

Research Publication 2011



Kyminlaakso University of Applied Sciences

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Dear Reader,

This fifth issue of the Research publication of Kymenlaakso University of Applied Sciences provides an interesting look at our research and development activities. With this annual research publication we emphasise the multi-discipline of our teaching and research and the connection to supporting working life. Kymenlaakso University of Applied Sciences invests strongly in international cooperation. As a part of this input we have decided to change the Research Publication so that it will be written in English as from 2011.

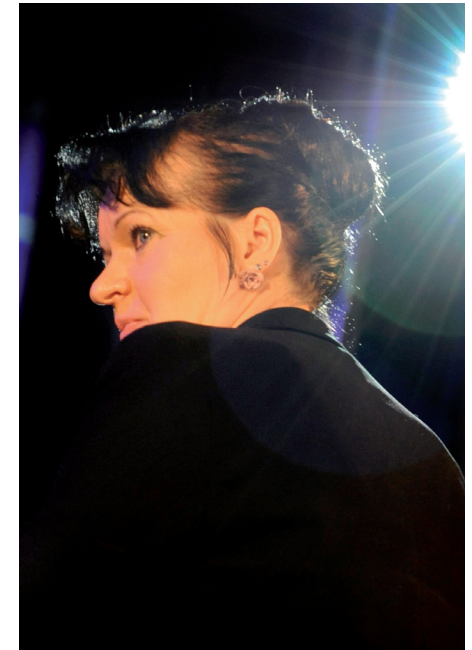
In this year's issue we particularly want to present to our cooperation partners two current aspects that characterise our daily activities:

1. In her article, *Towards Responsibility: cultivating the governance, processes and organisational culture at Kymenlaakso University of Applied Sciences*, Development Engineer, MSc (Eng) *Arja Sinkko* describes how the Bologna Process and its principles are guiding the development of processes in our university.
2. *Sinikka Pekkalin*, Senior Lecturer in Business Economics, presents the learning concept, "LCCE", developed by Kymenlaakso University of Applied Sciences, that creates a seamless cooperation between working life and the university within which the students are able to put their skills to practical use and at the same time teachers and companies have an opportunity to update their knowledge. The Finnish Higher Education Evaluation Council has chosen Kymenlaakso University of Applied Sciences' Learning and Competence Creating Ecosystem, LCCE, as a quality unit for 2010 - 2012.

Furthermore, this collection of articles split into different themes and selected from the various fields of our university - International Business and Culture, Social and Health Care, and Technology and Transport - presents the university's multi-disciplined knowledge and the expertise of our staff. Hopefully this publication - for its part - urges networking and creates cooperation between our international partners and us.

I wish to express thanks to the professionals from the various fields who have written these articles and all who have participated in the Research Publication. I want to express my warmest thanks to our partners for their valuable cooperation and also wish good success in the future.

Research and development regards
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1

Towards responsibility: cultivating the governance, processes and organisational culture at Kymenlaakso University of Applied Sciences

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The Bologna Process Guidelines

The Bologna Process started in 1999 and its influence of reforming Finnish and European higher education has been very strong ever since. Between 1999-2010, all the efforts of the Bologna Process members were targeted to creating the European Higher Education Area, that became reality with the Budapest-Vienna Declaration of March, 2010. To establish coherent and attractive European Higher Education Area (EHEA), having comparable educational system as well as enhancement of student and staff mobility is essential. The lifelong learning strategy and quality assurance in higher education including internal and external evaluation and dissemination of the results are examples of the tools which are created in order to enable international comparison of education. Higher Education is also a public responsibility.

The Bologna Process 2020 – The European Higher Education Area in the new decade
The 5th follow-up conference in 2009 in Belgium established the priorities for the coming decade to face the consequences of a global financial and economic crisis: *“In order to bring about sustainable economic recovery and development, a dynamic and flexible European higher education will strive for innovation on the basis of the integration between education and research at all levels.”* *“Striving for excellence in all aspects of higher education, we address the challenges of the new era. This requires a constant focus on quality.”* *“All students and staff of higher education institutions should be equipped to respond to the changing demands of the fast evolving society.”* (Communiqué of the Conference of European Ministers Responsible for Higher Education, Leuven and Louvain-la-Neuve, 2009).

The biennial follow-up meetings of the Ministers responsible for higher education from 46 countries ensure the progress of the objectives defined in the Bologna Process.

Finnish Higher Education

The Bologna Declaration and the UN Decade for Education for Sustainable Development have provided the guidelines for the promotion and implementation of ESD in Finnish Higher Education. The reform of higher education legislation in Finland has been executed and it came into operation on 1st January, 2010. In Finland the higher education sector is polarised into academic universities and universities of applied sciences with different tasks and profiles. The demand for supporting lifelong learning, achieving regional and societal influence and quality assurance of education and daily activities is, however, common to the entire higher education in Finland. The evaluation and auditing agency is called the Finnish Higher Education Evaluation Council (FINHEEC, Korkeakoulujen arviointineuvosto KKA in Finnish).

The Ministry of Culture and Education has governed the development of the quality assurance systems according to the Guidelines for Quality Assurance in the European Higher Education Area. The obligation of quality assurance is also written in the Finnish Law of Higher Education. To promote responsibility and sustainable development is voluntary, although, little by little, the ongoing degree and curriculum reform will in-

tegrate sustainability into teaching. The aim of quality assurance or integrated management systems is to systemize and support the strategic and/or operational development in an institute of higher education (HEI). The perspectives of responsibility and sustainability are a significant part of quality assurance in education. The progress of the Bologna Process will set pressure to take responsibility and sustainability into account as a natural part of internationalisation and quality assurance in HEIs. In Finland many actions have already been taken to support sustainable development through education and to strengthen education for sustainable development. Sustainable development has been integrated into the curriculum of Finnish preliminary and secondary education since 2004.

How to indicate responsibility and sustainability in HEIs?

The project “Education for Global Responsibility” (Kasvaminen maailmanlaajuiseen vastuuseen in Finnish) was executed by The Ministry of Culture and Education from 2007 – 2009. The aim of the project was to increase the quality and influence of global education in Finnish society. A sub-project “Global responsibility and sustainable development – basic information” (Gloaalivastuu ja kestävä kehityksen tietopohja in Finnish¹) was carried out from 2008-2009. As results of the subproject, the responsibility indicators and self-evaluation tools, as well as criteria were created to assist valueting the responsibility within quality assurance in higher education institutes. The sub-project concentrates on developing indicators and evaluation tools based on the Auditing Guidelines 2008-2011 set by the Finnish Higher Education Evaluation Council. This was an essential baseline for the project to ensure easier acceptance of responsibility and sustainable development being a natural part of quality assurance in HEIs. The indicators with lists of questions on the subject are useful when a smaller-scale or wider internal audit is implemented.

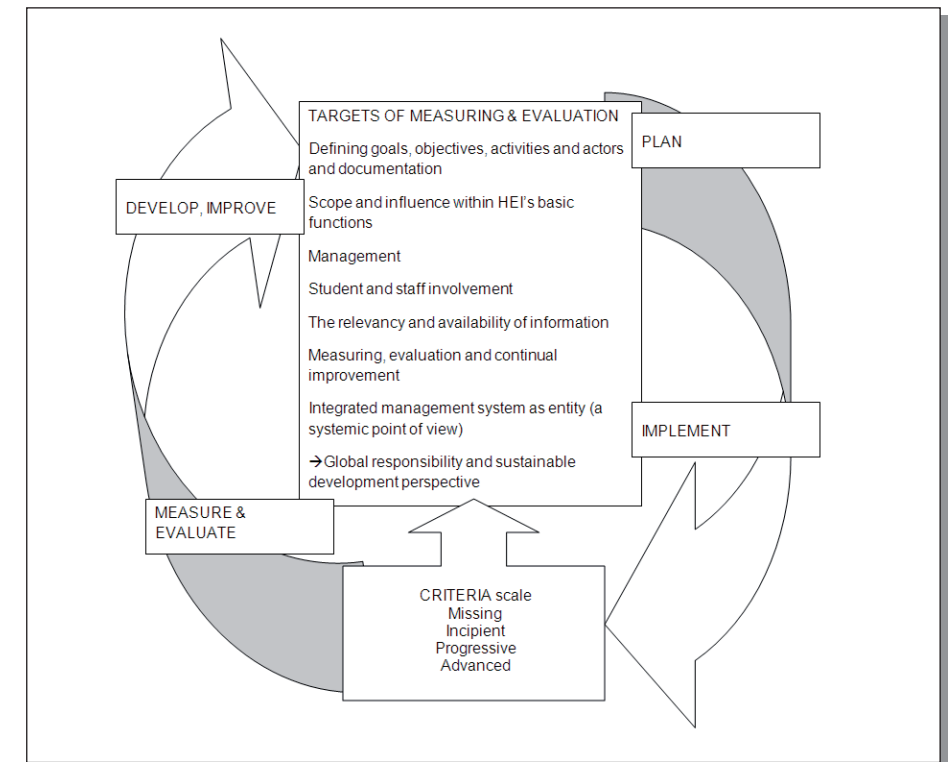


Figure 1. Responsibility indicators – general structure (Virtanen, 2009)

On the key roles of managing the academic community towards responsibility are shared values and trust of each other. There is also a need to facilitate an inspiring and innovative working and learning environment and atmosphere to ensure motivation and commitment to the joint set vision, strategies, goals, objectives and operations.

On the sub-project, the procedure of goal-setting follows the well-known quality assurance model, so called Deming's PDCA cycle (figure 2):

- Plan: establish the objectives and processes necessary to deliver results in accordance with the institute's policy.
- Do: implement the process
- Check: monitor and measure processes against policy, objectives, targets, legal requirements. Report the results.
- Act: take actions to continually improve performance of the management system

¹ The final report can be read on the Internet:

http://www.minedu.fi/OPM/Julkaisut/2009/Gloaalivastuu_ja_kestava_kehitys_koulutuksessa._Kehittamisen_ja_seurannan_tietopohja.html?lang=fi&extra_locale=fi

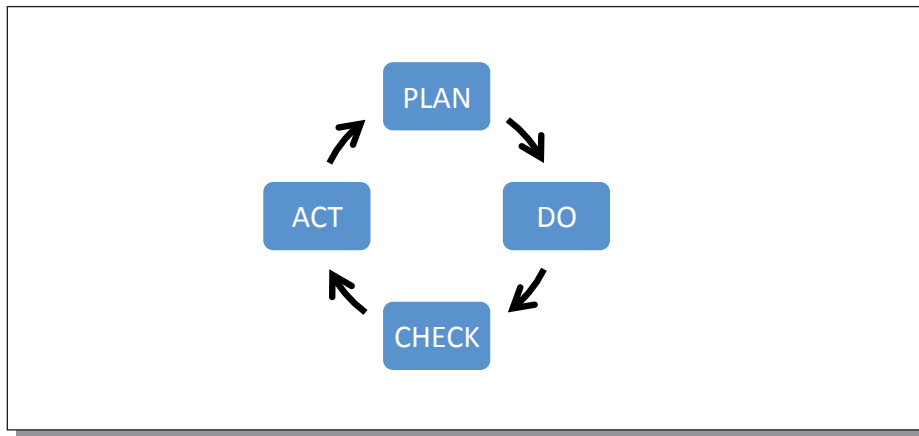


Figure 2. PDCA-cycle

The higher education institute specific goals need to focus on teaching methods and contents as well as R&D and innovations. The indicators show with measures, how well or badly the goals are achieved. According to these responsibility indicators, the aspects of evaluation are, for example, management systems in use, shared values, student thesis and work training as well as the number of academic publications and R&D&I activities within the field of responsibility and sustainability. The indicators also measure daily actions. The consumption of electricity and energy per student, staff, sustainable procurements and carbon footprint of the HEI are good and easily measured factors.

There are many various sustainable development management and evaluation systems in use both nationally and internationally. For example, UNECE², SEED³, ENSI⁴ and DHO⁵ have established well-known systems. In Finnish public administration the CAF-model is used, and for NGO's and preliminary and secondary schools there are systems created especially to fulfil their needs. In the educational sector ISO-standards and other systems (ISO 9001, EFQM, ISO 14001, EMAS, Green Office, GRI Global Reporting Initiative) are also in use.

Regularly running self-estimation and internal audit processes are prerequisites for continual improvement and development at higher education institutes. The indicators, created in this sub-project, can help HEIs to perceive responsibility and find targets for development.

The final report of this project can be read on the internet:

http://www.minedu.fi/OPM/Julkaisut/2009/Globaalivastuu_ja_kestava_kehitys_koulutuksessa_Kehittamisen_ja_seurannan_tietopohja.html?lang=fi&extra_locale=fi

² United Nations Economic Commission for Europe UNECE. <http://www.unece.org/env/esd/SC.EGI.htm>

³ School Development through Environmental Education, SEED

⁴ Environmental and School Initiatives, ENSI

⁵ Dutch Foundation for Sustainable Higher Education, DHO (AISHE Assessment Instrument for Education for Sustainable Development)

⁶ Common Assessment Framework, CAF

Responsibility at Kymenlaakso University of Applied Sciences

Kymenlaakso University of Applied Sciences was established in 1996. At the same time with the newborn higher education institute the systemic development of quality management and assurance were started. The Malcolm Baldrige and Finnish Quality Prize Models were used and the very first external audit was accomplished in 2000 by the Finnish Higher Education Evaluation Council. The latest external audit was carried out in 2005 and the auditing qualification is valid till 2011. The criteria consisted of structural scope and establishment in practice as well as wide commitment and participation of the entire academic community. To improve the quality and overall performance, the EFQM model with the Balance Score Card (BSC) management system have been taken as guiding systems in Kymenlaakso University of Applied Sciences (KyUAS).

Kymenlaakso University of Applied Sciences started to include sustainable development in all functions (education, R&D, daily activities) in 2003 when the environmental management system was launched. The EMS was based on ISO 14001 standard and the Eco-Management and Audit Scheme (EMAS). Initially, the EMS mainly consisted of the environmental impacts of KyUAS. During the past five years, the advantages of integrating quality management and sustainable development in education have become clear. However, the systems themselves do not ensure change in the organisation. A change in the organisational culture is also needed. The change to see things differently starts with strategies, vision, and goals.

At Kymenlaakso University of Applied Sciences, the managerial commitment is demonstrated in the updated organisational strategy which defines that our profile of expertise is based on socially, ecologically, and technologically sustainable and safe development according to the goals and objectives of KyUAS. Sustainability and responsibility are also one of the main components in our quality assurance system (EFQM, BSC, ISO 14001 + GRI). The transition towards responsible organisational culture and governance has proceeded step-by-step. The process is continuing.

The challenge is how to turn strategy into reality. We could follow the quality management protocol to simplify the task: a) Plan: Say what you do. b) Do: Do what you say. c) Check: Prove it. d) Act: Improve it. (This is known as Deming's PDCA cycle).

The Sustainable Development Policy was established to explain to the general public what we intend to do. According to the Policy, we have modified the governance as well as pedagogical and daily action processes towards sustainability. Sustainability is built into the degree programmes (curriculum development). We are using sophisticated information and communication technologies both in teaching and administration (e-learning facilities, e-library, thin client workstations, video meetings, electronic communication and documentation, etc.). The daily actions include, for example, waste management (recycling); efforts to measure and reduce energy, water, and electricity consumption; and the use of "green energy" (wind energy, district heating). Excellent quality together with responsibility and sustainability are the corner stones of good economic balance. Cost-efficiency and productivity reflects in the number of degrees and struc-

tural and process development. The important part of a responsible organisation is the willingness and ability to take care of the physical and mental health and well-being of the students and staff. All the actions need to be measured to prove the progress and to set new targets for continuous improvement.

At Kymenlaakso University of Applied Sciences the internal audit (university level) and self-estimation processes in faculties and departments were carried out during the spring 2010. The self-estimation process focused on documentation and systemic structure of the quality assurance system (so called laatu-Moodle: laatu.kyamk.fi) comparison to the practices on a daily basis. Instead, in the internal audit, the co-operation and interaction within stakeholders and inner customers were in the spotlight and also the feedback system in practice.

According to these evaluations, the strengths lie in systemic documentation and the structure of the quality assurance system. The information is transparent, available and up-dated. The biggest challenges can be found from more efficient enforcement: the system is not familiar to all members of the academic community. The actions of improving the utilisation of all collected information in daily actions are definitely a high priority. Kymenlaakso University of Applied Sciences describes the achievements by internal and external communication. We publish an annual Responsibility Report which describes the economical, social and ecological performance of Kymenlaakso University of Applied Sciences. The Report can be read on the internet (in English) on our website: www.kyamk.fi/responsibilityreport.

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Pedagogical Outlines in LCCE[®] Concept

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Learning and competence are central factors in the changing organizations and societies. When living in a state of change, the ways we learn and what we learn become especially important. Society expects the graduates from the universities of applied sciences to have knowledge beyond the substance of their field of expertise and be capable of more than only taking orders and reproducing information. No longer is field-specific substance the only object of learning but also attitudes and workplace skills have become increasingly important. From the perspective of regional development, skills and attitudes play a key role when a graduate from a university of applied sciences is faced with the challenge of doing things differently, networking, tolerating uncertainty, solving problems, and taking risks. Therefore, completely new approaches are required of the people involved in the learning processes at the universities of applied sciences because skills and attitudes can be affected by pedagogical solutions and by rearranging the learning environments.

The aforementioned issues are addressed by LCCE® (Learning and Competence Creating Ecosystem) learning environment created at Kymenlaakso University of Applied Sciences. LCCE® is a learning environment concept based on competence, innovations, creativity, and learning process designs that are open to business projects. The three fundamentals of the concept are learning, R&D&I, and regional development. At the heart of these three lie the university curriculum and the study modules that have been opened for business projects, as well as for the forms of co-operation integrated into the businesses and education within KymiDesign & Business unit. The concept was developed by the faculty of Business and Culture in Kymenlaakso University of Applied Sciences and was granted a Quality Unit reward in 2010. The reward evaluation was conducted by the Finnish Higher Education Evaluation Council.

In this article, I will first discuss the requirements that stem from our society and direct our actions and pose pedagogical challenges on the learning processes at the universities of applied sciences. Then I will focus on the LCCE® concept from the perspective of pedagogical practice; which factors in the learning environment facilitate the utilization of the LCCE® concept. Some of the most essential aspects are presented in two tables. The first table (Table 1) shows a comparison between a behaviouristic structural model and an ecosystem. The second table (Table 2) describes the central roles of the instructor and the organization in an ecosystem.

Workplace Skills and Entrepreneurial Practice in LCCE® Concept

The European Parliament and Commission define entrepreneurship as a capability of an individual to convert ideas into practice. According to this definition, entrepreneurship includes creativity, innovation, ability to take risks, and the capability to plan and direct operation towards predetermined objectives. These qualities support in performing the everyday routines required in education, work, leisure, and social activities. The same qualities are required in entrepreneurial activities and also add to the general awareness of an individual employee and help in seizing the available opportunities. In the definition of entrepreneurship, competence is divided into knowledge, skills, and attitudes, and all three categories are further described. The knowledge required in entrepreneur-

ial practice consists of individual, professional, and entrepreneurial knowledge. Knowledge also includes the ability to see, for example, the large systems in the field of economy and how they affect companies and organizations. In addition, the person who aims to perform in an entrepreneurial manner has to be ethically aware in order to promote fair trade or social business operations. Skills consist of project management skills such as project planning, and the capability to organize, administer, manage, analyze, communicate, evaluate, and report.

The ability to work both individually and in teams as well as acknowledge one's strengths and weaknesses has also become an important skill. Finally, the abilities to evaluate actions and take risks are considered skills in entrepreneurial practice. Entrepreneurial attitude is manifested in the abilities to take initiative, anticipate future events, be independent and innovative, maintain motivation and focus on personal and jointly determined objectives in personal life as well as at work. (Comission of the European Communities 2005.)

In his studies of entrepreneurial practice, British professor Allan A. Gibb has emphasized the fact that the development of an entrepreneurial learning environment must respond to the challenges the globalization process, insecurity, and complexity of modern world pose. He presents seven challenges that should be taken into consideration when developing entrepreneurial learning environment. 1) The student must have an opportunity to live the everyday life of an entrepreneur and experience and manage insecurity. 2) The development of the learning environment must allow for constant reflection on the values and beliefs that affect teaching. 3) The pedagogical methods must enhance entrepreneurial behavior (e.g. the recognition and utilization of opportunities, initiative, risk-taking capabilities), entrepreneurial qualities (e.g. motivation, self-confidence, creativity, autonomy, operation control, commitment), and other entrepreneurial skills (e.g. negotiation skills, sales skills, project management, creative problem solving). 4) The educational institution must be developed into an entrepreneurial organization that aims to support the development of entrepreneurial behavior (for example, versatile job description, low hierarchies, focus on customers, independence, learning through doing). 5) The entrepreneurial organization must operate as a learning organization where learning is uninterrupted and context-related instead of being controlled by an outside force. 6) The structures and processes of the learning environment must be expanded into external business contexts. 7) Entrepreneurial behaviour must be considered a form of learning new and, especially, a form to create new. In the entrepreneurial learning environment, the purpose of learning is not "what you have remembered" and "what have you learned" but "what do you think" and "what can you do". (Gibb 2002 a; 2002 b).

