can be considered a brand and business and cooperations based on it are a visible realization of it. In the same manner it is possible to base cooperation on building mutual trust between the parties within an organization.

Trust is at least a two-fold matter. The organization can operate well only if its personnel agrees to the objectives of the employer, but at the same time the employer has to agree to the objectives of the personnel and safeguard their position on the labour market to create the sense of social security. This two-fold trust is the cornerstone of agreements and arrangements that will bring us closer to the fundamental use of the innovation potential, which is also related to lifelong learning and the questioning involved in the learning organization.

7. Business Follow-up Systems

The sustenance of human resources in the knowledge society environment calls for a new way of envisioning things. When the information intensity of work and the dependence on innovations in the business environment are constantly growing, all types of organizations are facing the need for more information on how the human resources will develop in this context.

The backbone of the western follow-up and guidance system of business is bookkeeping. This system is over 500 years old and its core elements are economic transactions on which the annual closing of the books is based. The closing of the books includes both the balance sheet and the income statement of the company. Since the changes created by intellectual capital are hardly at all reflected in traditional bookkeeping, companies have started to come up with new follow-up systems, such as Balanced Scorecard and other reporting systems relating to intellectual capital, personnel and the environment.

As human factors have become more important in business operations, there has emerged a growing need for non-financial monitors of the operations. The Balanced Scorecard is an example of a tool that can help develop the organization. It concentrates on acknowledging and measuring intellectual capital. The main idea is that in order to succeed, a company has to meet the interdependent expectations of its shareholders, customers and personnel. The attitudes, quality consciousness and skills of the employees will affect customer satisfaction, loyalty and behaviour. The objective is the renewal and intellectual growth of personnel that will be reflected in the economic bottom line. Since personnel has become more important, the need for personnel reporting has increased. (Raivola & Vuorensyrjä 1998, p. 62.)

A group of international researchers have started to analyze the structure of the closing of the books in business and related problems. Edvinsson and Malone (1997) and Stewart (1997) have concluded that the balance sheet should be divided in four instead of the current two. This concept could be called the "perfect" balance sheet. (see: Diagram 2.)

Diagram 2. The "Perfect" Balance Sheet

	Assets	Liabilities	
Tangible	Cash on hand	Liabilities	Visible
Assets	Fixed capital assets	Net worth	capital

	Circulating assets		
Intangible Assets	Human Resources Internal structures External structures	Additional market value Contingent liabilities	Invisible capital

Source : Ahonen 1999

In a traditional balance sheet only tangible assets and visible capital are shown, but the perfect balance sheet also includes intangible assets and invisible capital. The latter are important in the sense that knowledge-intensive companies clearly have more invisible capital than capital-predominated companies. Pertinent literature defines invisible capital as intellectual capital. This definition is somewhat problematic, because accounting theory usually places capital balance on the credit side, i.e. liabilities.

It has been fruitful to determine the human capital of a company in accounting terms, because it has originated an intensive debate about the structure of the human capital. Based on pertinent literature, there is certain unanimity in that the human capital of a company consists of the human capital of the individual members of the personnel, and the internal and external structures of the enterprise. Internal structures include for example business culture, communications systems and systems for accumulating information. Sveiby sees copyrights, too, as part of this category. ([http://www.sveiby.com.au/Invisible Balance.html](http://www.sveiby.com.au/Invisible%20Balance.html)) External structures include for example customer contacts, partners in cooperation and subcontractor networks.

7.1. Closing Of The Books On Personnel And Knowledge

Personnel balance sheet is a report describing the human capital of a company. Sweden has utilized such reports during the 1990s, and other Nordic countries have introduced them over the past few years. In Finland they have become more common over the past couple of years and nowadays some twenty bigger companies utilizes them. Good examples are Nokian Tyres, Inc. (Nokian Renkaat Oy) and Engel Enterprises, Inc. (Engel-yhtymä Oy). Ahonen (1998) has created a model for an ideal personnel balance sheet and according to it, human resources are divided in three categories: (a) numerical strength of personnel, (b) characteristics of individual members of the personnel and (c) the work organization as a whole (see: Diagram 3. and Table 6.). The latter can also be further divided into internal and external organization, which division corresponds to the internal and external structures of intellectual capital.

It is important to describe the numerical strength of personnel, because it enables the company to see whether the growth in its volume and human resources is parallel and in balance. The characteristics of individuals describe such indicators as knowledge, health and endurance. Internal organization can be described with indicators such as fluctuation and atmosphere. The indicators of external organization are indexes describing customer satisfaction or the number of customer complaints.

It is essential that personnel takes part in personnel reporting. Though we presented the basics of personnel and knowledge reporting in this report, it does not exclude the need to have personnel actively take part in the assessment itself when the assessment methods develop further.

It cannot be denied that the innovative nature of personnel is very important in the growing global business environment, and this makes it even more important that the indicators describing the state of personnel also give an account of the company as a learning organization. This should be remembered when putting together questionnaires regarding the atmosphere at work. Indicators describing the number of suggestions and the structure of the system of paying wages also tell a lot about the innovative potential of a company.