The European National Qualifications Framework (EQF) is a common European framework of reference that helps in interconnecting the national degree systems and degree frameworks of reference. The eight levels of EQF cover all degrees from basic to advanced level. In EQF, the levels of reference are based on learning outcomes described as knowledge, skills, and competences. The university of applied sciences degrees are placed on level six, and master level university of applied sciences degrees are placed on level seven. According to level six description, a university of applied sciences degree provides the students with a competence to work in management positions in complex technical or professional operations or projects, and to have the decision-making responsibility in unpredictable work or study environments. The university of applied sci-

ences graduates are also expected to take the responsibility for the professional development of individuals and groups. (European Parliament and Council 2008). In 2010, the Rectors' Conference of Finnish Universities of Applied Sciences made important comments on the working life skills gained from the university of applied sciences degree programmes (National Qualification Framework, NQF 2010) including both bachelor and master level studies. In its recommendations, the Rectors' Conference divided competences into five categories of skills: learning skills, ethical skills, workplace skills, innovation skills, and international skills. It is emphasized in the recommendations that the pedagogical and learning environment solutions the universities of applied sciences make can have influence on the development of these skills. The learning skills implied for a university of applied sciences degree put the accent on self-evaluation and the development of learning methods, the retrieval, processing and evaluation of information, and taking the responsibility for one's own and a group's learning. Also, the sharing of gained knowledge to the whole group is emphasized. The ethical skills primarily consist of the abilities to have responsibility for the consequences of actions, recognize different operation participants, promote equality, ethical values and, of course, sustainable development. Workplace skills comprise, in an interesting way, acting as a member of work community and the promotion of its well-being, as well as the creation and utilization of work-related networks. In addition, an emphasis is put on the decision-making skills in unpredictable situations, and the ability to lead work but also act as an independent expert. Also, entrepreneurial as well as communication and interaction skills are emphasized. Innovation skills include creative problem solving, the development of work practices, project skills, customer relationships, and R&D skills. International skills, naturally, comprise language skills, ability to work in a multinational group, and the monitoring of the effects and opportunities of the developing international activities in one's own field of expertise. (Rectors' Conference of Finnish Universities of Applied Sciences 2010.)

Head of Department Raimo Pelli (2009) points out that also the national innovation strategy and Sitra's (Finnish Innovation Fund) innovation programme serve as path-breakers and direct the pedagogical solutions of universities of applied sciences. The previously prevailed focus on technology should be replaced by wide-ranging, interdisciplinary operations based on skills.

LCCE® - From Structural Model to Ecosystem

The entrepreneurial approach and the European and national competence targets and innovation strategies for university of applied sciences education are clearly interrelated and share a common basis for the remodeling of learning and teaching. Thus, the learning process can be deconstructed and the learning environments can be developed in such a way that in addition to gaining knowledge the participants of a learning process can improve their risk-taking capacity, practice their problem-solving skills and tolerance for uncertainties, co-operate and network, and train creative reacting.

The tables below present a deconstructed modeling of the key elements of a learning environment. The essential data for comparison consists of a curriculum, study module,

knowledge, practice, experience, thinking, and skills. Table 1 compares the structural model and an ecosystem. Table 2 presents the essential features in the practices of an instructor and organization in an ecosystem. Here, the structural model refers to practice initiating from the teacher and organization. In contrast, practice in an ecosystem is closely related to working life and emphasizes the role of the learner.

Traditional structural models are based on a curriculum which directs practice and manifests itself in schedules, instructions, and strict rules. By no means should curricula be eliminated because they help to organize practice. However, they should be made more flexible by introducing competence based study modules with integrated opportunities to participate in working life projects. It is important to provide the students with project participation opportunities at an early stage and allow them to learn through mistakes and creative thinking. Ideally, a study module is a complete plan only at the beginning of the learning process and will then be modified in each situation based on the learner's background and needs. This will allow the learner to independently produce learning-related innovations and materials in a social context.

The assessment methods and criteria are an essential part of learning. When the assessment is increasingly based on group, peer, and individual assessment, the learners gain feedback giving and taking skills which are valuable in working life. This will also teach critical process evaluation and improve interaction skills. Constant feedback during projects and processes enables corrective actions while the process is still in progress. Mechanistic feedback should be complemented by other forms of assessment. For example, feedback discussions and written reflections allow the learning process instructor to obtain significantly more information on the thinking patterns of a learner than, for instance, numeric assessment scales could ever deliver.

A fundamental question then is what should be assessed? In a learner-focused learning environment, the object of assessment should increasingly be the practice of a learner and learner group. The assessment in traditional structural models is often concentrated on the practice of the teachers, the teaching methods, materials, and performance. The assessment should develop the learning process and give the learners information and make their practice in the learning process transparent. The National Qualification Framework (NQF 2010) requires, among other things, that the students in universities of applied sciences learn to assess and improve their skills. Thus, it seems natural that the learner should assess himself and be assessed by his peers instead of only by the teacher. Also, such methods should be employed that train the ones in a learning process to give feedback to and receive feedback from their fellow students. In short, the assessment should develop the learning process and give the learners information and make their practice in the learning process transparent.

How do I know what I learn? The National Qualification Framework also mentions the matter of workplace skills. The university of applied sciences graduates are expected to have the skills to function as part of their work community, promote its well-being, and be capable of networking and creating personal work contacts. The concepts of team work, group dynamics, innovative working methods, project management, negotiation skills, and interaction skills are highlighted. In a traditional structural model, the assessment is often and sometimes even solely based on a test. The tests can be formative or summative. If well designed, a test can be helpful in assessment. However, in projects, for

example, the learners obtain a variety of other skills that should be made transparent to them. These exactly are the important workplace skills. This poses a great challenge for the instructors who should find ways to show the learners what else they have learned apart from the substance of the topic. For example, if a team work project runs aground due to problems within the team, as a first reaction the team often becomes paralyzed, and at worst the problems with group dynamics will hinder the progress of work. However, in these cases the team may just have learned something about team work conflict control and what team work normally is. It is important that the instructor or coordinator has the tools to make transparent to the learners what was learned despite of or owing to what happened. In other words, show that the project was not a failure but a learning experience. In entrepreneurial learning environments, the instructors must be capable of wide-ranging observation and introducing a variety of learning-related actions, for instance, during assessment or feedback discussions.

It is very important that the learning environment offers sufficient support to finish projects when the learners cannot do it by themselves. Also, the learning environment must allow the learners to fail safely. A failure, if thoroughly analyzed and not traumatic, can be the best absorbed learning experience.

Each learner has a rich world of experience. In teams, this becomes apparent in the form of different skills. To put it roughly, one member lightens up the atmosphere, one knows how to use technical devices, one has vast experience in the topic, one can retrieve information, one possesses a good logical way of thinking, one is a natural born performer etc. It is beneficial to amplify positive learning experiences by encouraging the learners to recognize their skills, also those not related to the substance of the topic.

From the perspective of learning, it is significant that the learners can participate in the search of opportunities and problematize occurring situations. This will improve their abilities to recognize and solve problems, and help them become more innovative. When the learners are allowed into projects, they will start creating networks. In a traditional structural model, the first contact with potential employers may be postponed until the learners start to search for work after graduation. If the learners are granted a chance to participate in projects and interact with organizations throughout the course of their studies, they will already have a functioning network upon graduation. This will considerably improve the employment prospects.

	Structural model Learning from teaching	Ecosystem Learning by producing
CURRICULUM	Internal matter of the school <ul style="list-style-type: none"> dictated by schedules rules, guidelines Planned in advance <ul style="list-style-type: none"> inflexible Relates to the internal life of the educational system and the administration	"Offering itself to be consumed" <ul style="list-style-type: none"> recognition of prior learning individual study plan Planned through the reflection of results <ul style="list-style-type: none"> flexible Relates to the production of innovations <p>Curriculum comprises the whole environment</p>
STUDY MODULE	Structural solution <ul style="list-style-type: none"> "re-packaging" Predefined	Complete plan only at the beginning → develops through reflection Broad assessment, 360° feedback Assessment of substance, processes, projects and skills management
KNOWLEDGE	Models, ready-made knowledge <ul style="list-style-type: none"> knowledge is transferred from one place to another Clear, predefined, same for everyone Learning by heart, controlled by a test	Problematic Insightful Constructive Critical What was learned? (1) workplace skills (2) substance Recognition of opportunities Self and group assessment
PRACTICE	Doing by copying a model <ul style="list-style-type: none"> predefined methods "correct solution" → punishment	Recognition of problems Creative problem solving → right to be wrong → learning from mistakes Individual solutions Result not always known Self and group assessment of practice and processes
EXPERIENCE	The learner has no experience <ul style="list-style-type: none"> experience is created through exercises 	The learner has a rich world of experiences ↔ transfer Making personal skills known to oneself and others
THINKING	Thinking by administration and teacher	Thinking by learner/learner team/business sector Reflection Problematizing
SKILLS	"Ready-made package" ↔ "Needs" of the working life	Interaction with working life <ul style="list-style-type: none"> workplace skills

COMPETENCE

The Role of Instructor and Organization in Ecosystem

The production of learning and competence in an ecosystem requires that the organization possesses a visionary pedagogical view with orientation into the future. The organization is the producer of resources but it also has to be capable of taking pedagogical risks. These include, in my opinion, innovative experiments and experimenting with new practices and pedagogical projects that may result in something new. A pedagogically creative organization cannot always operate by strict rules but its practices must allow flexibility. Also, the fact has to be accepted that not everything always works out as expected. On the other hand, it is typical of innovations, also in a pedagogical sense, that the result is not always predictable, and pedagogical innovations can emerge even from the smallest experiments.

From the viewpoint of an educational institution, it is important that the teachers and other staff understand the principle of entrepreneurial practice and are willing to develop learning processes and pedagogical solutions towards this goal. The characteristics of entrepreneurial practice comprise innovation, recognition of opportunities, tolerance for uncertainty, and the ability to take risks.

The organization has to adapt to versatile evaluation processes that also apply other instruments than quantitative parameters. In addition, the possibility of failure must be accepted. However, is success ultimately the only goal for a learning organization?

The most important change in the role of instructor in a learning and competence creating ecosystem may be the shift into team-like form of teaching. The concept of teaching no longer requires that one person has the perfect know-how but the competences of learners and instructors complement each other. New skills are produced in a social context where everybody learns. The boundaries between subjects vanish, which expands and contributes to the traditional teacher competences and skills, and makes practice more transparent. The ability of the instructors to recognize their own skills and make them transparent becomes of great importance in the learning process.

As for the learning environment facilities, certain requirements have to be met in the ecosystem described above. The learning environment must enable the learners, organizations, and other parties involved the learning process to work without interruption. Negotiation facilities must be available, and those participating in projects must be provided with suitable project work and communication tools. The learning facilities can be situated outside the educational institution, for example, in companies or organizations.

Table 1. From Structural Model to Ecosystem.
(Pekkalin, S., Tulkki, P. 4.12.2008, S. Pekkalin 3.1.2011)

	The role of the instructor in ecosystem	The role of the organization in ecosystem
CURRICULUM	Readiness to continuously "work on the curriculum" on individual level <ul style="list-style-type: none"> • continuous development of one's own teaching/working methods Team work/teacher teams Critical attitude/problematization Readiness to continuously give and receive feedback	Production of resources for work Risk-taking ability and creativity in the whole administration Flexible management Readiness to continuously receive feedback → leadership with a vision
STUDY MODULE	Co-learner Assessment; learning to apply versatile, multi-level assessment	Learning organization; learning from client relationships; students, working life Versatile evaluation processes
KNOWLEDGE	No "Besserwissers" but learners The right to be wrong and to fail ↔ learning from mistakes	Organization admits its lack of competence ↔ readiness to learn new From "school-learning" to comprehensive workplace skills
PRACTICE	Open learning environments <ul style="list-style-type: none"> • flexible, readjustable facilities • working life facilities Breaking down boundaries between subjects	Open management, transparency Enabling practice Permission to fail Making competence in learning visible Strategies, visions → proactive pedagogical approach
EXPERIENCE	Making personal competence known (oneself, others) <ol style="list-style-type: none"> workplace skills substance 	Making the organization's competence known Driven by innovations
THINKING	Reflection Problematization	Open to new ideas Giving credit Encouragement
SKILLS	Attitude: I will never be complete You can if you want to → motivator	Learning, learning, learning...

COMPETENCE

Conclusions

The concept of university of applied sciences pedagogy has yet to be defined. In the course of their rather short existence, the universities of applied sciences have tried to define their pedagogical principles and apply different forms of practice based on the needs of working life, including for example student cooperatives, project learning, and learning through research. What these experiments have in common is that they all emphasize the role of the learner and integrate learning into different working life contexts. The student who is admitted to an university of applied sciences may have a background of education based on the traditional concept of learning. From the student's perspective, it may be easier to attend traditional lectures, copy and write down notes, and complete the given assignments than start taking risks and operate in environments that produce uncertainty. In my opinion, situations like these pose two types of challenges. First, it becomes very important to constantly remind the students of the new concept of learning, which could be called "student pedagogy". Why this is done, why it is important. Second, I believe that the student surveys and satisfaction and achievement parameters used in universities of applied sciences should be complemented with instruments applicable to learner-based pedagogy. This could be achieved, for example, by including the assessment of workplace skills in the study module assessment. The recommendations for common competences by the Rectors' Conference of Finnish Universities of Applied Sciences (NQF 2010) lay a solid foundation for assessment. Naturally, learning skills, ethical skills, workplace skills, and innovation and international skills should be included in the curriculum and be subject to assessment. This seems to be a challenge for the remodeling of assessment also on a national level. For example, in "Opala" student feedback system a focused self-assessment could support the working-life based assessment and feedback.

However, it is obvious that from a pedagogical point of view, the universities of applied sciences are faced with the challenge of proactivity; what meta-skills will be needed in the organizations and societies of tomorrow, and how these skills and attitudes and new knowledge could be practiced in learning environments.

Table 2. The Roles of Instructor and Organization in Ecosystem.
(Pekkalin, S., Tulkki, P. 4.12.2008, S. Pekkalin 3.1.2011)

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Cultural accessibility of web sites: a case study of participatory design with Deaf communities

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1 Introduction

Despite an extensive body of research on usability, accessibility, and user experience, web sites localised for sign language users have been merely concerned with providing signed alternatives to written and auditory content. As a result, accessible web sites rarely offer a web browsing experience that Deaf users would enjoy. These sites have failed to take into consideration the aspects of Deaf culture and signed communication that ultimately affect user experience. By far research in the area has not examined how Deaf people constitute meanings on the web, how these meanings affect interactions, and how to organise the interface in a way that reflects the world as Deaf people perceive it. This article reports a study in which a web site for Osata (Knack) project was co-designed with Deaf users in order to bring about a design that Deaf users would be happy with, that is, culturally accessible. The study was conducted in 2008–2009 in the course of designing a pilot web site for Osata (Knack) in co-operation with the Finnish Association of the Deaf.

In order to enhance user experience, it is important to respect users; be committed to user needs; and have a holistic understanding of the interactions that is influenced by one's culture. In order to explore experiences, perceptions, ideas and emotions, the challenge is to create conditions for the objective study of a subjective topic. This challenge is informed by one abiding feature of experiences; that is, experiences are not directly observable by an external observer. Thus, the study follows the participatory design principle in which the design knowledge is obtained during the design process itself, the users participate in the process from the beginning till the end, and the tacit knowledge of users and their creativity is fully respected.

Overall, the essay identifies and demonstrates that the unduly narrow focus on accessibility has undermined user experience. It reinforces the importance of involving the users in the design process and understanding their culture. There is a need to consider the full range of issues involved in designing pleasurable interfaces. In other words, the designer needs to understand both the social and cultural contexts of use as well as the meanings the stakeholders give to the interface.

This article first reviews the concepts of usability, participatory and cultural design promoting the new 'cultural model' of design. It will then summarise a case study in which recommendations for Deaf specific interfaces were developed. The study aimed to provide design recommendations for Deaf culture specific web sites taking into consideration the implications of Deaf culture and sign language as a first language on web user experience. Finally, it reviews and discusses the findings of the design activities.

2 From accessibility towards culturally accessible

The study is grounded on the belief that if an interface meets one's cultural needs, it enhances one's browsing experience. This realisation of the importance of culture is the newest turn in user experience studies. This means that the value of an interface does not only lie in its material form such as aesthetics or functions but in the meanings that it brings forth to its users. Thus, more effort should be put on culturally sensitive design elements, which are preferred within a particular cultural group. In the context of this study, this means looking beyond accessibility, functionality, and usability of an interface, and considering the impact of culture on design features.

Usability and accessibility are essential parts of interface design today. Especially so for sites targeted towards Deaf users: these sites need to find the right balance between the needs of Deaf users while ensuring it is accessible to others. The problem with the accessibility standards is that they focus merely on functionality, underestimating the importance of user experience. The standards assure that a web site has all the inevitable qualities that allow everyone to perform a function and access information and content on it, but they do not guarantee that the users enjoy using it. Jordan (2000) has even claimed that the joy of use and meaningfulness of the interface is a more important aspect of user experience than the functionality itself.

There is widespread misconception that accessibility equals uninteresting design as if sites for the disabled need to be uninspiring and plain. A study by Petrie, Hamilton and King (2004) concluded that sites can be visually appealing and sophisticated – and still fully accessible. Consequently, they argue that accessibility should not be viewed as a constraint but rather as a challenge and a prerequisite for a successful design. This means that accessibility is not used as a checklist but as a mental construction to guide the design process; that is, an attitude towards the act of designing to listen to people and their various needs in order to bring about a design.

The term user experience has traditionally been used to stress instrumental aspects of interaction; that is, biological and physiological factors of design (Keinonen, 2008; Djajadiningrat, et al., 2002). However, the way a user makes sense of the interaction process is influenced by previous experiences. It is a result of a continual engagement with one's culture, self, and others that creates collective meanings to these interactions. These meanings provide a description of the values that people bring with them when they act with technology such as web sites. (Djajadiningrat, Hummels & Wensveen, 2002; McCarthy & Wright, 2004; Jordan, 2000; Margolin, 1997) Thus, designers should also consider the values that users bring with them while interacting with a system. This means that physically accessible and functional design is not enough: users are not going to use the product if it does not reflect their personal and social values (Buchanan, 1996; Sanders, 2004).

Recently, the attention of usability studies has changed towards a wider range of interests aiming at matching new interactive technologies with social and emotional perspectives. A number of researchers have contended that the overall user experience is affected by emotions. This importance of emotion and non-instrumental needs without clear and precise goals has been referred to by a number of terms including pleasure-based

approach (Jordan, 2000), joy-of-use (Nielsen, 2002), empathic design (Battarbee, Koskinen & Mattelmäki, 2003), and emotional design (Norman, 2004). Already in the early nineties, Brenda Laurel (1993) argued that engagement in computer mediated activity is as much about emotional and aesthetic relations as it is about rational and intellectual ones. Motivations to use interfaces are not only rational or goal driven but also ones that bring sheer pleasure – they bring life to technology (Krippendorf, 2006). The more useful and more enjoyable programs are, the more easily they are accepted by their potential users (Davis, 1989).

The newest turn on user experience studies is the realisation of the importance of culture. This means that design should connect not only emotionally but also culturally with users; that is, users should be able to use the same systems each in their own way as naturally and effortlessly as possible (Krippendorf, 2006). This involves acknowledging the way people think, do, perceive, and feel. Numerous studies have shown that people from various cultures experience, understand, and perceive things differently (e.g. Hall 1976, 1983; Hofstede, 1991, 2001; Nisbett, 2003; Trompenaars & Hampden-Turner, 1997). Therefore, it is through better understanding of the users' sensorial perception and cultural values that design is capable to meet users' real needs and make their experiences more meaningful.