Table 6. Contents Of The Personnel Balance Sheet

Section	Answers the question...	Indicators
Personnel strategy	What type of human resources the company needs to realize its business or operational idea?	
Results of personnel calculation	What is the structure of personnel expenses?	Expenses of personnel development Expenses of personnel strain Renewal expenses of the labour force Expenses of hours worked
Personnel balance	What is the value of the capital, especially human capital, of the company?	Separation of the market value and bookkeeping value of the company
Number and structure of personnel	How big human resources the company has and what type of working relations they consist of?	Working years of personnel Efficient use of hours worked Permanent / temporary Full-time / part-time Overtime Subcontracting
Individual characteristics	What are the areas of expertise and other characteristics of management and other personnel?	Education Work experience Years of service Health

		Capacity for work Ways of life
Internal organization	How is personnel managed and how does it function as a team? Does the company meet the requirements of a learning organization?	Measurements of the atmosphere at work Suggestion activity Fluctuation Sick days Bonus systems
External organization	What are the connections of the personnel to external groups related to the company?	Customer satisfaction Number of complaints Long-term customers Long-term subcontractors Number of customers and subcontractors who develop the knowledge level

(Lähde: Ahonen 1999.)

The business idea and strategy of the company would be a good starting point for the personnel balance sheet. It is actually a very important starting point, because it will show how well the present human resources of the company meet the requirements of realizing the business idea of the company.

During the past couple of years so-called knowledge balance sheets (vidensregnskab) have started emerging in Denmark (Larsen et al., 1999). They describe the whole value chain of the company from the angle of intellectual capital, and most often include the following factors pertaining to the company: (a) objectives and basic values, (b) capital input and (c) information on the results.

The significance of capital markets to business and industry and to the society as a whole is growing all the time. Yet analysis regarding the development of human capital is very limited. This is proved by the fact that every piece of news reporting reductions in personnel will raise the market value of the company in question, though research shows that uncontrolled reductions in personnel result in lowered state of health of the personnel, thus resulting in decreased human capacity. The reactions of the capital market will eventually change thanks to the accumulated information regarding the significance and development dynamics of human resources.

IV PROPOSALS

This report has concentrated on discussing the possibilities the knowledge society creates to improve the competitiveness of business and industry. The analysis and support of developmental prerequisites of innovations is seen as one of the most important aspects. The main theme is that the nation has to be prepared to understand new technology, and to utilize it and produce it. Development does not depend on any one nation alone but it is global and is taking place regardless of nations in societies, companies, on local levels and even at homes. Especially small nations have very limited chances to affect this progress. Regardless of this, it is important to maintain social cohesion.

Technological development steered by enterprises cannot be smooth and treat all citizens equally. Quite the contrary, substantial groups will be left out and some groups will suffer from this. Though it might be possible in the Nordic well-to-do societies to distribute material well-being through the traditional methods of income distribution, they would not benefit the cultural side, for example provide the reassurance of security that all citizens need. This can be proved by the general negative attitude of less educated citizens towards membership in the European Union, which is especially evident in the Finnish countryside. International networks, multinational corporations and international flood of information will undoubtedly cause the crumbling of the identity guaranteed by the concept of nationality. These problems must be taken seriously and met with constructive solutions. If cultural displacement is let develop without paying attention to it, it may lead to the isolation of substantial groups of citizens and thus lead to the prevention of the development of the knowledge society.

Therefore, it is very important to try to correct the disadvantages caused by this global development, and it is the government that should take this responsibility. It could begin by training the elder generation to use the internet and by developing easy-to-use computer systems. It may also become easier to adapt to the use of international information networks when internet applications pertaining to communal services become more common.

Labour administration must consider the fact that not all citizens will conform to the good advice and recommendations of the government to learn to use information networks. Not everybody even has the capability to do so, and still more people have other reasons for not doing so. When this leads to lacking or outdated professional skills, we are facing structural unemployment, and that is something the labour administration has to act on, anyway. However, the objective should be to build the society in such a way that everybody has an equal opportunity to survive as a useful member of the society, some with less support than others. Developing this sense of collective responsibility is a proactive way of preventing social problems, which are plentiful in different parts of the world and can serve as examples.

The following proposals offer limited solutions to the basic problems mentioned above. The main issue in this report was to understand the aspects of the knowledge society and to come up with measures concerning the quality of working life and employment. However, in some respect the proposals are also directed to preventing potential isolation in connection with the knowledge society. The intermediary report also included some detailed proposals regarding developmental measures.

1. Development Of The Educational System

The education policy should set as its objective to create a cultural environment of curiosity, searching and questioning. This seems to be one of the basic requirements of continuing development and qualitative improvement.

Likewise, in the education of trainers and in pedagogy, the management of basic methods of social sciences should be made a more central objective. This involves being able to consider and analyze different angles at the same time, questioning things, and understanding change.

Both employment and education administrations should take action to enhance the ways of acquiring knowledge and extend it to encompass the entire labour force. This should include multiple elements, such as institutionalized continuing education and systems of apprenticeships. The educational content of the systems allowing compensated voluntary leave of absence and compensated voluntary part-time employment should be increased. Especially aging and less educated labour force should be given training on skills to use computers and the internet.

The opportunities offered by networks should be fully employed in education.

2. Follow-up Systems Of Intellectual Capital

Closing of the books includes both the balance sheet of the enterprise and its income statement. Since changes in intellectual capital are reflected hardly at all in traditional bookkeeping, companies have started employing new types of follow-up systems. The Balanced Scorecard and balance sheets regarding knowledge, personnel and working environment are some examples of these reports. This new development should be supported, and especially the Employment and Economic Development Centres should offer their cooperation and support the introduction of reporting methods measuring intellectual capital. The information systems that support the creation of reports on intellectual capital should be further developed through cooperation between research institutes and enterprises.

3. Strengthening The Connections For Telecommuting and Working From Home

It is recommended that a program regarding the research and development of telecommuting should be initiated. This is essential due to the needs concerning traffic and the organization of work, and also due to regional and social needs. It could be connected to the priority program concerning the networking of enterprises and telecommuting that has been suggested by the Finnish fund Sitra as part of the Finnish national information society strategy. The objective should be to promote the kind of telecommuting that supports the use and growth of intellectual capital and utilizes the potential offered by the information and telecommunications technologies. The program should be integrated with the objectives of the labour, education, regional and economic administration policies.

4. Organization Of Work

Aid and support for work done in teams should become a self-evident factor in organizing work. Teamwork aiming at continuous improvement and reaching the level of a learning organization should be considered a good model of development also in labour and education policies. The objectives of the development programs of working life and educational curriculums should be related to this model. This should be backed by the objective of a continuous increase in the accumulation of knowledge and information and the open distribution of the accumulated knowledge. It would be very important to strengthen the resources for the development of working life.

The definition says that tacit knowledge is knowledge that has not been articulated. For example, knowledge and value selections based on experience are a form of tacit knowledge. Work environments and processes are complicated entities in their operation and by structure, and the management of these entities involves tacit knowledge to a great extent. Therefore, it would be important in the organization of work to create long-term participation that supports knowledge and the continuity of working relations that enable the distribution and use of tacit knowledge. When introducing new technology, it would be advisable to take into consideration the limitations and possibilities the transfer of tacit knowledge involves. These objectives should be noted especially in the selection of plans for the development program of working life.

5. Further Development Of Research That Supports Creativity

Cooperation to study the national connections between knowledge, work and culture is more important than before in the competitive environment of the knowledge society. Key factors in this type of cooperation would be the cultural elements of creativity, the impact of work and organizational culture on productivity and employment, and the capacity the methods of higher cultures have to describe and support individual creativity in working life. It is therefore recommended that the Academy of Finland would initiate a general study regarding what the creative work and research environments or teams that generate scientific or other innovations are like, what the organizational principles of these teams are like, and what we could learn from them. The following topics should be considered special objects of the research:

- What are the characteristics of creative work and work environment?
- Can creativity be promoted by certain ways of organizing work?
- What characteristics in a work environment are detrimental to creative work orientation?
- What type of organizations have the most innovative potential?

6. Support For Networking

A very central competitive edge a work organization has is its capability to generate new knowledge. In the knowledge society environment, this is more than ever based on cooperation between different parties. Developmental plans that support networking and aim at joint ventures between companies, research institutes and customers should be systematically promoted in ways that the labour, education, and economic administrations agree on.

7. Technology

So far the possibilities offered by the information and communications technologies to support work and to build virtual workspaces have been poorly utilized. Technology and the related

organization of work should be developed so that they would essentially improve transparency, feedback and chances for assessments, cooperation, and easy use of systems. The conceptual, technology-oriented field of application of the information technology can be said to be too limited. Therefore, the bookkeeping reporting of information technology and application know-how should be developed so that both aspects would be worked at in the same manner.

Technology should be utilized to strengthen the support for the human ability to think and generate innovations. Programs and technology that require constant adaptation to the conditions of the technical system can be problematic in this sense. It is recommended that user connections would better correspond to people's cultural concepts and ability to conceptualize their environment. Developmental plans with this objective should be initiated in cooperation with the Ministry of Labour, Ministry of Trade and Industry and pertinent research institutes.

8. Innovations That Support Ecologically And Socially Sustainable Economy

Ecologically sustainable development is part of business activities and a growing source of employment. Sustainable development could be promoted locally and regionally by, for example, observing the nature and built environment and developing renewable forms of energy. The knowledge society facilitates many forms of employment that are ecologically and regionally positive. Therefore, the central strategic objectives of the labour administration should include creating and promoting solutions regarding work environment and employment that would support employment and be ecologically sustainable.

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