Krippendorf (2006) explains this as a semantic turn in design in which diverse cultural meanings generate a need for new design practices that connect culture, cognition, and design. He acknowledges that the sole purpose of interfaces is to be meaningful, remain useful, and enable members of the community to feel at home with them. Thus, the value of an interface to its users does not only lie in its functional benefits but in the meanings and values that it brings forth to its users (Rafaeli & Pratt, 2006; Krippendorf, 2006; Sengers, 2003). To become successful, an interface needs to embed the ways members of a society make sense of the world: people are not going to use the system if it undercuts their cultural values and needs (Buchanan, 1996; Beyer & Holtzblatt, 1998; Sanders, 2004; Krippendorf, 2006).

Barber and Barber (1998) coined the term 'culturability' to link culture and usability as well as to emphasise the importance of one's cultural background on user experience. They argue that it is important that usability is redefined in terms of a cultural context: what is user friendly for one culture can be vastly different for another. Moalosi (2007) takes a similar approach claiming that no matter how innovative and beautiful a product is, if it fails to gain user acceptance, it will be a wasted design effort. People use objects that serve and strengthen their identity, the ones they like to be associated with. Moalosi (2007) argues that culture can be integrated in a design by employing metaphor, allusion, historical and cultural references that form a product language – in this case, the shape and form of the interface.

3 Cross-cultural web design

Multiple studies in behavioural and cognitive psychology have uncovered significant differences in the way people communicate, behave, think and assign value in different cultures (e.g. Evers & Day, 1997; Evers, 1998; Faiola, 2002; Faiola & Matei, 2005; Jhangiani & Smith-Jackson, 2007). The key notion here is that the collection of experiences constructed over history becomes part of one's identity and affects how one learns and creates meanings. This is why cultural environment determines what people are able to see, how they construct meanings of what they have seen, and also how they process this information. These culture specific styles are embedded in the values held by the members of that culture and their patterned ways of thinking, interacting, and responding. The research on cultural differences has also slowly begun to shed light on cross-cultural web design. Web sites communicate on multiple levels: how the information is categorised, how the sentences are constructed, what types of images and colours are used, and through which mediums messages are being delivered (text, images, video, audio, animation).

The way people perceive sensory experiences is not universal: the values and meanings that are given to people, objects, and events are strongly influenced by one's culture (Hofstede, 1991). Culture and language affect one's attitudes, behaviours, ways of thinking, and even remembering; and thus, also fundamentally influences the way interfaces should be designed for specific cultural groups. Culture is a result of enculturing and an unconscious learning process (Hall, 1997). Varying authors have defined culture in many different ways. Among them Hofstede (1991, p.5) defined culture as "the collective programming of the mind which distinguishes the member of one group or category of people from another". This definition has been used as the basis of many cross-cultural web design studies (e.g. Marcus & Guild, 2000; Würtz, 2005; Callahan, 2005; Evers & Day, 1997)

Though Hostede's model is popular among researchers, it has been criticised for simplifying the complexity of real-world interaction processes (e.g. Ess & Sudweeks, 2005; Barnett & Sung, 2005; Hewling, 2005). Faiola and Matei (2003) have criticised this approach most dramatically. They argue that this model neglects the cognitive style of users focusing solely on surface design elements such as aesthetics. Faiola and Matei (2003) stress that both cognition and behaviour are dependent on one's socio-cultural context: people with different cultural backgrounds not only behave but also think, feel and perceive the world differently. They have developed a cultural cognitive theory that stresses the importance of culture specific cognitive styles and their impact on speed and simplicity of finding information.

4 Deaf culture and sign language

Statistics for the number of deaf people depends on the definition, and of interpreting the resulting figures (Benderly, 1980; Johnston & Schembri, 2007). Nevertheless, it has been estimated that deafness, from moderate to profound hearing loss, affects one person in a thousand in developed countries (Ladd 2003; Johnston & Schembri, 2007). Throughout history Deaf people have experienced fundamental language barriers in developing meaningful relationships with hearing people. This has resulted in Deaf communities in which Deaf are the ones that are trusted – it is import to share the same cultural heritage. This has brought forth a unique Deaf way of life: patterns of behaviour, beliefs, attitudes, and values referred to in English as Deaf world, Deaf community, and only more recently as Deaf culture. (Ladd, 2003; Sacks, 1991) Rather than seeing themselves as disabled, Deaf consider themselves as a language minority, similar to other oppressed cultural minorities and indigenous populations such as Sami people: both have fought for their rights to use their language, preserve their heritage, and follow their customs which have formed around shared experiences, values, and history. This forms the basis of Deaf experience in which the inability to hear is seen as secondary. (Ladd, 2003)

Around the world wherever communities of Deaf people have formed, sign languages have developed. As sign languages are born as a result of natural interaction in Deaf communities, they are closely related to Deaf people's cultural values and social behaviour (Padden & Humpries, 1988). As the meanings of sounds are cut off, Deaf people have generated a language system that relies on vision. Even if numerous sign languages around the world have developed separately from each other, they are strikingly similar in terms of grammar and vocabulary (e.g. Zeshan, 2003; Rathmann, 2005). In contrast to spoken languages, which consist of vocal articulators, sign languages consist of sequences of movements and configurations of hands and arms, face, and upper torso. Sign languages differ from spoken languages in two significant ways: their (1) modality of production that is gestural instead of oral; and (2) perception that is visual instead of aural channel. (Zeshan, 2003)

Even though deafness relates to a biological condition, the way Deaf experience the world also involves social factors (Ladd, 2003; Mindess, 2006). As these two are tightly connected to each other, in the study both domains – including sign language, shared collective consciousness, and issues related to different sensory order – are all encompassed under the same term culture. These differences influence the way one recognises, interacts, and values web sites. For instance, previous studies (Fajardo, Abascal & Cañas, 2004, 2008b; Fajardo, Cañas, Salmerán & Abascal, 2006; Fajardo, Arfé, Benedetti & Altoé 2008a, Fajardo et al. 2008c; Namatame & Kitajima, 2005) have shown the inadequacy of text-based links for Deaf users. In their study Namatame and Kitajima (2005) recognised the limitation of accessibility guidelines for Deaf Internet users. Their argument is that these guidelines do not deal at all with behavioural characteristics of Deaf people such as the different interaction methods compared to that of hearing.

In theory, Deaf people have more visuospatial capacity to maintain and manipulate visual and spatial information derived from sign language usage. Several studies have indicated that Deaf people are particularly sensitive to visual stimuli. A recent study has suggested that the brains of Deaf people compensate by reassigning the area used for hear-

ing to be used for visual functions. This results in improved peripheral vision. (Lomber, Meredith and Kral, 2010) In addition, as sign language is a visual-spatial language, it can be assumed that the differences in encoding and recalling environment are not only medical but also linguistically based (Gentry, Chinn & Moulton, 2004/2005). This view is supported by recent studies which suggest that an early acquisition of sign language leads to above average performance on face recognition, block design, movement detection, and spatial memory (Mayberry, 2002; Marschark & Hauser, 2008).

In addition to the linguistic and medical reasons, the Deaf culture is acclaimed to be one reason for Deaf people perceiving their environment differently to hearing. Deaf culture belongs to high context cultures which are characterised with a holistic mode of thought that is linked with oral communication style (Mindess, 2006). Members of these cultures have a tendency to perceive scenes globally; that is, the context and the field as belonging together (Nisbett, Peng, Choi & Norenzayan 2001; Nisbett & Norenzayan, 2002). Moreover, the study by Dong and Lee (2008) proposes that holistically-minded people – a category in which Deaf also falls into (Mindess, 2006) – tend to scan a web page as a whole. They suggest that in order to cater to people from holistic cultures: (1) the context of the web site should be shown clearly to provide an overall picture of the page; and (2) attention should be placed on the harmony between foreground, background, and content.

5 Participatory design and cultural framework as guiding principles

The study utilised the participatory design ideology that puts stakeholders at the centre of the design process. It is a type of research in which the course of designing forms the actual research. The method provides a unique perspective: it allows the empowerment, engagement, and involvement of the community in the design process from start to finish (Von Hippel, 2005): that is, the users are regarded as innovators, and not as target objects for user research. Utilising several methods ensures that participants' interpretations are taken into account throughout the design project. The power of participatory design research lies in its ability to bridge participants' tacit knowledge and researchers' more abstract, analytical knowledge (Anttila, 2005).

Despite the huge interest in participatory and emotional design, hardly any design methods have been developed to tackle culture-specific characteristics. There is a lack of in-depth research and appropriate methods when it comes to assisting designers with how culture should be integrated in product design (Moalosi, 2007). A rare exception of this is Moalosi's (2007) culture-oriented framework. He specifies two distinctive phases of the culture specific design process: (1) identification to specify, analyse and integrate socio-cultural factors and (2) integration to transform these factors into design features. According to the framework, different data collection methods can be used to gather information on users; such methods include conducting interviews, focus groups, user observation, and ethnographic methods. Integration then is the designer's domain in

which he/she needs to interact with the users to draw from their experiences in order to translate culture specific features into the design. This triangulation of theories and methods allows to gather several points of view for the project and to recognise re-occurring culture specific design patterns.

6 Case study: Knack.fi

The design research focussing on user preferences in the Deaf culture was carried out in 2008-2009. The Knack was part of a larger "Osata-project" run by the Finnish Association of the Deaf (FAD). The primary aim of Osata was to raise awareness of learning disabilities in deaf and hard of hearing children as well as Deaf adults and to promote new methods of remediation. As a part of this project the Knack study aimed to understand the ways in which interfaces could become meaningful for Deaf users by considering the implications of Deaf culture and sign language as a first language on web user experience. Due to the tacit knowledge in this context, the purpose of the study was not to research quantitative or an object research 'truth' in its traditional terms, but rather to look for inspirational and actionable insights on culturally rooted conventions that influence user experience including functional and aesthetic choices that Deaf people make. In order to pinpoint these intangible aspects of an interface, the research was qualitative in nature.

In this practice-led project design ideas were gathered through participatory design methods and applied in the course of designing a pilot web site for the project. Altogether sixteen members of the Deaf culture (who are all sign language users) were invited to participate for the duration of the study. These participants included Deaf and hard of hearing grass-root users, designers, academics, and researchers. The design process involved three main phases: (1) contextual inquiry through observation and stakeholder meetings; (2) identification of Deaf culture specific design features through a focus group session, card sorting method, and thematic interviews; and (3) integration of the identified design features by way of a brainstorming session, two collaborative workshops, and development of prototypes in collaboration with deaf designers. The design methods were used iteratively to construct the emerging design, which itself simultaneously constitutes and elicits the research results as co-interpreted by the designer and participants. Utilising several methods ensured that participants' interpretations were taken into account in the research throughout the design project.

The design research looked at the process of designing with Deaf people taking into consideration the effect of biological, cultural, and linguistic factors of Deaf people on web user experience. The design research promoted the new 'cultural model' of design considering the impact of Deaf culture on preferable design features. Participatory design research was used to help in understanding the 'native' point-of-view. Following the human-centred design ideology, the design research aimed to put the stakeholders at the centre of design process and appraise their concerns, values, and perceptions. The goal was not just to empirically understand the activity, but to simultaneously envision, shape, and transcend it in ways the participants find buoyant.

7 Results and discussion

Both the user research and literature have illustrated that not everyone in the Deaf community precisely fits the cultural pattern, but there is enough regularity to identify preferences. Presented are some of these identified tendencies to enhance Deaf people's user experience. Even if many of the findings are in line with general usability guidelines, it is important to realise that the needs of Deaf users differs somewhat from mainstream users. Even though Deaf people do not face such strong physical barriers in accessing content as blind and weak-sighted people do, there are mental barriers that may be as limiting. For example, a written replacement for audio content is not enough: the lack of confidence in writing skills may prevent taking part in text-based discussion forums, inability to use one's mother tongue may cause frustration, and unclear guidance may prevent using the site. Additionally, this study has demonstrated that the style in which information is told was important to Deaf users: it determined if they were engaged and willing to explore the content of the site.

The result showed that there were huge differences in the ways beauty and attraction is valued within the community; but yet, there are common themes that could be identified: importance of stories, nature, beauty, visual clarity, people playing together, and images of hands. The participants emphasised their frustration with long paragraphs of text, lack of images, slow uploading times, and overly textual navigation. Most participants said that they would visit sign language web sites more often if they were better designed and offered content that interested them. Even if the participants were overwhelmed by text, some stated that they preferred to read text than watch sign videos: One has to wait for videos to stream; text on the other hand can be scanned and read quickly. Most participants, however, preferred visual and signed communication to text if it was available. All the participants used both mediums and expressed that the one they used varied from one day to another.

The design process showed that even if visually engaging content was the key for liking an interface, ease-of-use and speed were as important factors for Deaf participants. A signer on a web site did not only bring functional value as such but it brought cultural value by giving access to their mother tongue. In addition to sign language content, participants yearned for visual guidance such as icons on navigation; photos to illustrate the context of signing; colours to visually differentiate different sections of the site; and visual responses to mouse movements to clarify functionality. The research suggests that the visual processing may be even more dominant for sign language users than for mainstream culture due to the visuospatial features of sign language.

Some of the findings may also apply to hearing people; thus, they should not be treated as a list of differences but rather as a list of issues to be considered when designing for the Deaf community. This from-minority-to-mainstream thinking also implies that Deaf people – whose language is based on visual gestures and movements – are more sensitive to visual elements. Consequently, they have a smaller tolerance for clutter and discontinuity in design. This may also bring a new perspective in designing for other user groups such as for elderly and dyslexic users who are visually oriented due to short term verbal memory.

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4

Indicators of Infant and Child Well-being

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Introduction

This article follows principal lecturer Minna Veistilä's widely considered and many-sided article of well-being. I will consider an infant's psychological well-being through developmental psychology, especially in the light of attachment theory and the results of researches. Attachment researchers focus on how parent-child relationships, including children's attachment status/behaviours or maternal sensitivity, relate to a child's regulation and negative emotionality. Attachment theorists have also emphasised continuity in the child's attachment status from infancy into childhood. (Harris, 1994; Mäkelä, 2006; Silvén, 2002; Sinkkonen, 2006)

I will consider an infant's psychological well-being also through protection and participation. They are related to a parent's care and sensitivity, development and properties of emotions, language, memory and play. A parent's and child's temperament and stress are mediators and regulations. An infant's development and circumstances of development I consider through continuity and discontinuity. It is important to know the continuity of favourable development and well-being and prevent unfavourable development. The continuity of positive factors adds to a child's resources and well-being, and close relations between parents/caregivers contribute to children's well-being (Feldman & Klein, 2003; Komsu, 2009).

Social sciences, especially social work uses the concept of welfare or concept of well-being. The developmental psychology uses concepts of psychological functions and development while it considers psychological well-being. Understanding of a child's view of well-being demands to know and deeply understand a child's development. To protect a child's well-being requires a good service system and also enough shared and contemporary knowledge about children, childhood and parenthood. In the common interest is that adults are responsible for a child's psychological well-being.

Man can consider an infant's well-being on the one hand conditions of well-being and on other hand activities of well-being. In different periods of childhood the well-being of a child focuses on different indicators of well-being and the child has different kinds of resources and risk factors. At some age the child can feel well and at same time can feel badly. Well-being is different at home and in daycare. In our common interest is that adults bear a child's well-being.

Infant's well-being and parenthood

An infant develops in different areas of psychological activities as a result of basic care and as a result of face to face interaction by parents/caregiver. In early childhood the development is very holistic. Closeness develops brain functionally, sensory perception, autonomous nervous system, emotions, memory, language, play and thinking. The most important elements of early interaction between an infant and parent are care and attachment. The quality of attachment depends on an infant's temperament and a parent's attachment and his or her belief of attachment and how the parent keeps the child in their mind (Kouvo, & Silvén, 2010; Mäkelä, 2003; 2006; Salo, 2006; Sroufe, 1996; Sinkkonen, 2008.)

Characteristics of personality and temperament are theoretically and empirically related and closely associated with an individual's well-being and psychosocial adjustment (e.g., Rothbart et al., 2006; Komsı, 2009). These researches conceptualised temperament as constitutional individual differences in reactivity and self-regulation, influenced over time by the interactions of heredity, maturation and experience. There is evidence for two broad temperament dimensions as early as infancy, positive and negative affectivity. Temperament refers to early differences in motor activity, smile-proneness, soothability, attention span, anger-proneness and fearful distress.

A very often used theory of temperament is the theory of Thomas and Chess. There are three dimensions of temperament in childhood after three years old and in adulthood. They are positive emotionality and extraversion. It includes regular autonomy nervous systems, positive reactions toward all news, sociability and positive mood. Slow adjustment includes negative reactions toward all news and slow adjustment. While difficult/negative temperament includes irregular autonomy nervous systems, withdrawal, avoidance, prepared for new situations and mood is often negative. (Keltikangas-Järvinen, 2004.)

Temperament and stress as mediators of well-being'-s indicators

A parent's/caregiver's most important duty during early childhood is to take away a child's stress. This manner also raises an infant's undifferentiated feelings and it is a message to the infant that a parent/caregiver is present and keeps the infant in his or her mind. (Mäkelä, 2006; Salo, 2006). Hunger, pain and tiredness are stressful for an infant, while the child tries to stay close and connect with his or her parent by sucking, crying, smiling and trying to be held (Salo, 2006). While a parent/caregiver removes or decreases stress by care or by holding, she or he protects the development of the autonomous nervous system and development of senses and emotion regulation. This kind of care creates the foundation of attachment and generates basic-security (Mäkelä, 2003; 2006.)

This kind of care and holding develops an infant's memory and cerebration. Experiences of care are recorded in subconscious memory, which is implicit memory. These kinds of memory are the body's memory, memory of affects and procedural memory. The body's memory is immediate and subconscious recording memory of heart aches, breathing intensity or ooze of stomach acid in different situations. The memory of affect records e.g. the affect of hunger, pain or tiredness. The procedural memory records order of different functions and automatic motions. (Mäkelä, 2006.)

Komsı (2009) researched in her longitudinal study the degree of continuity of temperament over five years from the infant's age of six months to the child's age of five and a half years. She showed developmental transaction between parental personality traits and child temperament. Mothers' and fathers' higher extraversion correlated significantly with higher infant positive affectivity and a child's higher effortful control five years later. A fathers' higher extraversion correlated to a child's higher extraversion and a mothers' higher extraversion correlated with lower child negative affectivity. Mothers' and fathers' higher neuroticism correlated significantly with higher child negative affectivity and for fathers, with lower child effortful control.

Komsı (2009) researched also transaction between maternal stress and child temperament. Maternal stress measured in the infancy period correlated significantly with maternal stress five years later and a mother's initially higher stress was also correlated with the infant's higher fear, distress to limitations and less smiling and laughter. Pesonen (2004) showed that maternal and paternal depressive symptoms were significantly associated with perceptions of the infant as temperamentally more fearful, distressed to limitations and consequently more negative reactions. Also, the development of parents' personality traits and attachment style dimensions seemed to be susceptible to their perceptions of a child's temperament.

Parent psyche themselves up for infant's emotion and the infant becomes attached with procedural memory system

After the first months of life, an infant's brain has now developed to connect and categorise perceptions and phenomenon together causing the emotions they evoked. The development of these cerebration demands interaction, which the parent/caregiver psyche himself or herself up for infant's emotion (Mäkelä, 2003; 2006; Paaso, 2008). Parent/caregiver recognises an infant's positive emotion and reflects it back to the baby through facial expression, gestures, tone and movements. A parent/caregiver also reassures and calms down a baby when she or he feels distress and fear. A parent/caregiver recognises and interprets aloud emotions and in this manner helps the baby to differentiate between emotions. (Salo, 2006.) In this interaction an adult's more developed central nervous system is transferred slowly to an infant's inner procedure. In this manner begins the development of emotions from mutual regulation to inner self-regulation. This kind of interaction starts an infant's attachment to a parent/caregiver with procedural memory system. (Hautamäki, 2001; 2001; Mäkelä, 2003; 2006.)

After a half year of life an infant's memory has been recorded in limbic system memories interaction with parents/caregiver, which reassures an infant's emotion. A child's early emotion regulation is a secure base phenomenon, which joins a child's continual balance between safety confirmation and examination of the environment. The infant uses a parent/caregiver as his or her secure base phenomenon when new situations and strong emotions occur. The infant regulates his or her emotion with a parent/caregiver. (Hautamäki, 2000; 2001; Broberg ym., 2005.) With a secure base phenomenon the infant can learn and examines the environment. In this way one of tasks of attachment is realised. (Salo, 2006.)

Selective attachment and basis of cognitive skills

When the infant is about eight month old, he or she displays selective attachment and selective attention. The infant is especially interest to follow a parent'/caregiver's attention focus and how the parent feels his or her perceptions. E.g. a parent/caregiver and an infant pay attention to a toy or a dog at the same time and they both are aware of this

perception. The infant's ability for joint attention is the basis of language, communication and development of attention. These kinds of situations are e.g. shared picture-book readings, which both a parent/caregiver focuses perception on the same object. These kinds of situations are very necessary to an infant's development. (Lyytinen & Lyytinen, 2006; Salo, 2006; Sroufe, 1996.)

Experiences of joint attention and experiences of secure base phenomenon starts the canonic babble stage in language development. The infant repeats a series of consonant-vowel or vowel-consonant. This transition to babble is connected to development of attachment between a parent/caregiver and the infant. The basis of learning phonemes and babbles is hearing of speech. (Lyytinen & Lyytinen, 2006.)

There is plenty of correlation evidence suggesting that attention shared by the mother and the child on objects and events facilitates word learning during second-year play interactions. This is especially true if the parent follows rather than directs the child's attention focus while naming objects. Engagement in joint attention is thought to provide the children with the necessary experiences for learning word meanings. (Silvén, 2002.)

At the end of the first year the basic capacity for social interaction develops. It shows when the infant plays and a strange person comes into the room. The infant looks at his or her parent/caregiver and gets worried and surprised e.g. asking: "Mother, is this strange person dangerous?" When the mother notices the infant's message and answers, the infant will be quiet and continues playing. This is called social referencing. It is a mutual feeling. It is important for the infant how the parent/caregiver looks at the infant while she or he speaks about the situation. Mutual sharing and experience enable special emotion. These memories outline the infant's perceptions and define to the infant their own and their parent's/caregiver's social role. (Broberg et. al., 2005; Harris, 1994.)

Inner working model, mutual play and emotion regulation with another

During the first year of life an infant has developed expectations of a parent's/caregiver's behaviour with the infant. Memories of these expectations and experiences are recorded in procedural memory. This memory system keeps in mind knowledge of daily and repeated basic-care situations, order, interactions and emotional tone with the parent/caregiver. A child's experiences about him- or herself with parent/caregiver include affect and knowledge (Mäkelä, 2006). These repeated experiences about myself with another generalise models in the mind. An infant's attachment with a parent/caregiver is composed of these inner working models.

A securely attached infant develops an expectation that his or her emotional signals and needs will be reacted to by the parent/caregiver in a responsive, consistent manner. A secure attached infant learns to freely express their emotions, and the development of emotion regulation is enhanced because of the supportive emotional environment children experience. (Cassidy, 1988; Eisenberg & Morris, 2002.) In this way one of the aims of attachment happens (Saló, 2006).

An insecurely attached infant is believed to develop the expectation that emotional needs will not be responded to or will be responded to in a selective and inconsistent manner. (Eisenberg & Morris, 2002). When a child expects a parent/caregiver to be unresponsive and inconsistent in this way, the child may restrict the display of emotions or display negative emotions to receive attention from a parent/caregiver, and the development of emotion regulation suffers (Eisenberg & Morris, 2002; Mäkelä, 2006; Sinkkonen, 2008).

Early play develops during face to face interaction with the parent/caregiver and an infant. These experiences are recorded in the inner working model. At the end of the first year of life, action with objects differs. An infant's play is putting familiar objects one on top of the other, one inside the other and turning and rolling objects. The play of a securely attached infant is more multi-faceted, because infants are more willing to examine their environment and also they are willing to be a playmate. Secure attachment with parents/caregivers improves on learning. (Lyytinen & Lyytinen, 2006.)

Semantic memory, language and play develop with parent/caregiver interaction

The cortex develops intensively after an infant is one and half years old. Disappointments evoke negative emotions. A parent/caregiver helps a child to bear these disappointments by holding a child in same way as a baby; by thinking and by recognising emotions with a child. (Mäkelä, 2006.)

The development of the cortex improves also in cognitive development. Semantic memory develops during the second year of life and it is connected with e.g. a child's early description about himself or herself and about daily happenings. Memories are general verbal schemes about himself or herself in connection with attachment objects. Episodic memory means representations of happenings, which occur at a time and place. Memories include emotions and construct connections of holistic sensory perceptions and also memories construct how current stimulus outlines a time and place. (Hautamäki, 2000; 2001.)

A child learns to produce words during the end of the first year or at the beginning of the second. Productivity of words grows individually after one and half years. To produce words demands, that a child understands the word's meaning, she or he can pronounce it and can communicate with language. Studies indicate continuity in the language skills. Early learners of first words also produce early diverse conjugation and sentences than other children. A quickly expanding lexicon increases a child's possibilities to structure communication with language and participate in conversation. Finnish studies indicate that children who have an interest in books have a wide lexicon. They start earlier than others to look at picture books and papers and they ask parents to read books. Children had the ability to concentrate on reading for a longer time than children who have no interest in books. (Lyytinen & Lyytinen, 2006.)

Language skill is very important to cognitive development. Through language the child analyses his or her perceptions, become acquainted with his or her environment, receives and learns knowledge. Early language skill is also related to basic reading skill (Silvén, 2002.)

The development of memory and language leads a child to symbolic play at the beginning of the second year. First imaginary actions are connected with daily happenings such as like eating, sleeping, driving and caring. When play expands outside live (parents, caregivers, sisters) and lifeless subjects (cars, puppets, teddy-bears) it shows a child's attempt to communicate and share experiences with others. A child can feel pleasure while she or he translates learned schemes to new targets. E.g. parents have tucked the child into bed and the child tucks a teddy-bear into bed in the same way. (Lyytinen & Lyytinen, 2006.) It is very important to a child's well-being and the development of play that the parent commits to play and that parent encourages the child's play (Kalliala, 2008).

Symbolic play and language develop at the same time. E.g. when a child starts to pronounce sentences, which contain many words also the course of events in symbolic play becomes longer. Attention and play also has connections. The capacity to maintain attention is necessary but not a sufficient condition to the development of play. Temperament also regulates attention. (Lyytinen & Lyytinen, 2006.)

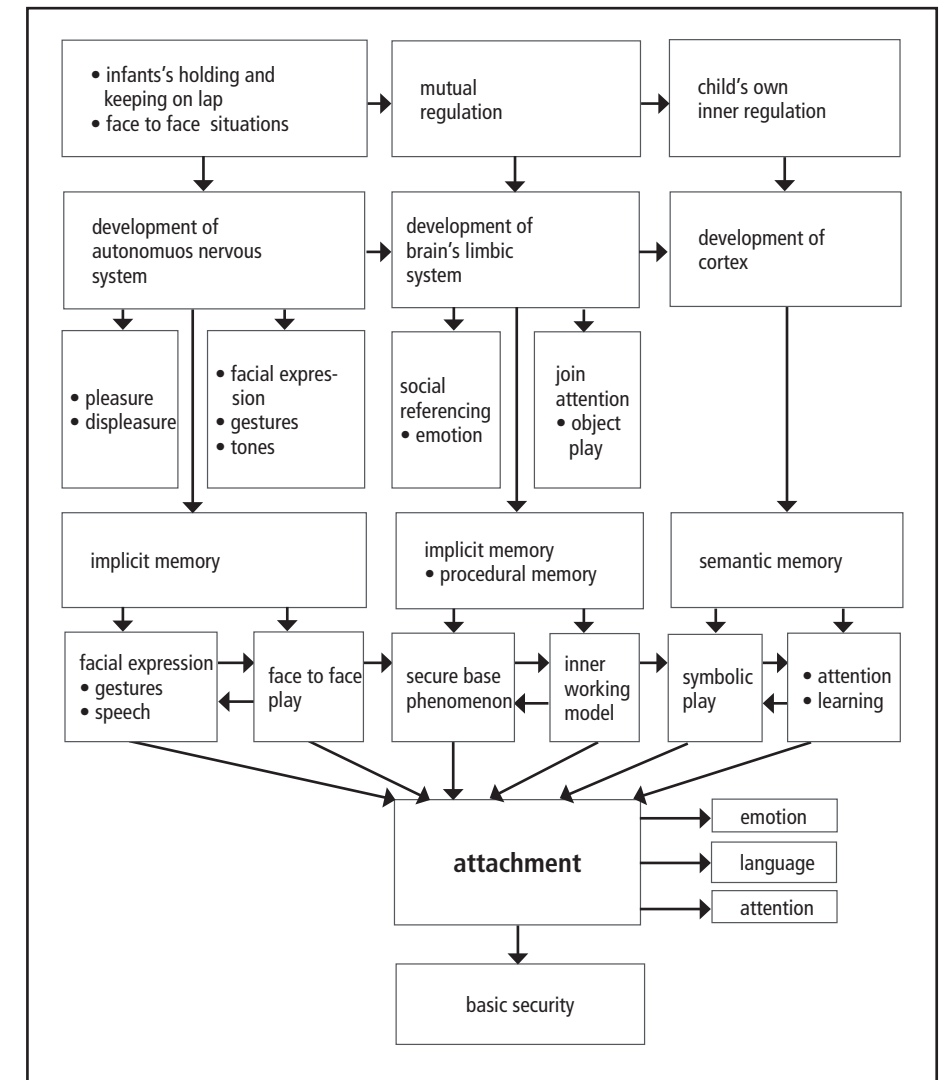


Figure 1. The development and outcomes of attachment.

The development of emotions and social skills after two years

Most researcher determine, that the development of a child's emotion consists of emotion expression, emotion knowledge and emotion regulation. The knowledge of emotion consists of emotion recognition, identification and emotion understanding. (Denham, Blair, DeMulder, Levitas, Sawyer, Auerbach-Major & Queenan, 2003; Paaso, 2008).

Researcher have studied on emotion recognition in different ways by using pictures of facial expression and they found that almost all three-year-old children could correctly recognise facial expression of anger, happiness, and sadness, whereas expression of fear and surprise was harder to recognise. (Denham, 1986; Denham, McKinley, Couchoud & Holt, 1990; Denham etc., 2003; Suviala, etc. 2007). A child's ability to perceive and recognise emotions of other people is an important skill for social interaction. A child's own emotion expression is connected with emotional understanding and helps the child express to his or her own feelings and understand causes between emotions and events (e.g. Denham 1986; Denham et.al., 1994).

During the third year of life the securely attached child begins to develop theory of mind. The development of memory and language helps the progress of this development. In interaction the child learns that other children and parents have different thoughts, intentions and aims than he or she has. The child develops the capacity for empathy. In this way the process of social information develops. He or she learns better than earlier to perceive other people and interaction situations. In the same time she or he learns to make conclusions on the basis of it. In this way a child's social skills develop. (Hautamäki, 2000; 2001; Salo, 2006.)

In order to learn to regulate his or her own actions and emotions in different situations, a child must have a connection to his or her emotions. He or she will learn to recognise and to evaluate emotions and knowledge in situations. This is called epistemic space. Secure attachment improves on the development of epistemic space. This development influences the process of perception and information and develops a child's social skills. (Hautamäki, 2000; 2001.)

Researcher showed that a parent's discussion with children about the children's own and others positive and negative feelings in the family predict the development of children's emotional understanding and the development of emotion regulation (Denham etc., 1994, 2003; Brown & Dunn, 1996; Dunn, Brown & Beardsall, 1991). Denham etc. (1994) showed that a parent's positive expressions foster children's emotional understanding, security and empathy and also such kinds of emotion regulation as the use of language expression, attention shifting about negative and stressed events and trying positive thinking. These positive emotions experienced in interaction also foster dealing with negative emotions (Eisenberg & Morris, 2002).

Denham etc. (2003) showed that after three years, children's emotional expressiveness predicted both emotion knowledge and emotion regulation. More positive children were both more knowledgeable about emotions and more able to regulate them. The emotion regulation predicted social competence more strongly for girls than for boys, more strongly for younger than older children, and also more strongly for low-negative children than for high-negative children. Emotion knowledge predicted social competence more strongly for younger children.

Play and stories are good methods for emotion regulation. With them a child can express and experience emotions more naturally than speaking. In play and by listening to a story, a child can experience different feelings, difficult experiences, and also carry out different solutions than in real life. She or he can translate passive experience to active experience. In this way play and stories give tools for maintaining well-being. (Kalliala, 2001; Sinkkonen, 2006.)

Infant indicators of psychological well-being

In conclusion, the theories presented here give rise to the indicators of infant psychological well-being. Indicators of a child are expressed in activities of the parent/caregiver and in the activities of the infant. Adults are responsible for protection and improvement of infant's psychological well-being. A child shall have rights to protection and participation. An adult's duty is to protect and make possible the child's participation in accordance with the child's developmental stage. Offered indicators of psychological well-being can be considered by a process of attainments of resources and part-areas of indicators of well-being or directions of development in future. Parents and caregivers can evaluate indicators in a children's clinic regular visits and in day care centres at a time agreed upon, e.g. during one week four times in a year. Offered indicators represent a theoretical model, which researches and tests empirical data in order to generate new practical innovations. These innovations can generate infant widely used indicators of psychological well-being.

Indicators	Parent/ caregiver protection	fr.	An infant 1 year old participation	fr.	A child 2 year old participation	fr.	A child 3 year old participation	fr.
Sensitivity to children's emotions and needs	Parent/ caregiver holds an infant in his/her mind. is available for an infant. enjoys to be with an infant. responds to an infants needs at the right time (hunger, tiredness, distress).		An infant trusts in parent/caregiver. enjoys to be with parent/caregiver. gets food at that time when she or he is hungry. can sleep when she or he is tired.		A child trusts in parent/caregiver. enjoys to be with parent/caregiver. gets food at that time when she or he is hungry. can sleep when she or he is tired.		A child seeks out parent/ caregiver to get help. enjoys to be with parent/ caretaker. gets food at that time when she or he is hungry. can sleep when she or he is tired.	
Emotions	Parent/caregiver is empathic toward an infant's emotions and reflects these emotions back to an infant. is holding an angry and sad infant. holds an infant on his/her arms. shares joy with an infant. helps an infant to recognise facial expressions. can be a secure base to an infant. gives words to an infant's feelings. holds up an infant's feelings in his/-her mind during play.		An infant lives feelings with parent/caregiver = mutual emotions. Mutual emotion regulation with parent/ caregiver. can be on adults lap. answers to parents/ caregivers face expressions and emotions. has a permanent adult. is glad and in a good mood. uses parent/caregiver for his/her secure base phenomenon.		A child has the courage to throw a temper tantrum can be on adults lap. has a permanent adult. is glad and In a good mood.		A child has the courage to throw a temper tantrum recognises in face expressions and in face pictures: • glad • hate • fear • surprise is glad and in a good mood. speaks emotional words. tells about his/her feelings during play.	
Play	Parent/caregiver commits to play. gives stimulus for play. constructs environments for play. is present and concentrated in play. holds up and expands child's play.		An infant plays objects play. has shared play sessions with parent/ caregiver. has shared picture-book reading with parent/caregiver. commits to play. plays side by side with other child.		A child plays symbolic play. commits to play. plays with another child. uses his/her own experiences in play. tells his/her roles during play.		A child plays many-sided symbolic plays. commits to play. uses his/her own experiences in play. tells his/her roles during play. can play in a group. tells his/her roles during play.	

Indicators	Parent/ caregiver protection	fr.	An infant 1 year old participation	fr.	A child 2 year old participation	fr.	A child 3 year old participation	fr.
Language	Parent/caregiver talks to an infant during care and during play. is discussing with an infant. tells stories to a child. is singing to a child.		An infant phonemes. gurgles. speaks words.		A child speaks two words in sentence. speaks three words in sentence. asks questions.		A child speaks three words in sentence. speaks more than three words in sentence. uses tenses during his/her speaking. asks questions. proposes during speaking.	
Other communication tools	Parent/caregiver can understand child's expression Parent/caregiver responds to language of • crying. • motion and body. • aggression. • sleeping. • eating. • playing. • drawing. • memory and forgetfulness. • touch. • facial expression. • words.		An infant dares express: • pleasure • happiness • fear • anger An infant is crying while distressed. displays anger by aggression. sleeps well. eats well. likes to play. communicates by facial expressions. likes some smells, noises and colours.		A child dares express: • pleasure • happiness • fear • anger A child is crying while distressed. displays anger by aggression. sleeps well. eats well. likes to play. communicates by facial expressions. likes some smells, noises and colours.		A child dares express: • pleasure • happiness • fear • anger A child is crying while distressed. displays anger by aggression. sleeps well. eats well. likes to play. communicates by facial expressions. can tell in words about happenings can tell in words about his/her favourite colours, smells, music and noises.	

Figure 2. Indicators of infant and child well-being.

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5

Indicators of Child and Youth Well-being

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In this article, I discuss from a social science viewpoint what could be the indicators or signs of child and youth well-being that should be followed in order to receive enough information on the situation of child and youth well-being in our country. This article complements the article of lecturer Heli Paaso, who discusses the indicators of child well-being from the viewpoint of developmental psychology in this research publication. With these articles, we try according to the ethos of universities of applied sciences to adapt, combine and give a wider perspective on the existing information about the subject. This article is also connected to the article “Forms of well being and integration among young adults” by Juhani Pekkola in *KyAMK Tutkimusjulkaisu 2010* (Pekkola 2010, 121-143).

The key concept that will be defined in this article is “child and youth well-being”. My goal is to discuss this concept in accordance with research professor Marjatta Bardy that is “with criticism and creative care”. The modern international research on well-being questions over and over again from the viewpoint of concepts and evaluation methods on what well-being really is. This article asks the same question from its readers. (Bardy 2009a, Bardy 2010, 27.)

The Finnish word “hyvinvointi” can be interpreted in English as “welfare” or “well-being”. The concept can be related to either society or human behaviour. In the field of social work, increasing people’s welfare/well-being has actually been defined internationally as the main orientation of work. (Niemelä 2010, 16.) I have chosen the word well-being to be used in this article - with the help of Sari Loisa from KyUAS Department of Languages, who has been kind enough to translate this article - very well realising its limitations (and partly paying no attention to them).

I begin by discussing well-being as a research subject and proceed from the current discussion on indicators to compile some of the central indicators. In conclusion, I discuss the possibilities for the utilisation of indicators. In this article I focus mainly on indicators - I shall not represent any results of various researches about child well-being that have been made in Finland and/or worldwide.

Well-being as Research Subject

Well-being research categorises well-being generally as objective and subjective, evaluative and experienced/interpreted factors. Nordic well-being research is dominated by resource-based study of well-being. In other words, well-being is seen as a resource – instrument – used by individuals in order to guide their own course of life, make choices and decisions, and live as they choose. This is also very close to the concept of lifestyle where well-being can be seen as a possibility to follow the most pleasurable lifestyle. Our well-being is relative: we evaluate and interpret it in relation to socio-cultural norms and experiences. (Bardy 2010, 27-32; Niemelä 2010, 17-21)

Since 1980, Unicef has published a series called *The State of the World’s Children*. In this series the organisation follows, with multiple indicators, how the UN Children’s Rights are being fulfilled around the world. The indicators in this series are a compromise of statistics available: infant mortality rate, neonatal mortality rate, annual number of child

births, GNI per capita, life expectancy at birth, total adult literacy rate, primary school attendance and household income. (Mocchia et al 2009.) These indicators are necessary and in a way un-negotiable in order to understand child well-being in general. They cannot, however, fulfil the need to have a closer view on children's well-being in our Finnish culture and way of life.

In 2002, 2005 and 2008, Antti Karisto's research group performed a well-being barometer in Päijät-Häme, Southern Finland, in which the concept of well-being has been carefully formulated to meet the criticism towards previous research on well-being and the new emphases of theoretical discussion concerning everyday life. (Karisto et al 2003, Haapola et al 2009.) Karisto's well-being barometer discusses the well-being of adults with the following elements.

1. spouse and family	2. relatives	3. neighbours	4. relationships
5. appearance	6. health	7. physical condition	8. sex life
9. wealth	10. consumption possibilities	11. permanence of a job	12. meaningfulness of a job
13. amiability	14. faith	15. travelling	16. physical exercise
17. learning	18. cultural interests	19. entertainment and recreation	20. community
21. organisational activities	22. respect	23. influence	24. choices
25. accommodation	26. neighbourhood	27. home environment	28. closeness of services
29. pleasures of everyday life	30. homely environment		

Figure 1. Elements of well-being (Haapola et al. 2009)

The central issue in this barometer has been that residents of a municipality have been asked how these preceding elements of well-being are realised in their current life and how do they expect them to be realised in the future. The residents were also asked what kind of meaning they give to each element of well-being. It has been thought that this barometer will make it possible to find, for example, such elements of well-being that at the moment realise poorly, but that are considered to be highly meaningful. This way, services could be allocated exactly for these elements.

Also this barometer uses the combination of need-based and resource-based tripartite classification of well-being having – loving – being (doing), outlined by Erik Allardt already in 1976 (Allardt 1976.) This classification is still seen as current in several social science well-being researches. How well does it suit as the basis of research on child and

youth well-being? What kind of barometer would we need to receive enough information on child and youth well-being? What about the viewpoints of action, inclusion and exclusion?

The discussion of child and youth well-being often focuses on the provision and protection of well-being. Thus, adults' responsibility for child and youth well-being becomes the perspective. A child alone is no longer in the centre of well-being discussion, but children's rights to the special protection of the society, to the share of common resources, and to the participation in issues concerning children themselves take their places in the centre. In the research of child and youth well-being from the perspective of solicitude, Marjatta Bardy (Bardy 2009b) compiles the elements of well-being to the central elements of rights, Provision – Protection – Participation, in the UN Convention on the Rights of the Child according to the following figure.

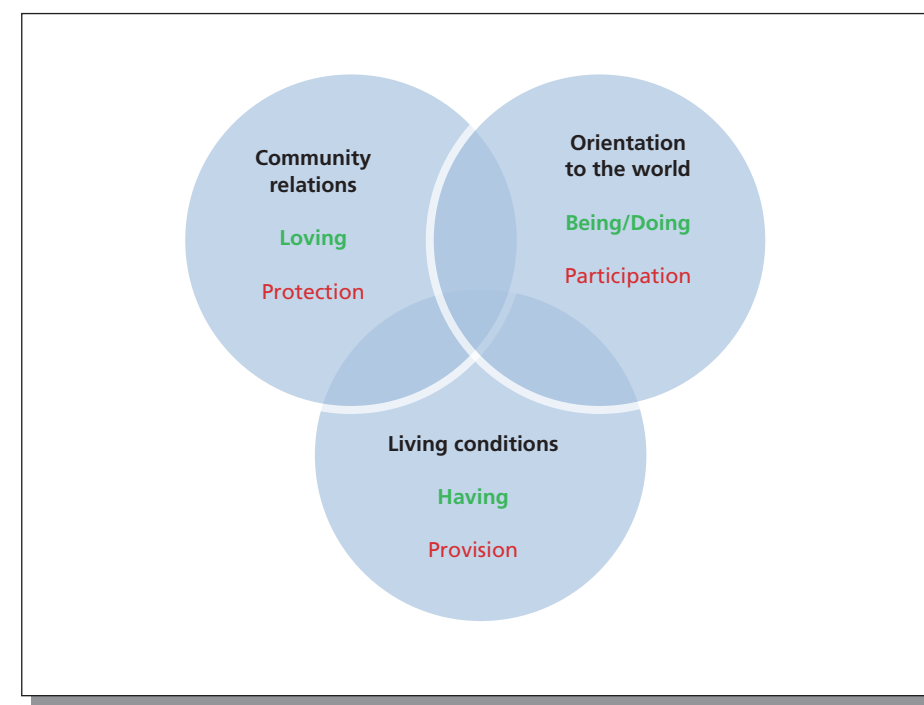


Figure 2. Dimensions of well-being in the solicitude for child and youth (based on Bardy 2009b, 36)

Different dimensions of child and youth well-being overlap each other, but neither of them can replace the other. By being measurable and having an effect on socio-political action, the having-element has, however, been dominant in research and other discussions on adult as well as child and youth well-being. In the Finnish socio-political research discussion, subjective experience and themes of participation can be interpreted to have risen as dominant paradigms in the 21st century. Since the 1990s, child and childhood research have provided and tested a wide range of tools that can present in-

formation and experiences of children and youth (e.g. storytelling, interviews with children, ethnographic research on interaction, youth barometers). However, these have barely been utilised in the large-scale discussion of child and youth well-being. Especially, the loving-element seems to be a difficult research subject. The Finnish Academy has now started a wide research programme on this topic: SKIDI/KIDS –programme will take place 2010-13 with multi-dimensional research projects regarding children and youth, childhood and adolescence. (Suomen Akatemia 2010.)

Furthermore, Marjatta Bardy has brought out a historical viewpoint on the well-being of families with children: in history, the ways of earning one's living and living conditions of families, the acceptance of new generations and community relations, as well as orientation to the world, participation, significance and identity have influenced the well-being of children and families. In this point of view, the mutual relations between a family and a society, the changes in responsibilities, for example, the changes in the ways of earning one's living, and the numerous cultural manners in the discussion of human existence are emphasised. (Bardy 2009a.) How should this viewpoint be noticed when defining the indicators of child and youth well-being?

Pauli Niemelä (2009) has researched the dimensions of well-being in a classification based on needs, participation and resources. He structures human action into being, doing and having and suggests material, social and spiritual as the basic dimensions of action. Thus, according to his point of view, well-being can be conceptualised as good feeling (well-being), good action and living (well-doing), and good having/success (well-fare). In every basic dimension, these concepts are represented in various ways, and in addition, they can be discussed through experience (well-being). Table 1 is based on Niemelä's suggestion on elements of well-being. What is well-being in this kind of research from the viewpoint of children and youth?

Elements of well-being	Dimensions of well-being:		
	material	social	spiritual
resources, having welfare	financial wealth, income, accommodation, material confidence	political influence, social confidence, social capital (power, trust)	know-how, profession, education, spiritual confidence
participation, doing well-doing	working life, work community, physical self-actualisation	civic- and organisational activity, social self-actualisation	cultural activities, studies, spiritual self-actualisation
satisfaction of needs, being well-being	nutrition, clothing, health, physical well-being	family, friends, love, happiness, good relationships	authenticity, safety, autonomy, self-acceptance

Table 1. Conception of well-being based on the theory of functionality (Niemelä 2009, 218; Niemelä 2010, 25-33)

Last but not least, it is worth noting that well-being is in our country often seen as a negation of malaise, when utilising the existing statistics of, for example, services and support. In that case, the statement is that the less there are people in need of income support, without education, as well as children and youth taken into care and as clients of mental health services, the better is the condition of children and youth. The first objection is, of course, that the statistics of service users can be assessed to tell more about the availability and quality of services than about the actual situation of children and youth. On the other hand, research as negation of malaise doesn't bring out the various elements or experiences of well-being. The way of talking about children in our society has in fact been defined as "talking about worries". (Harrikari 2009.)

When defining the indicators of child and youth well-being, how are the models of Karisto, Allardt, Bardy and Niemelä and the existing information on negation of malaise seen? There is at the moment at least three ongoing researches and compilations of indicators in our country: Kaste programme, School Health Promotion Study by the National Institute for Health and Welfare, and policy programme for the well-being of children and youth have all in their own perspective taken a stand on what should be evaluated and researched from the well-being of children and youth in our country. In the following, I discuss these indicator compilations more closely.

Kaste Indicators

National Development Programme for Social Welfare and Health Care (Kaste) 2008–2011 has 19 various indicators. We can assume that these indicators are at the moment the central indicators of social and health care in our country. These indicators are presented in the programme as goals that are pursued by various projects of the programme. Indicators of the services for children, youth and families are the following:

- The number of children placed in care outside the home in relation to the age group will begin to decline.
- The proportion of 17–24 -year-olds with no education after comprehensive school will remain below 10 percent of the age group.
- The proportion of 18–24-year-olds in receipt of long-term income support to the corresponding age group will be halved.
- The proportion of 16–18-year-old smokers will decrease by five percentage points.
- The low income level of families with children will drop below 10 percent. (Sosiaali- ja terveydenhuollon kansallinen kehittämissuunnitelma, 2010)

To realise the goals these indicators suggest, social and health care services should therefore improve children's home environment, ensure education for young people, secure the financial situation of children, youth and families, and increase young people's healthy lifestyle in the matter of smoking. It can be noted that in this programme, child and youth well-being is seen as a combination of home, school, finance and healthy lifestyle.

Indicators of National Institute for Health and Welfare

Every other year, the National Institute for Health and Welfare monitors by means of the School Health Promotion Study the well-being of 8th and 9th graders in comprehensive school and 1st and 2nd graders in upper secondary and vocational schools with 44 various indicators. These indicators are divided into five categories: living conditions, school as working environment, health, and health-related habits as well as health knowledge and student welfare services.

The category of living conditions includes questions about family structure, smoking and unemployment of parents, youth's spending money, parents' knowledge of where their children spend weekend nights, conversational problems with parents, friends, experiences of physical threat, and minor offences.

School as a working environment includes physical working conditions, accidents, working atmosphere, feeling of being heard, amount of work, difficulties in studies, lack of help, bullying, truancy, and liking of going to school.

Questions concerning health include state of health, chronic diseases, obesity, symptoms, tiredness, neck and shoulder pain, headache, depression, and exhaustion.

The category of health-related habits include questions about eating of school meals, unhealthy snacks, brushing one's teeth, amount of exercise, bedtimes, smoking, being drunk, and experimenting with narcotics.

Health knowledge and student welfare services include questions about health education and how interesting its topics are, how much the education has improved the ability to take care of one's health, information on sexual health, information on intoxicants, lack of help, how easy it is to get an appointment with school nurse or doctor, and contentment with school health care. (Kouluterveyskyselyn indikaattorit, 2010)

Can we assume that so widely investigated parts of young people's lives would best describe the well-being of youth of this age? At least they give an extensive picture of the amount and changes of youth malaise. One goal of the National Institute for Health and Welfare in this research seems to be to find such concerning trends that the service system should intervene.

Policy Programme Indicators

The working group of the policy programme for the well-being of children and youth appointed by Matti Vanhanen's second Government has worked during the current government term to develop the indicator package appropriate for the evaluation of child and youth well-being (Lasten ja nuorten hyvinvoinnin kansalliset indikaattorit, 2011). The indicators are supposed to describe especially the implementation of the UN Convention on the Rights of the Child in Finland, a convention that also Finland ratified twenty years ago. The working group's job has been completed during the writing process of this article.

The professionals gathered together by the policy programme think that child and youth well-being consists of

- living standard,
- health and well-being,
- education and learning,
- safe everyday life and home environment,
- participation and social activities, and
- support and protection provided by the society.

Is it possible to get under these headlines an adequate picture of child and youth well-being? The report of the group is most carefully written, and gives a wide and deep picture of the issue. However, most of the suggested indicators still describe well-being from the negation of malaise -point of view, mostly according to the service provider's interests.

These indicators are, as mentioned before, mainly built to serve the need of describing the Finnish implementation of the UN Convention. After researching the member states of the EU, Finland is in fifth place in the overall statistics of child and youth well-being. Our children do especially well in the sectors of material well-being and housing, but health and personal relations are weakest. In the OECD comparison that has been made with slightly different indicators, Finland is seventh. According to that, the educational well-being of children and youth is especially good in our country, and risk behaviour and the quality of school life are weakest. (Doing Better for Children, 2009) There isn't, however, indicators to all indicator categories of these comparisons in the statistics that are at the moment compiled in Finland. What does it tell about us that particularly information on subjective experiences, families and social relations is not systematically compiled here?

Indicators of Well-being in Different Phases of Life

The service systems of social and health care are in several municipalities in our country organised according to the life cycle or the course of life model. Research from the perspective of time is probably one possible way to perceive the multi-dimensionality of child and youth well-being. In addition, that well-being appears in a cross study differently with children of various ages, it naturally appears differently also in the different phases of life of the same child and youth. These kinds of profile studies haven't been so much carried out in our country; almost the only one is the follow-up study by the research group of professor Lea Pulkkinen related to the course of life of one school class (Persoonallisuuden ja sosiaalisen käyttäytymisen kehitys lapsesta aikuiseksi, 2010.) In the "box" next to the article, I have tried to describe the well-being of a young woman, who studies in a university of applied sciences, according to the course of life model, taking into account the previous indicator models as well as Karisto's, Allardt's, Bardy's and Niemelä's conceptions of well-being as presented in Table 2.

Elements of well-being in the life of child and youth	Indicators in the dimensions of well-being:		
	material	social	spiritual
resources, welfare, having Provision	financial security, housing, spending money	leisure activities, social capital, cosiness of neighbourhood	early education/day care, education, learning, study possibilities
participation, doing well-doing – being/doing Participation	housework, summer jobs, possibility to influence on the family's purchases, travelling	playing, organizational activities, use of media, friends, entertainment and recreation, experiences in participation	cultural activities, experiences in significance, ethical choices
satisfaction of needs, being well-being loving Protection	basic care, nutrition, clothing, health, appearance, physical well-being	family, friends, love, happiness, well-being in relationships, quality of early interaction, dating/sexuality	authenticity, faith, autonomy, self-acceptance, safety of growth and development

Table 2. Elements and dimensions of child and youth well-being (based on Allardt 1976, Bardy 2009 and Niemelä 2009)

In the different phases of life of child and family, the meaning of various elements of well-being is emphasised differently. Individual differences are also wide. In our society of individualism, the need and possibility of individual choices are a significant part of overall well-being. Therefore, I want to emphasise that in the research of indicators, it is necessary to take into account also the meanings they are given to.

In the phase of a family expecting a child, the indicators of well-being could be the income and housing of expectant families, jobs of parents, relationships and other social relations of families, as well as parents' expectations and experiences in the child and the pregnancy.

When researching children under school age and their families, the indicators would be, for example, the amount of children in the family, the quality of early interaction with each child, day care and clubs as experienced by the children, financial situation, travelling, social relations of family and child, children's health, growth, and development.

When researching the well-being of a child in primary school, research targets would be in addition to the previous indicators themes relating to children's hobbies, school, friends, participation, and bullying.

When researching children in secondary school, research targets would include also intoxicants, dating, formation of the world view and plans for the future, and with young adults, research would include the receiving of an education place, questions relating to independence, economy and relationships.

In Conclusion

The research on child and youth well-being is challenging and significant. We still need multidimensional scientific research on how child and youth well-being appears today. The compilation and research of indicators is one part of this study. With indicators, we have a quick and relatively versatile picture of the economic-political decision-making of the life of children and youth in our country. Nordic and European comparability of indicators makes possible the wide research of regional differences.

The evaluation relating to the use of services is not included in the previous indicator compilation I suggested. Following the use of services for children and young people is without question important, for example, to make services suitable. It may well be that demand follows in some way supply in our existing services. As I mentioned earlier, by following the use of services, we can receive information mostly on the use of services, not on the phenomena behind it. It is, for example, impossible to say that the increase in the amount of children and youth taken into care or the lines of mental health services indicates the deterioration of child and youth well-being. It may be a sign of this, but it may also be a sign of a service system that functions too well or poorly. Influencing factors can be the lack of proactive or early support services, financial choices, lack or incompetence of employees, changes in working methods and training of employees – to mention only a few. Because of this, I would say that the choice of indicators of child and youth well-being should be separated from the research of the child and youth service system.

However, the research of indicators is not enough. Well-being is so strongly qualitative that it is necessary to widen the research perspective with qualitative research methods, case studies, ethnographies, creative methods relating to hearing and improving the participation of children and young people, as well as with versatile means of expression of art and culture. In this fascinating combination, it is possible to attach entirely new strands.

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6

Interference avoidance in intermodal supply chain of South Eastern Finnish ports

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Abstract

The maritime and port activities have had a growing tendency in the Eastern Part of the Gulf of Finland. Ports of the area have acted as important nodal points for the transit traffic between EU and Russia. Largest ports of the area, Kotka and Hamina have also been the main export ports of the forestry industry of Finland. It has been estimated, that the changes of the operational environment will increase both the usage of inter-modal sea transportations and air freight. By these transport systems the new challenges caused by economic development, logistic demands and globalisation will be encountered. Freight transport should be faster, more precise and more reliable.

This paper discusses the disturbance management of intermodal supply chain in port related companies in the South-Eastern Finnish ports. The focus has been directed on the avoidance of various disturbances, identification of disturbances, fast countermeasures and reduction of the negative impacts of perturbations. Current strong drivers affecting the aerial logistics have also been highlighted such as the significant reduction of the forestry, pulp & paper capacity in Finland and new custom tariffs for timber in Russia and the impacts for transport planning and requirements. Finally, the current economic depression and its impacts, for example for transit traffic, has been discussed.

1. Introduction

Intermodal transport is one of the key transport modes for the South-Eastern Ports of Finland. Close vicinity of the Russian border with the close situation of the large Russian cities, such as St Petersburg and Moscow, have contributed to the strong development of transit traffic through the Finnish ports to the Russian markets.

Kyminlaakso University of Applied Sciences (www.kyamk.fi) participated in an EU funded research project (www.merikotka.fi/safgof/) where the focus was on maritime transport development in the Gulf of Finland waters in 2007-2015. One of the tasks of this research project has been to define various disturbances and interferences affecting the intermodal supply chain. Base line studies were conducted in 2008-2009 (Rytkönen & Ulmanen, 2009), after a more detailed study on disturbances was made and reported in 2010 (Ulmanen & Rytkönen, 2010). Due to the fact that the target area is the South-Eastern part of Finland it has been quite natural to select main ports of that area for studies. Thus, two ports, Hamina and Kotka have been selected to represent case ports of this study.

1.1. Briefly on statistics

In 2009 Finnish seaborne export and import volume was close to 90 Million tons, including 6.2 Million tons of transit. Seaborne transport volumes were lower in 2009 than

in 2008 (see Figure 1) due to the global economic regression. The economic depression especially hit transit traffic in Finland, and monthly transport rates dropped down temporarily even by 60%. Transit volumes of Kotka and Hamina in 2009 were 1,912 Million tons and 1,159 Million tons, respectively. Container transit figures of Kotka and Hamina in 2009 was almost 190,000 TEU jointly, while a year before in 2008 the same figure was almost 380,000 TEU. The same decreasing trend in 2009 was reflected in the total container transport rates of Kotka and Hamina being 108,000 and 346,000 TEU respectively. The total container traffic of Finland in 2009 was 1,125,000 TEU, around 30% less than in 2008. The situation now, in the moment writing this article, is again showing significant growth of both maritime and transit cargoes, illustrating the economic regression is over and much better expectations for the business is foreseen.

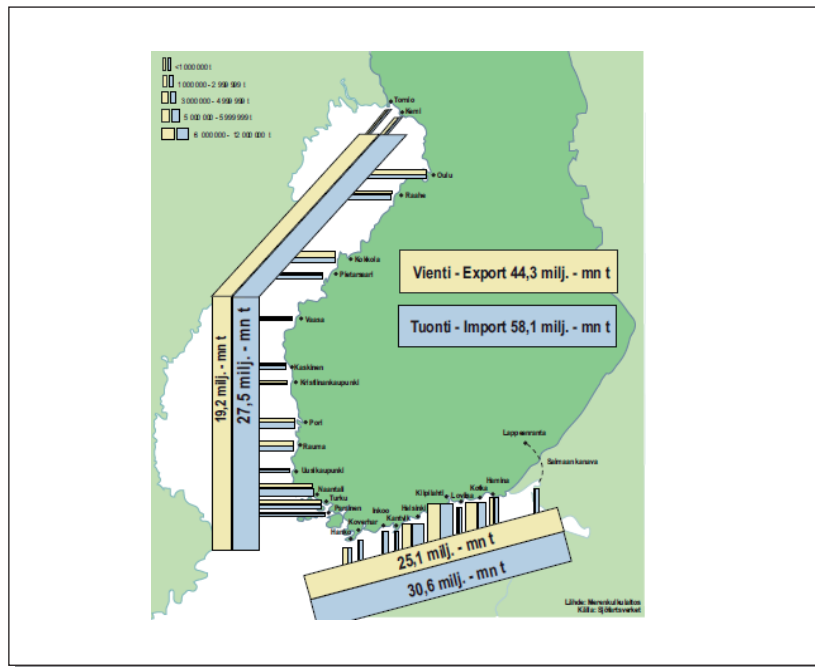


Figure 1. Seaborne foreign transport in 2008 (Finnish Maritime Administration 2009).

1.2 Port of Hamina

The Port of Hamina, shown in Figure 2, is located in the eastern part of the Gulf of Finland, close to the Russian border. The depth of the approach channel is 10 m. The port also has more than 540 hectares of water areas and close to 500 hectares land areas. Total lengths of the quays are 3,000 m for the bulk, general cargo, containers, oil and LNG. The port has warehouses with various functions and more than 100 industrial areas. Regular shipping lines in 2010 are mainly to EU ports such as St Petersburg, Lubeck, Gdynia, Bremerhaven, Hamburg, Vlissingen, Efesos, Heraklion, Saloniki and Tilbury. There are also regular lines to Baltimore USA.



Figure 2. Layout of the Port of Hamina (www.portofhamina.fi)

1.3 Port of Kotka

The Port of Kotka is located around 20 km west of the Port of Hamina. It has several terminals and also constant daily shipping lines to Europe. Regular liner services are for example to the ports of Gothenburg, Tallinn, Sillamäe, Lübeck, Hamburg, Bremen, Bremerhaven, Felixstowe, Amsterdam, Rotterdam and Antwerp.

The Port of Kotka is the leading export port of the Finnish wood processing industry. It is also the most significant transit cargo handler in Finland. The locations of the main terminals of the Port of Kotka are shown in Figure 3.

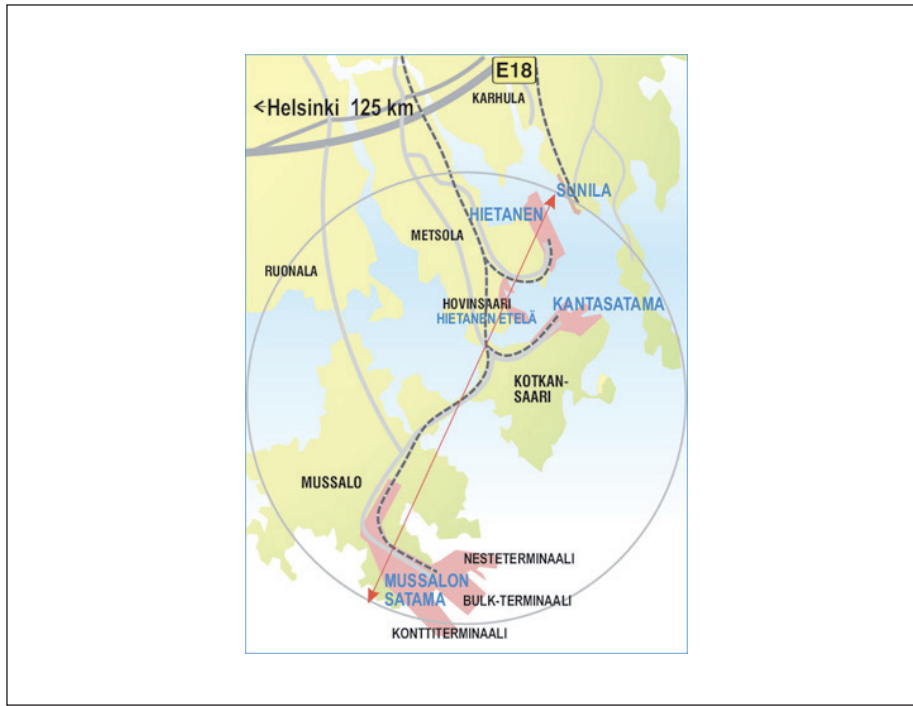


Figure 3. Terminal areas of the Kotka Port (www.portofkotka.fi).

Mussalo Terminal

In addition to the Container, Bulk and Liquid Terminals, Mussalo offers a large logistics area where various logistics and forwarding companies complement the services of the port itself.

The Mussalo port and logistics area currently encompasses 500 hectares. There is a total of 275,000 square metres of heated and unheated warehouses for the containerisation, handling and intermediate storage of export and transit goods. Many of the warehouses in the area have a direct rail connection.

Hietanen RoRo and Car terminal

The Hietanen Terminal has gone through many changes since it was originally built in 1971. Initially constructed as a RoRo terminal, Hietanen also handled container traffic which arrived in Kotka in line with new traffic trends. The actual Container Terminal in Kotka was completed at Mussalo in 2001, which opened new perspectives for the development of RoRo traffic at Hietanen.

The car terminal business was launched at Hietanen in 2003. Car compounds have been built in stages, and presently there are 90 hectares of areas for the storage of cars. In 2006, a total of 205,500 passenger cars were transported through Kotka, primarily for the Russian market. The cars are mainly carried by road, but the Hietanen Car Terminal also now has a ramp for loading cars into car transporter wagons, enabling rail carriage of cars to the destination.

Hietanen houses a warehouse of approximately 8,000 square metres for the containerisation of SECUs (Stora Enso Cargo Unit). The SECUs are shipped from Kotka to Gothenburg in Sweden, which serves as the hub for SECU traffic.

City Terminal

The City Terminal, the oldest part of the Port of Kotka, has gained a new appearance. The City Terminal is divided into two parts, a cultural harbour and a commercial harbour. The commercial harbour encompasses cargo and passenger traffic. Cargo traffic continues to consist of Finnish pulp, paper and sawn goods.

The authors of this article also like to inform the audience on the new situation between the Hamina and Kotka maritime ports, which in the end of 2010 made the decision to start the new life under a joint management, thus joining the forces and getting more efficiency to the operations and service concepts.

2. RISKS RELATED TO INTERMODAL SUPPLY CHAIN

2.1. Methodology used for identifying risks

A questionnaire survey was conducted by the Kymenlaakso University of Applied Sciences between late autumn 2008 and spring 2009. The target audience of the survey was the port-related companies in the ports of Kotka and Hamina. These ports were selected due to their importance in the transit traffic between Finland and Russia and their growing role in the intermodal transport development.

A set of questions to define risks were prepared for the following group of stakeholders:

- port owners
- customs
- stevedoring companies
- forwarders
- shipping companies
- terminal operators
- transport companies (trucking) and
- railroad provider, VR Cargo

The internet based ZEF-tool (Z scored electronic feedback) was used in the questionnaire with the possibility also to leave comments and answers in free format. In this study the answers were sorted by an absolute reporting way where the mean value of each answer is printed based on a given number of the value (0...3).

Both the frequency of the pre-defined disturbances as well as their consequence level was asked to be defined. Answers were then grouped and printed shown in Figure 4, where the horizontal axis corresponds to the consequence level. Vertical axis is the frequency, thus the shown location of a certain number of question gives the expected risk (defined: risk is frequency x consequence). The ellipse drawn round each number shown corresponds to the standard deviation of the particular answer.

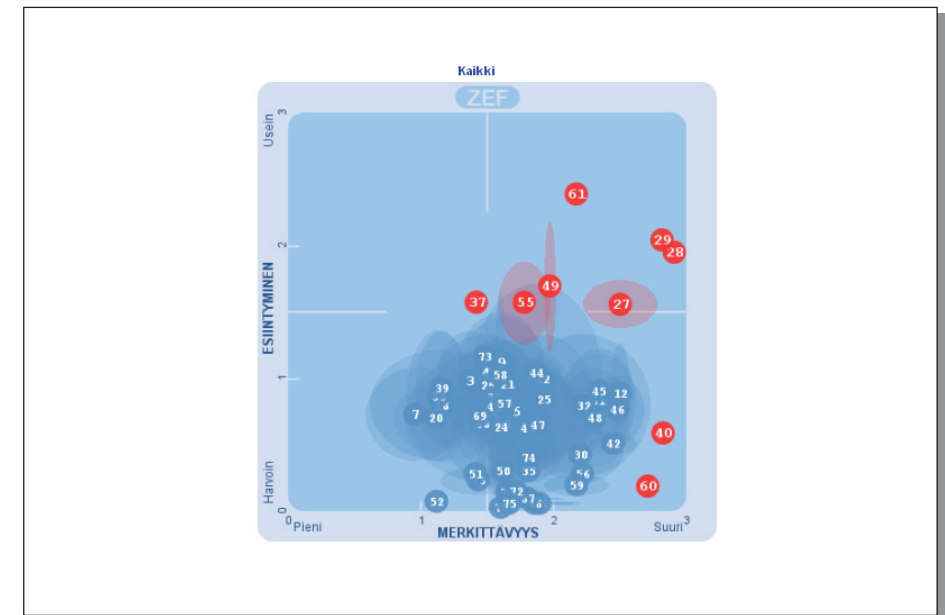
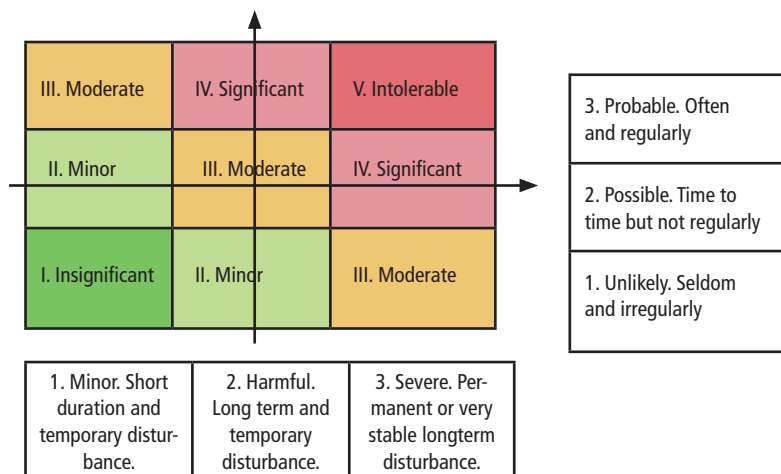


Figure 4. Example of the ZEF output. Horizontal axis corresponds to consequence level and vertical corresponds to the frequency.

For analysing and reporting, the risk matrix shown in Figure 5 was used. Each processed group of answers was analyzed using the grouping principle of the matrix. The principle here follows the general ALARP (as low as reasonable practicable) definition, where the consequence of certain disturbance increases when going from the bottom left-hand corner up towards the right. The frequency level in turn grows upwards from the unlikely event up to the probable and regular event.

RISK ASSESMENT PROTOCOL USED IN THE STUDY



RISK LEVELS:

V.	Risk elimination is necessary. Risk reduction activities must be started immediately.
IV.	Risk reduction is necessary. Risk reduction activities have to be started.
III.	Certain activities should be carried out to reduce risks. Risk reduction protocol should be made.
II.	There is no need for urgent activities. Monitoring activities to control risk.
I.	Risk impacts are insignificant thus no risk reduction is needed.

Figure 5. The risk matrix.

3. RESULTS

3.1. Port owner's view on the interferences

All answers have been analysed and presented in (Ulmanen & Rytönen 2010). Here only the principle of ZEF type visualisation is shown as an example. More detailed presentation with the graphics is shown in the oral presentation of this paper.

The intolerable interferences defined by the port owners are:

- the lack of field and storage capacity for empty containers
- the lack of space for cargo containers and
- interference related to the weighing systems for trucks

Significant risks in turn were identified among the lifting capacity of cranes and various accidents and near miss situations in ports. Lifting capacity of containers in these ports was earlier defined to be not well exploited (Niiranen et al 2007), which could be one reason for this evaluation. The possible risk control options to solve the lifting capacity problems is one of the findings to be studied later in this project.

Moderate risks were identified related especially to loading and unloading phases, safety and security items. The frequency of these risks was estimated to take place rather seldom, while their importance in consequence level is significant. Other typical moderate risks were:

- crane services and problems related to SECU storage areas
- bilge water reception facilities
- IMDG markings
- labour safety aspects
- lack of workmanship, training
- human error
- ICT network
- gate monitoring and
- fire warning systems

3.2. Customs viewpoint

Answers given by the Customs showed no intolerable risks related to the supply chain management or operations. However, terminal related activities were identified to have significant risk for certain duties. The frequency of these events, however, was estimated to be rather rare thus these risks were not kept significant in reality. One of the interesting definitions was problems and risks related to dangerous goods transportation, thus this item was later selected for further studies (Maijanen S. 2010). Here the focus was directed to the proper documentation practices and experiences gained from the field.

Risks belonging to the moderate level were all in relation with custom declaration processes. Customs also pointed out some importance of the disturbances in gate processes with an adequate information sharing service.

Moderate risks were also identified among dangerous goods transportations, in proper labels with RID containers as well as in deviations of the IMDG-documentations.

Finally, failures and short cuts of the ICT systems were noted to have moderate risk for the customs daily work. A special item defined here is the interface between the customs ICT system and other stakeholders. As a curiosity, the fire warning system was also identified by Customs as a moderate risk for operations. The fire warning system came up in every group of answers, which obviously is a case to be studied at first hand.

3.3 Stevedoring viewpoint

Only two significant risk items were identified by stevedoring companies: deviations in the transport documents and problems related to operative systems. However the deviation among the answers point out that some of the stevedoring companies have suffered more problems and disturbances than others.

Moderate risks identified were the lack of advance information or problems related to information sharing, missing documentation and the lack of workmanship and training. All these identified disturbances had a rather low frequency. Bad workmanship and the need for training were subjects defined by all the stakeholders. These subjects have been selected to be developed at Kymenlaakso University of Applied Sciences: In Finland the staff of the stevedoring companies are all trained by an 'on-the-job' principle. Thus, already in 2010, special refresher lectures and virtual training sessions will be arranged for this group.

Moderate risks were also identified related to ICT systems, causing delays and confusion especially regarding container and truck handling in the area. The occurrence of these problems has been small indicating quite high reliability of the operational and management systems. Weather related problems were also identified here to have moderate risks for the operations. Port related companies are usually well protected against the weather and seasonal changes. The sudden change of weather however, usually causes delays and problems for cargo handling and trucking. Cleaning of roads, snow blowing etc operations are often run by outsourced service providers with predefined content of the contract having a limited space for extraordinary weather situations. Preparedness against major weather related deviations may differ a lot in different ports.

3.4 Forwarder viewpoint

Answers of the forwarding companies are shown in Figure 6. The general view of the figure shows a lot of identified risks close to the significant level. Most part of the risks however, can be listed in the moderate category. All answers also show significant deviations in most of the answers, especially in horizontal level.

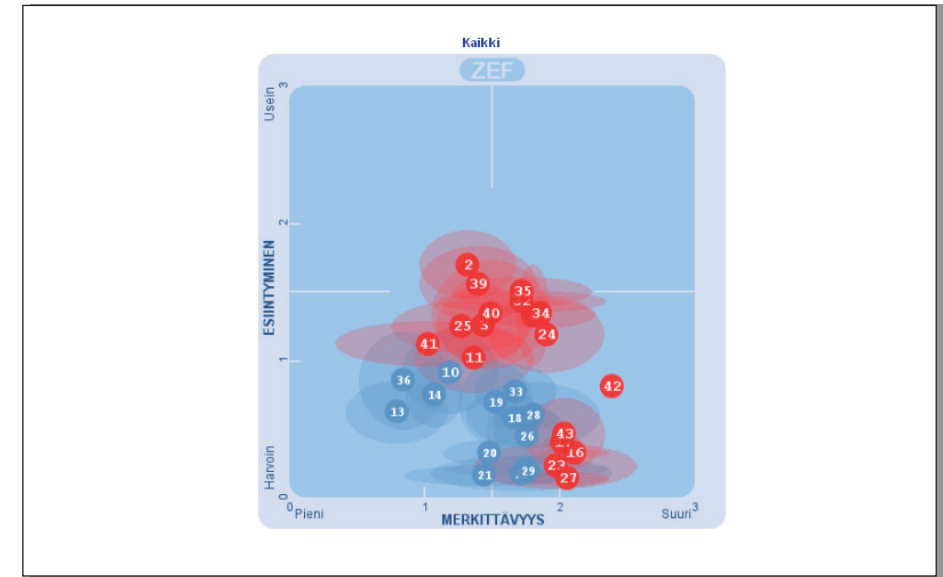


Figure 6. Operative risks identified by forwarders. Note there are a lot of events having rather high occurrence frequency with a significant consequence.

Moderate risks identified here were, for example:

- weather related interferences to ICT, container handling, gate control etc
- delays in services and/or deliveries
- capacity problems of parking areas
- railroad forwarding
- lack of training and qualification
- operative and management systems
- deviations within cargo/failures in car transportations
- dangerous goods etc

Failures related to vehicle transportation was one of the cases selected for further analyses (Hanhela, A.2009) due to its importance especially for the Port of Kotka.

3.5 Ship Owners viewpoint

Ship owners identified in total five significant interferences which may endanger their business activities in the intermodal supply chain management. These items were:

- weather related delays for loading and unloading in ports
- insufficiently prepared cargo documents
- dangerous goods transportation
- fastening of cargo onboard generally
- human impact, near miss situations and accidents

Among the above listed disturbances causing significant risk there were a large group of moderate interferences. Although weather or seasonal variations do not play a significant role for shipping companies they may have negative impacts on the economics of the transport chain: strong winds and waves may increase the fuel oil consumption of a ship, causing delays for schedules. Winter navigation with ice may also require special arrangements with fairways and ice breaker support incurring extra costs.

Moderate level disturbances were identified with bilge water reception facilities (services), forwarding, fastening of containers onboard a ship, improper workmanship and lack of training.

3.6 Terminal operators viewpoint

Terminal operators defined two significant interferences, i.e. the use of outsourced labour and the lack of training or bad workmanship. These findings strengthen the author's opinion of the need for refresher courses and the creation of virtual educational material for the staff of the terminals.

Terminal operators also defined a lot of moderate interferences such as capacity problems of the terminal, disappearance of cargo documents, labour safety, disturbance in the warehouse management system, fire warning system etc.

3.7 Transport companies viewpoint

Answers of the transport companies (trucking) highlighted almost only insignificant problems. Only moderate "pain" was defined related to the reception (gate) services and the lack of information. Information related problems will further have their influence on schedules and delays. Mobile terminals of the cockpits do not often have a good enough interface between the terminal operators ICT system.

3.8 Railroad company viewpoint

Almost all respondents identified only minor disturbances in their work. Only interference classified to have moderate risks was related to unclear markings in RID containers (dangerous goods) and weather related problems for locomotives. Railroad experts generally considered weather problems to very seldom exist, typically caused by snow and ice. Icing of switches of the rails is a typical problem related to the winter, and can be a problem during heavy snow or rainfall. Experience from the last snowy winter however, showed the vulnerability of the rail system at many levels. Snow caused a lot of problems

and delays for passenger trains, and a lot of extra man-hours were used for keeping rails and switches free of snow and ice. There was a lack of manpower for carrying out cleaning and maintenance operations in time.

4. DISCUSSIONS

The main aim of the study, briefly reported in this paper, was to find out interfering parameters affecting the intermodal supply chain management in ports. The target ports selected for the study were the main ports of the South-Eastern part of Finland, i.e. Kotka and Hamina. Both ports are important export ports of the Finnish Forestry Industry having also a growing importance in container and transit traffic. Kotka port has also been the largest transit port of new vehicles to Russian markets. Dangerous goods also form an important factor for the throughput of these ports.

In order to define different disturbances in ports a questionnaire survey was made for the stakeholders. Both electronic questionnaire format and free format questionnaire were used. The survey was carried out between autumn 2008 and spring 2009, when the economical regression also strongly hit the maritime business of the target area: both export and import figures in 2009 were around 20% smaller than the previous year, and transit figures even lower. Thus some of the risks identified in this survey perhaps reflect more the situation just before the crisis.

However, the survey clearly identified a group of risks related to the intermodal transport chain. Both frequencies and consequences of interferences were estimated and classified into different risk classes. Some findings made were further selected to be studied in more detail to define suitable risk control options or best practices to avoid unwanted events.

The aim of the authors of this study is to continue to find out better risk control options to be used in the target ports of this study. Thus a set of small projects and studies will be carried out to produce tailor-made solutions to avoid risks identified in operational procedures. The focus is also directed on finding out best practices and lessons learned for other ports than the target ports of this study with tailor-made courses for the stakeholders. The next step is trying to evaluate the impacts of global changes and restructuring the development of the area

5 CONCLUSIONS

This paper was focusing on the disturbance management of the intermodal supply chain in selected South-Eastern ports of Finland. The base line idea has been to define risks related to operational procedures and to look at suitable risk control options for stakeholders.

After the risk identification phase risk control options will be defined by brainstorming sessions with the stakeholders and also by small-scale studies conducted by students of the University. An important part of the study has also been to define best practices and lessons learned and to assist all the stakeholders to better understand the need of other players related to the supply chain management and to develop a proper interface with certain harmonised procedures and reliable practices.

ACKNOWLEDGMENTS

The authors would like to express their gratitude to all stakeholders related to this study. Stakeholders here represent almost all main players of the ports of Kotka and Hamina with experts from stevedoring companies, forwarders, terminal operators, customs, truck companies, ship owners and port owners. Identified risks will also form a valuable platform for further development of the University's plans to offer further education for stakeholders in the form of tailor-made refresher courses and virtual education material on the Internet.

This study has been part of the EU funded Safgof project (www.merikotka.fi/safgof/) where the focus has been directed on the maritime transport development in the Gulf of Finland environment 2007-2015.

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Support from Calibration Procedures in Paper Quality Control

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1 Introduction

Quality control plays a very important role in the modern paper industry. On the one side there are the high requirements of customers, and on the other side there is the profitability of production lines. In global competition paper and board mills have to pay a lot of attention to a systematic quality control policy. Single paper mills coordinate quality activities in their mill-wide quality management, build their quality control systems of production lines, and perform single quality control tasks on their paper and board machines.

There is always some quality variability in the quality variables of paper and board grades. Significant deviations in quality may lead to production losses. There are three main reasons for this inadequate overall effectiveness. Firstly, the quality of raw materials, for example, chemical pulp, mechanical pulp and thermo mechanical pulp may change. Secondly, there may be some engineering or manufacturing imperfections in process machinery. Thirdly, the quality of process automation may be insufficient, or not well-tuned.

The quality of paper can be characterised with quality variables such as basis weight, moisture, calliper, ash content, colour, and fibre orientation, for example. The variations of product quality variables should be limited. These quality variables are widely measured on-line with traversing scanners but there are some problems in this measurement technology. Real cross-directional (CD) variations cannot be measured on-line, and fast machine-directional (MD) variations are not detected at all. CD and MD variation components have to be estimated for control loops. A lot of signal processing is needed. The performance of CD and MD component estimation is limited, and aliasing effects may occur.

On-line quality control systems (QCS) on paper machines consist of system hardware, as well as measurement signal processing and control software. Advanced multivariable and predictive control algorithms are used. Systematic calibration procedures are called for in order to support successful paper quality control on paper machines.

2 Quality Control in Paper Industry

In general, quality is a degree to which a set of inherent characteristics fulfils requirements. It implies that there is a conformance to customers' requirements to function, reliability performance, maintainability, and appearance. The following quality related concepts are widely used in the paper industry:

- Quality management states the coordinated activities of a paper mill, or a corporation to direct and control its organisation with regard to quality. In the quality management of a paper mill, several activities of different facilities such as production, customer services, engineering, maintenance, and training must be integrated and coordinated toward unified quality objectives.

- Quality planning is the part of quality management which focuses on setting quality objectives and specifying necessary operational processes and related re-sources to fulfil quality objectives.
- Quality control is the part of quality management focused on fulfilling quality requirements. Quality control in paper manufacturing culminates in on-line QCSs of paper machines, and their supporting process laboratory and maintenance activities.
- Quality assurance is the part of quality management focused on providing confidence that quality requirements will be fulfilled. The quality assurance implies a programme to assure that manufactured grades meet customers' quality requirements, while the quality control states day-to-day monitoring of production for conformance to the standards and specifications set in the quality assurance programme. Figure .Figure .(SFS-EN ISO 9000, 2000; Smook, 2001)

2.1 Variability in Quality Variables

A common way to describe a paper quality variable of a sample is the presentation of its comprising components (1):

$$q_{ij} = q_{av} + e_{ij}^{CD} + e_{ij}^{MD} + e_{ij}^{RES} \quad (1)$$

- q_{ij} quality variable element in a measurement matrix, in a row i , in a column j
- q_{av} mean value of all measurement matrix elements in a sample
- e_{ij}^{CD} cross direction variation in a measurement matrix element
- e_{ij}^{MD} machine direction variation in a measurement matrix element
- e_{ij}^{RES} residual variation in a measurement matrix element. (Figiel et. al., 2010)

The CD variation component is principally assumed to be only spatial, and thus time invariant. The MD variation component is generally considered as temporal, and it is time variant and independent of CD variations. The residual variation component contains all remaining variations, the interaction effects between MD and CD components, and pure random effects like measurement noise.

The variations of paper and board quality variables, in general, come from many different sources such as:

- changes in raw materials
- shortcomings in process machinery design
- poor quality variable measurement sensors
- ineffective control actuators
- shortcomings in quality control loop design or commissioning
- differences in process operation
- seasons (Sell, 1995; Tippett and Bialkowski, 1998).

The main sources for variations in product quality variables are raw materials and the manufacturing process itself. Straight, detailed links between quality variable variations and their sources are generally not provided. CD variations of basis weight, calliper and coat weight are more harmful compared to their MD variations because of the piling-up effect on a reel. Some common influencing factors in the machinery together with different quality variables are given in the following list:

- Basis weight is a fundamental quality variable of a paper grade and its variations cause variations in other quality variables. The MD variations in basis weight come from the changes in the stock flow or in the stock concentration. The changes in the stock concentration may be encountered in an approach system. Basis weight CD variations are related to the uneven flow distribution across the paper machine. The CD variations of basis weight are influenced by the changes in the flow, speed or volume of a jet stream from a head box. The CD variations may come from changes in retention, cross flows in a wire section or in a gap former, or from changes in shrinkage.
- The variations of moisture and basis weight are dependent on each other, and the variations in one variable may be encountered in another variable. Starting from a press section, all following process sections may cause some MD variations of moisture. Most CD variations in moisture are caused by an uneven water removal in wire and press sections. Changes in evaporation in a dryer section may cause variations, and edges may dry more than the middle parts of a web.
- Changes in calendaring and a press section have influences on CD and MD variations of calliper, moisture and basis weight.
- Changes in dosing additives in an approach system may cause MD variations in ash content. Uneven coating may be a reason for CD and MD variations of coat weight content and basis weight.
- Colour MD variations are influenced by adding colorants and optical brighteners in an approach system. The changes in dosing may cause MD variations in colour or brightness. Uneven coating may cause CD and MD variations in colour and brightness. (Leiviskä, 1999)

The variations of paper quality variables are spread over a wide frequency area. MD variations due to different causes has been studied with the help of frequency analyses, and reported in several references, for example in Sell (1995); Cutshall (1997); Nissinen (1999).

2.2 Quality Measurement and Control Scope on Paper Machines

Paper product quality is definitely made on a paper machine. Basically machinery design of paper machines should lead to production processes where high product quality may be achieved, and few disturbances may occur. Major product quality variability and

process problems have to be solved by the redesigning of machinery. Minor variability could be attenuated partly by automation by using closed control loops.

A machine reel with values of characterising quality variables comes out from a paper machine (Figure 1). A paper grade in its quality variables includes CD, MD, and residual variations. When these quality variables are measured on-line by traversing scanners, sampled measurement data comes from a zigzag path. CD and MD components have to be estimated according to some CD and MD estimation models. CD and MD variations can only be minimised separately by different actuators of CD and MD control loops.

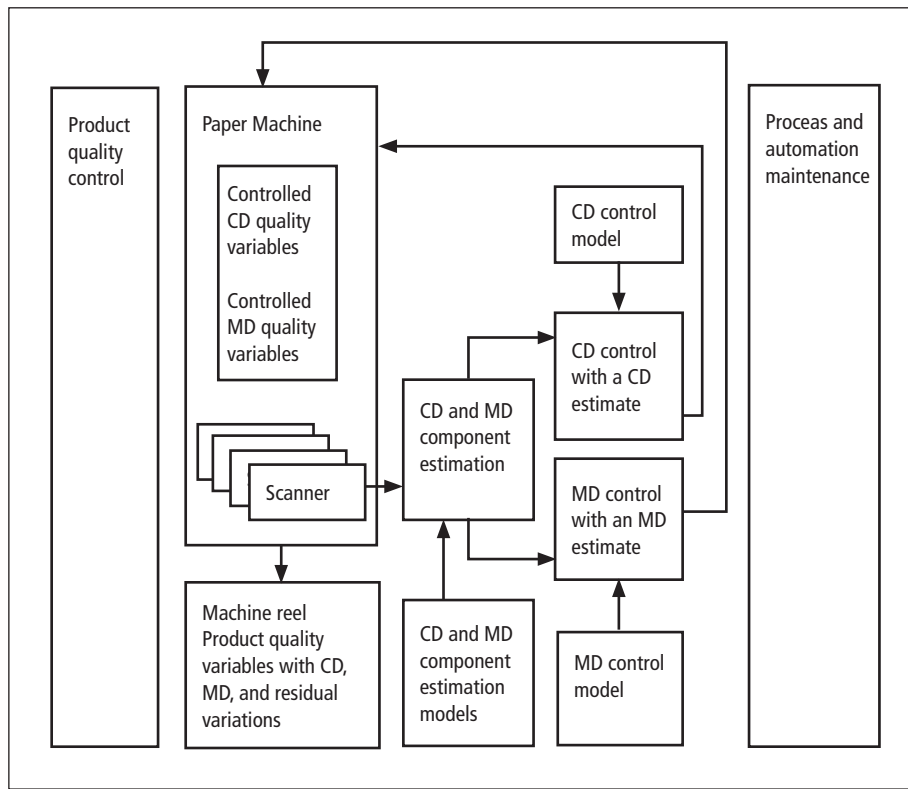


Figure 1. Product quality is made on the paper machine. Quality variables of a paper grade are measured on-line by traversing scanners. The measurement data is separated into CD and MD components which work as feedback estimates of closed CD and MD control loops. Maintenance activities affect the scanner measurements, the CD and MD component estimation, and the CD and MD control performance through the calibration and adjustment procedures.

2.3 Measurement of Quality Variables by Traversing Scanners

In traversing scanners, a scanner head contains sensor modules which record measurement data. A paper web travels through the scanner's frame. The movement of the scanner head on a web is a gently sloping zigzag path which depends on the speeds of the web and the scanner head (Figure 2). Due to a sparse measurement path, a scanner's ability to describe detailed periodic phenomena is limited. In commercial scanners the scanner head movement can be controlled, and there are the following common operation modes:

- In a scan mode, the scanner measurement head is traversing and recording measurements. The scan mode is a common operation mode. Some of the newest scanners may have adaptive scanning speeds and patterns according to operation conditions. Principally the scan mode thus consists of several sub-scan modes.
- In a standardisation mode, the scanner measurement head is outside the web. For example, every hour sensors are calibrated in an internal calibration. After the calibration the scanner may compensate for the effects of dust and aging in electronics by making the necessary adjustments automatically.
- In a fixed point mode, the scanner measurement head is not traversing. It measures real MD variations in a fixed CD position. The fixed point mode is mainly used for dynamic calibration purposes, together with laboratory analyses.
- In an off-sheet mode, the scanner measurement head is taken outside the web edges, and the sensors do not measure. In a web break, the scanner reverts to this mode automatically. The off-sheet mode can be called manually when there are some maintenance activities.

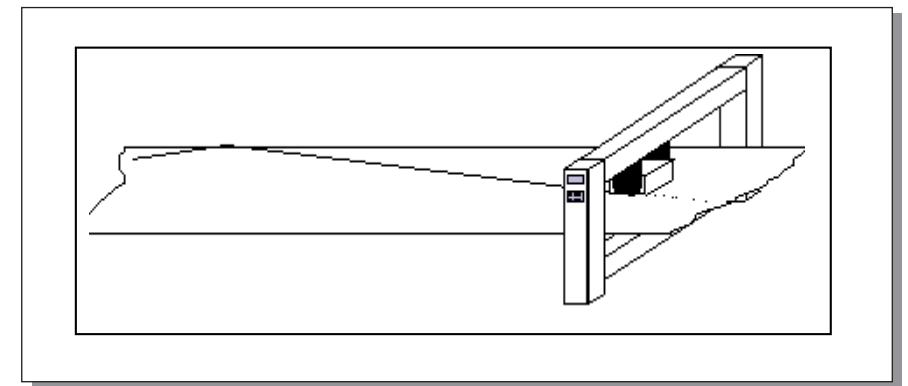


Figure 2. A traversing scanner consists of a solid frame and a traversing head with sensors. A paper web travels through the scanner's frame. In a scan mode, the scanner head moves on a zigzag path of a paper web, and its sensors are recording.

During a scan, measurement sensors record data which represents total variations of quality variables on a zigzag path. The measurement data of scans needs to be separated into components, and estimates for CD and MD components are computed. A scan data consists of single data box values. In modern scanners a typical sensing width of a data box is 5 - 10 mm in a cross direction. This sensing width may be considered as the measurement resolution of the scanner.

According to the terminology handbook (Smook, 2001) cross direction and machine direction profiles are, in general, visual presentations of scan measurement data, as follows:

- “A cross direction profile is a graphical presentation of a paper property as a function of sampling position across the machine. A profile can show single-point values, composite values, or mean values based on a number of measurements.”
- “A machine direction profile states the variation in property of a paper or a paper-board web along a straight line in the machine direction. The term is sometimes applied to the machine direction variation of the mean value of a property over the entire cross direction of the web, which more specifically is the machine direction mean profile.”

In the control room visualisation, profile estimates are often combined with mean values. An example of a single basis weight CD estimate profile related to its mean value 63.3 g/m² shows some variation (Figure 3). The variation of the CD estimate profile is expressed as a 2-sigma value (2sig) 0.8 g/m² (two times a standard deviation). The maximum and minimum values of this CD estimate profile are 64.6 g/m² and 62.0 g/m², accordingly. The pre-sented profile is a filtered CD estimate.

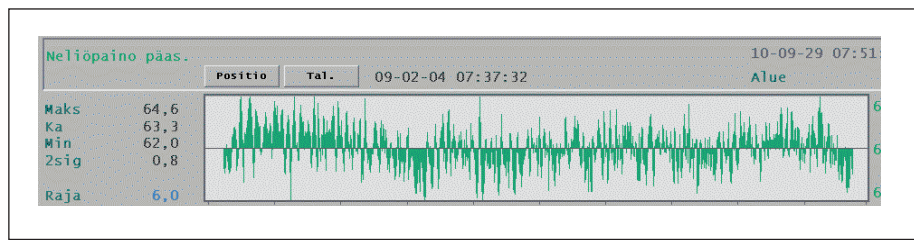


Figure 3. A filtered CD estimate profile of basis weight with its variation is presented in the human-machine interface of a QCS. The minimum and maximum values of basis weight and the variation as a 2-sigma value are presented in numbers, as well.

In modern QCSs total variations of quality variables may be presented by 2-dimensional profile maps. As an example, about 500 pre-processed CD estimate profiles of basis weight are presented as a profile map (Figure 4). The profile map consists of measured scans, and colour variations show the variations of basis weight. This example shows very little variability. Averaged CD and MD estimate components of the sample are shown, as well.

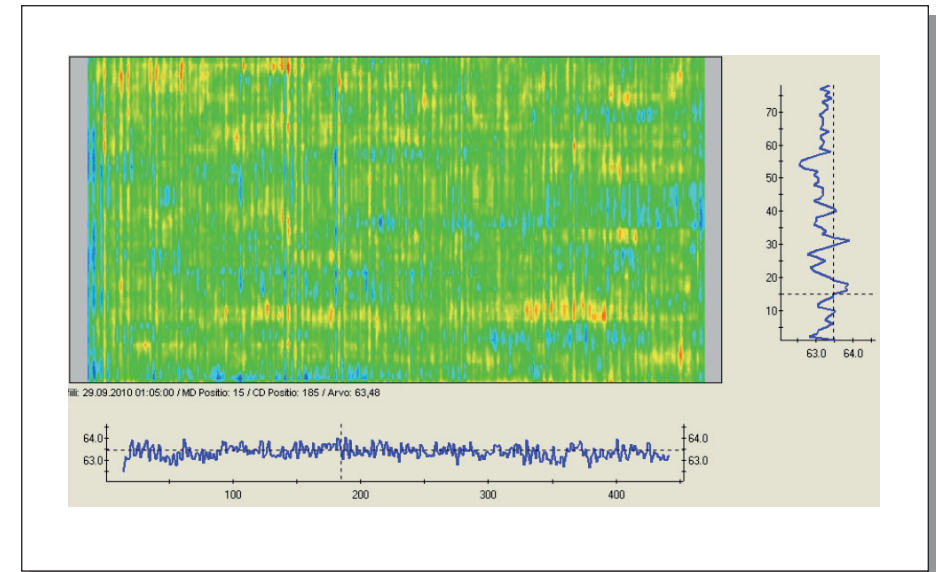


Figure 4. This 2-dimensional profile map shows a total variation of basis weight measured on-line by a traversing scanner. The variation of basis weight is expressed in colours. The averaged CD estimate profile is on the right side of the profile map, and the averaged MD estimate profile under the profile map.

2.4 Challenges in On-line Measurement and Control

CD and MD estimation from the measurement data of traversing scanners is imperfect. There have been several trials to improve these estimation methods during the last 25 years, such as presented in Wang et. al. (1993). Shakespeare states that a perfect CD and MD estimation from the measurement data of traversing scanners is not possible at all (Shakespeare, 2001). Generally, it would be ideal when all quality variables could be measured on-line in a whole web width. There are efforts of system suppliers to develop whole web-width measuring devices: An infra-red-based moisture measurement frame with several 100 mm traversing heads is presented in Mattila (2005). A fast moisture measurement traversing in separate rails has proved to be successful, when a web crossing needs only a few seconds (Baker et. al., 2008). At the moment, most quality variables have to be measured on-line by traversing scanners because whole web width measuring devices are not available at a reasonable price.

Basis weight, moisture, calliper, ash, colour, gloss, and fibre orientation can be controlled automatically in machine direction with closed control loops. MD control loops aim to keep set point levels and minimise long-term MD variations. There are several challenges in MD control loops. Periodic measurement principles of traversing scanners and remote actuator positions from measuring devices imply in the MD control loops long time delays, even minutes. Responses to changes are slow, usually several minutes. In addition, there are often strong interactions between several controlled variables. Thus multivariable and pre-dictive control strategies are needed.

Basis weight, moisture, calliper, coat weight and fibre orientation can be controlled automatically in cross direction with closed control loops. CD control loops aim to minimise spatial, cross direction variations. CD control loops are large-scale multivariable control loops with hundreds of controlled variables and dozens of manipulated variables. Aliasing effects of scanner measurements may cause problems in CD component estimation. When there are MD variations near scanning frequencies, MD variations may show up in on-line scans. In those circumstances CD control loops may work with aliased measurement data.

3 Calibration Procedures of Quality Control Systems

In addition to raw materials and process machinery functionality, final paper and board properties are highly dependable on the functionality and performance of quality control systems and their professional use. Practical calibration procedures of quality variable sensors are called for.

In calibration procedures, sensors of scanners are calibrated with respect to some reference standards. A calibration result may be expressed as a statement, a function, a diagram, a curve, or a table. In paper mill practices, sensor calibration procedures can be classified in three main categories: firstly short-term internal calibration, secondly mid-term dynamic calibration and thirdly long-term accredited field calibration.

3.1 Internal Calibration

Internal calibration refers to sensor technology calibration. This internal calibration implies that in a standardisation mode of a scanner, the scanner's sensors are calibrated internally, for example, on an hourly basis. QCS suppliers often use a slightly misleading term "standardisation" when they refer to this internal calibration. Due to varying dust levels of sensor windows and aging of electronics, there is need for frequent internal calibration.

An internal calibration cycle is performed when a scanner is in a so-called standardisation mode. In this mode, a scanner measurement head with sensors is moved outside the web. Each sensor performs its standardising procedure by using its internal reference samples, or other calibration methods. Some sensors, such as basis weight and ash sensors may be calibrated against foil sample standards which are included in the sensor electronics of the scanner measurement head. Internal foil standards have high manufacturing requirements, but nevertheless they are generally not fully traceable as reference standards. These internal foil standards are provided by scanner suppliers or specialised suppliers.

3.2 Dynamic Calibration

Dynamic calibration deals with calibration of scanner measurements against sample parameters analysed in standard test procedures, for example, on a weekly or a monthly basis. These standard test procedures are accomplished by single analysers, laboratory analyser robots or profilers in quality control laboratories. Many mills rely on standard test procedures as practical reference standards. Measurement data from reel strip or punched samples is used. This kind of dynamic calibration is often called the definition of dynamic correlation. Dynamic correlation principally describes the conformity of on-line and off-line measurements. On-line data is recorded in a QCS and off-line data comes from the laboratory analyses of the same samples. TAPPI, SCAN, ISO and related standards give basic guidelines for these laboratory analyses. Dynamic calibration is especially needed when sensors are changed, or when basic signal levels of sensors have to be verified.

In a dynamic calibration procedure, several indeterminate errors may occur such as differences in work practices of various operators, changing conditions in a laboratory, variations in QCS sensors, poor sample handling, variability of laboratory instruments, dust levels of sensor windows, or misalignment of cut samples compared to on-line recordings, for example.

In mill practices, we suggest the following main guidelines for a dynamic calibration procedure:

- We should provide operators with exact instructions for sampling. Every operator should carry out the sampling procedures in exactly the same way.
- The location of an on-line measurement should be chosen from a feasible part of a web width. Two independent sample locations are chosen.
- We should provide testers with exact instructions for quality control laboratory analyses. Special care is needed with samples for moisture analyses. Paper samples may have an increase or decrease in moisture if conditions change.
- Analysis equipment should also be calibrated.
- Dynamic correlation is expressed by the correlation of on-line measurement data and off-line laboratory analysis data. 15 to 20 reliable off-line and on-line results from different reels are chosen for the correlation analysis.
- Final dynamic correlation results may be given in terms of deviation mean values and 2-sigma values, or by correlation curves and coefficients. The correlation results are documented in an information database of a mill with the data including the date and time of sampling, the reel number, the paper grade, and the tester's name.
- When there are significant deviations between on-line and off-line measurements, QCS maintenance and production teams should be informed.

In a study case, dynamic correlation is expressed as a correlation graph (Figure 5). Two different analysis combinations for paper samples (SensAvg and NewSens) are presented. Averaged values of paper samples from an on-line quality control system and related analysis results of the same paper samples from a quality control laboratory are compared. In this case most sample values practically meet the regression line, or are near it. Thus on-line and off-line values correlate very well, and the correlation coefficient is 0.9950, almost 1. In this case, there is no need for sensor adjustments.

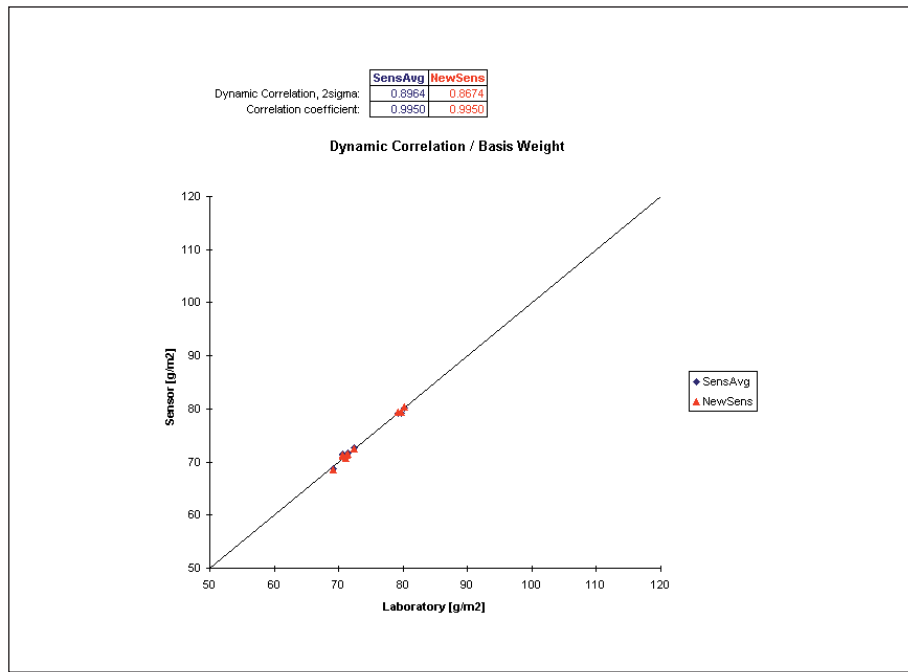


Figure 5. Dynamic correlation of basis weight is given as a correlation graph. On-line values from a QCS are defined by the Y-axis, and related off-line values from laboratory analysis results by the X-axis.

3.3 Accredited Field Calibration

Accredited field calibration is mainly used in long-term auditing processes. In the accredited field calibration scanner sensors are calibrated against traceable foil sample standards in production circumstances. Basis weight sensors may be calibrated against foil sample standards in a static calibration, in a calibration laboratory which has a national accreditation for its traceable foil samples. A field calibration procedure for basis weight in production circumstances may also be traceable. In the field calibration procedure a scanner is in the off-sheet mode and the scanner head with its sensors is outside the web. Separate traceable foil sample standards are installed between the sensor heads

and the output readings are recorded. On-line sensors are thus calibrated against traceable foil standards in production circumstances but not in a scan mode. Some specialised suppliers manufacture traceable foil standards and develop field calibration procedures which are nationally accredited. (FINAS K033, 2006)

3.4 Adjustments Based on Calibration Procedures

When a QCS in its internal calibration procedure notifies that there are significant deviations in sensor readings compared to internal references, it may perform automatic adjustments to signal levels. These automatic adjustments are not available for all sensors because there are no suitable references available. The adjustments according to internal calibration are compensating for varying dust levels of sensor windows and compensating for aging of sensor electronics. Nevertheless, with some paper grades, even daily manual cleaning of sensor windows may be necessary.

The dynamic calibration procedure compares on-line measurements from QCSs to off-line analysis results from quality control laboratories. When there are significant deviations of on-line and off-line measurements based on dynamic calibration procedures, there may be a need for manual sensor adjustments. In mill practices, we suggest the following main guidelines for sensor adjustments:

- The previous sensor adjustment date is checked.
- The calibration status of the scanner is evaluated from the standardisation reports of the QCS.
- The correlation of external sample results or field calibration results, and on-line results is checked, if possible. Is there a significant deviation?
- A decision about a possible change is made. Production teams are informed. Changes are made in cooperation with production teams.
- Necessary adjustments to sensor slopes and offsets (product coefficients) are performed manually according to exact instructions and QCS manuals. Often a single set of product coefficients applies to all paper grades of a paper machine. Sometimes a set of product coefficients works for an entire family of paper grades.
- Did the process change? Did the sampling process change? Did the laboratory testing change? Did the sensor correlation curve change? The results of adjustments are verified by a new correlation procedure.

4 Conclusions

Paper quality control has to be done on paper machines which are rather complicated, multivariable processes. In addition to raw materials and machinery, quality measurement and control technology of machines plays an important role in product quality management. The condition of QCSs and widely used traversing scanners significantly affects on-line quality control.

Traversing scanners with plenty of electronics and signal processing need a lot of care. Regularly updated preventive maintenance programmes are called for. Advanced calibration of measurement technology is needed. Short-term internal calibration takes care of frequent sensor checking, and related sensor adjustments are performed automatically if they are necessary. Mid-term dynamic calibration considers a wider scope. In addition to technology, professional skills and qualifications are taken into account. The dynamic calibration procedure will work for quality control when there are high working disciplines, and easy cooperation of production, maintenance and quality control teams. The sensor adjustments based on the dynamic calibration procedures have to be performed manually by QCS maintenance teams with the agreement of production and quality control teams. The long-term accredited field calibration aims to fully traceable calibration procedures, and it exists for basis weight by now.

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8

Telework type of work organisation and the structure of Intellectual Capital in two modern Finnish companies at the beginning of 3rd millennium

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Abstract

The format of standard accounting model in companies is ca. 500 years old and based on material, tangible, wealth. The concept of Intellectual Capital (IC) was introduced in 1969 by Kenneth Galbraith. He considered IC as a dynamic but not visible matter, which is connected with the accumulation of value. The idea of IC is to describe the whole, real value in a company, that is: generate the complete asset by combining material and immaterial wealth.

There is no holistic definition of IC. The focus lies in studying the functions and impacts of various factors within intangibles. Many companies have built Intellectual Capital Accounts of their own. When the knowledge intensity increases in economy, it is all the more reasonable to study the functions of organisations by using IC-theory in connection to the work organisation. The nature of talent, actions, strategy, resources and the needs of the customers define the substance of IC. Therefore, every workplace should estimate its own IC-model.

Telework refers to the formulation of working environments and working time by using information and organisational technologies. It is reasonable to understand “work place” in four dimensions; as a physical, social, virtual and mental working environment. The first three are conceptual environments in which the production of ideas and thoughts can be supported in mental – individual and shared – consciousness. Telework comprises the use of human talent and motivation which is boosted with technology (Engelbart 1962) and synchronical and asynchronical time concepts. Telework as a model of work organisation is neutral. That is, from the economical or social point of view, the consequences of telework applications may lead to a positive or negative direction. Goals, business strategy, organisational applications and nature of management have an impact on these outcomes.

In two Finnish companies the elements of efficiency and drawbacks of telework were defined in empirical case studies. At the same time, the nature of telework was studied in concepts of business strategies and business environment. On the basis of this information, a theoretical and empirical telework related model of IC was generated. The main elements of this model are human- and structural capital. The latter is divided into customer and organisational capital. Organisational capital consists of innovation and process capital. Both the positive and negative elements of telework are demonstrated in this IC-model.

Great expectations notwithstanding

It has become customary to write that “despite great expectations, telework has not been realised in an anticipated manner. This refers to some estimates made in the 1980s and 1990s about the complete transfer of work from traditional workplace to home. Usually, such texts convey the intention that telework “did not succeed”. How should this be interpreted?

People live in a world of a series of changes, moving in different directions. At every moment, many ideas differing from or even contradicting each other are true at the same time. However, in their everyday flurry people expect to have just one, preferably simple, solution. It is the task of social scientists, especially those focusing on working life, to explain how ideas can appear to be contradictory and still be true at the same time. When describing the social world scientifically, one has to be careful in the fascination of research materials, scientific definitions and the results of previous studies so as not to be cornered by the uncomfortably complex “reality” that defines all categorical statements.

In the 1990s, it became common to start using computers to assist people’s work. The expansion of the Internet led to radical changes in the documentation, storage and search of information. At the same time, the information aspect of work became dominant, and all the more often the work tasks were related to creating and distributing information. The tasks no longer required much physical performance but they became psychologically more demanding.

Managerial employees especially suddenly had more alternatives as to where to do their work. Experts still have their desks and work stations but they also work at home, during conferences, at their customers’ facilities, whilst commuting, and even in their spare time while travelling or staying at their summer cottages. This is made possible by information technology tools and networks. In addition to the three-dimensional surroundings of our workplace, we also work in a social and virtual environment.

Employees now have the chance, even the responsibility, to be flexible about the place where they conduct their work. As early as 2004, 40% of Finnish employees occasionally worked outside their workplace, and 25% occasionally worked from home. The use of computer technologies no longer classifies workers. The forms of telework have become routine for managerial employees, and the practices are spreading among all levels of employee positions.

Usually, telework is seldom explicitly agreed upon by the employer and the employee and therefore it may appear “invisible”. The arrangements are unofficial and often based on expert autonomy, that is, the employees’ possibility to organise their work independent of the employer. The employees working from home or while travelling, do not consider themselves to be teleworkers, they are simply working in a convenient way. Also, the surveys determining the amount of telework on the basis of – missing – official and formal agreements, or a high number of teleworking hours, increase the invisibility of telework. The internal prerequisites and administrative decisions of such surveys significantly constrain the study which then fails to meet the quantity criteria. The lack of supporting survey reports has led to the conclusion that telework does not exist. Because of this approach, the unofficial or unidentified work arrangements pass unnoticed. As far as the social sciences are concerned, the situation is further complicated by the fact that the unofficial nature of telework is often a deliberate choice, and may have very interesting reasons. Therefore, it is essential to study the concepts of working time and workplaces in all their diversity.

After 25 years, the apparent forms of telework are quite different from the forecast made in the 1980s. There exists a wider variety of working hours and workplaces. The transi-

tion has not been into full-time home-based work, but into technologically, even organisationally, supported working environments. The expectations may have been great, but the changes in organising work were more extensive than expected. However, the expectations were not directed at the paradigmatical changes in the way people work. Therefore, they could not be met. This is why new hypotheses are needed.

Satu Ojala (2009) has conducted pioneering research in the field of “distributed work”, defined terminology and determined the relations between terms, and illustrated the dimensions in which the various forms of work are structured. One cannot help but agree with the statement she and Sullivan (2003) made: “The different forms of work should be assessed on the basis of the collected materials without preconceived constraints, and it is important to create and operationalise a framework for unprejudiced research.

1. The Concept of Telework

According to Glaser and Strauss, a concept is a structure of the conceived features. Evidence is a theoretical generalisation of the nature of a system. It forms the foundation for categories and describes the concept. The concept proper is unchangeable, although its essential characteristics may have different interpretations over time. It has its meaning which relates to time, more specifically, the theoretical-practical way of thinking in which it was created. (Glaser & Strauss; 1967, 23., compare; Björkegren & Rapp; 1999, 163.)

The definition and usage of the concept of telework is inseparable from the context. The content of the definition is determined by what the term telework refers to, for example, physical distance, varying working hours and places, or participation and presence in a work process. Scientists have used telework to generally describe context in its different stages. Telework, eWork, and presence refer to the idea of being present in a process which is progressing in different places. The core content in the organisation of telework relates to the facilitation of this participation, whether it emerges from an individual or organisational initiative.

Ignoring here the terminology relating to the history of the definition of telework, the term ‘telework’ itself and the concepts of eWork and presence can be given a common operative definition:

The concepts of telework, eWork and telepresence are considered as a whole to which the term telework refers. Telework seeks to create temporal and spatial arrangements to facilitate working methods that foster an innovative environment in order to produce knowledge. This may be done in physical, virtual or social platforms or spaces as long as they are used to support psychological or conscious individual or group processes to create knowledge. To this end, the physical, social, and technological factors of working and business environments should be interrelated in ways that improve thinking and innovating.

2. Knowledge Economy and Intellectual Capital

The concept of intellectual capital was first used by John Kenneth Galbraith in 1969. He considered it as a dynamic but invisible factor to which the accumulation of value in business applications re-lated. (Campbell & Grantham; 1998, 171.) There is no comprehensive definition of intellectual capi-tal but the term relates to the factors involved in the production of knowledge whose operative func-tions are interpreted in parallel.

Stewart regards information and knowledge as public commodities that can be used without being consumed. The number of users has no effect on the production costs. An item containing know-ledge is accessible within the limits of physical and economical realities but the knowledge the item conveys is not restricted by these limits. The use of knowledge is often controlled by the consumer, not the producer. Also, knowledge can exist in several places simultaneously. It can be divided but no longer returned to the sender. Knowledge is time-sensitive. It is valuable because it can be found in abundance and refined, and made more concise. The initial production costs of knowledge are usually high but reproduction and distribution is inexpensive.¹ (Stewart; 1997, 169-173.)

Knowledge as a product brings new qualities to business operations in relation to product develop-ment, distribution and production organisation. In the world of network co-operation, the roles of the producer and consumer are becoming more versatile. Nevertheless, it is still imperative to find rel-evant market or application areas for the produced knowledge, and the distribution of knowledge has its cost. Especially, customer-specific knowledge cannot be produced endlessly or without ex-penses. The production of knowledge may also be blown out of proportion resulting in what is called information fatigue when it becomes difficult to interpret and process information. Stewart also has admitted the problem of knowledge overflow (ibid. 130.) (Pekkola; 2002, 137.)

The criticism towards the so called new economy is founded in the relation between power and efficiency. Virtual organisations and markets offer an ideal environment to make the production processes qualitatively more flexible. However, control maintenance, lack of trust, and the problems in generating knowledge or the asymmetry of knowledge hinder virtualisation and the applications of telework. (Etzioni; 1977, Pekko-la; 1993, 97-100, 246-248, 255-258., Gareis & Mentrup; 1, 2001.). An attempt to solve the problem has been a network organisation where technology is used to im-prove internal flexibility and create long-term relations of trust. (On the e-Work Frontier...)

¹ Prior to the economic bubble of the millennium, the knowledge economy was sometimes viewed with hyper-optimistic expectations: Stewart claims that the principles of the tradi-tional economic theory did not apply to the knowledge economy. Demand and supply will not determine the nature of production through price mechanisms because the roles of the buyer and seller, or the producer and consumer are intermixed. Also, the logic of marginal utilities in diminishing investments is inapplicable to knowledge production. Rather, exces-sive production may increase the profits. Knowledge production has significant returns to scale, and its networking benefits will lead to better usability and higher market value as the number of users grows. The wide-spread usage of a production model based on knowledge production will lead to a standard to which the competitors are forced to adjust. (Stewart; 1997, 173-177.)a

How then could the operations of workplaces be modelled amidst the increasing knowl-edge inten-siveness? What are the strategies that are directed at the personnel and the organisation of work, and what are the trends that relate to intellectual capital?

3. Structure of Intellectual Capital

The facts pointing to the growing role of human factors in economy include, for example, virtual working spaces, networking operations partially based on social competence, flexibility expecta-tions, work processes based on independent and responsible consideration, and the transfer of supervisory functions to workers. (Suomi & Pekkola; 1999.) The theory of intellectual capital has aimed at explaining the significance of human and social factors in business.

3.1. Concept of Knowledge in the Theory of Intellectual Capital

Sveiby constructs his theory of intellectual capital upon the arguments about human nature and knowledge: people are the only active operators in business life, and they create the internal and external structure of business enterprises to manifest themselves. (Sveiby; 1997, 8.) Knowledge is a resource that will qualitatively grow and become more significant when shared. The production of knowledge is a synergetic process serving the customers' needs but also changing the system where knowledge is originated. (ibid. 22.) Sveiby regards knowledge as a process and describes information as compressed knowledge served to the customer. He emphasises the significance of competent customer-oriented networks of employees in the production of knowledge and core business operations. (ibid. 24-28.)

Sveiby refers to Shanon's (1959) theory of the entropy of information and views knowledge as non-entropic by nature. The contents of information are defined by the recipient, not the sender². He considers information significant only if it is part of the knowledge forming process. There are many ways to deliver knowledge by means of task performance, and according to Sveiby, the administra-tive and expert approaches differ from each other. The bitter "power struggles" are often an element of a knowledge-intensive organisation. (Sveiby; 1997, 40-50.)

² Sveiby even goes as far as to describe information as meaningless and of low value.

Sveiby says knowledge is tacit, referring to the uniqueness of the search of profound knowledge, the dual character of knowledge as a public and private entity, and the attachment of knowledge to prevailing practices. He describes knowledge as a socially constructed phenomenon manifested in the language. (ibid. 30.) On the other hand, Stewart emphasises the contextuality of knowledge. It is useless unless it relates to an existing strategy. (Stewart; 1997, 70.) Sveiby regards competence both as an individual and socially related quality, and defines knowledge as an ability to function. Competence may lead to expertise manifested in creating one's own rules of operation, and breaking conventional norms. He regards knowledge as an individual operative hierarchy developing from an ability to competence, and further to expertise. (Sveiby; 1997, 29-39.)

3.2. Knowledge Production Paradigms

Sveiby claims that work and production can be organised according to an industrial model based on the utilisation of “materialistic” instruments. In the evaluation of knowledge-intensive organisations, this mainly refers to the paradigms related to informatisation and knowledge production. (Sveiby; 1997, 130.) (Figure 1.) In informatised production, knowledge is a by-product, whereas within knowledge-based strategies knowledge and knowledge-production are sold as an independent process. In his discussion about the instrumental value of knowledge in the generation of operations, Sveiby summarises the elements of knowledge control as follows:

Knowledge is the capacity to act	Knowledge cannot be controlled – only the space where it was created	Information is knowledge made visible
This ability increases when it is used	Shared knowledge is doubled knowledge	...but a major portion is lost in conversion...
People have an infinite ability to create knowledge	The sharing of knowledge is based on trust	The benefits of information are dependent on the use of knowledge

Figure 1. The Principles of Knowledge Control (Sveiby; 1 Sept 2000.)

3.3. Intellectual Capital And Knowledge-Intensive Organisation

The principles of the accounting system are 500 years old, and the balance sheet model currently in use was introduced in the 1860s. According to Stewart, it is suitable for the evaluation of industrial companies and the monitoring of the visible balance sheet. However, it fails to recognise several other value-creating factors. In knowledge-intensive organisations, the traditional balance sheet is rendered irrelevant because the production costs are generated by research and development, human capital, and services. (Stewart; 1997, 58-59.) A Danish survey concluded that the benefits gained by evaluating intellectual capital relate to the identification of the actual resources, the possibility of different parties to assess the company strategy, and the increase of the company's market value and the investors' interest. (Intellectual Capital Accounts.)

Stewart cites Klein and Prusak's definition of intellectual capital as being “intellectual material that has been reached and attached to a product in a value-adding way”, and describes intellectual capital in this way: Intelligence is converted to a resource when freely moving intellect is usefully organised. This requires that it is given a structured form (mailing list, database, agenda, process description); it can be described, divided, utilised, and attached as a part of something that could not have existed if knowledge had been left scattered. Intellectual capital is compressed useful knowledge. ³ (Stewart; 1997, 67.)

Human Capital

Human capital aims to bring innovations to an organisation, and it is manifested in products and services whose production should be promoted by the business process. Stewart is well aware of the twofold nature of the way human capital grows. On the one hand, an organisation increasingly uses human competence, on the other, people gain more knowledge than the organisation needs. In order to better utilise people's knowledge, the company should develop methods to make private knowledge common and tacit knowledge explicit. (Stewart; 1997, 86-89.) ⁴

³ Cf. Intellectual capital is the command of such knowledge, applied experience, organisation technology, customer relations, and competence that provide Skandia with a competitive edge on the market. (Edvinson & Malone; 1997, 44.)

⁴ Stewart also manages to problematise the importance of education. He notices that there is a varying significance of educational strategies among the personnel categories, and a general irrelevance of education. According to Stewart, the relationship between human capital and education should not be assessed based on the variety of knowledge elements but the capacity it creates for innovation production. (Stewart; 1997, 93-95.)

Structural Capital

Stewart signifies the importance of the company and context in the production of knowledge. The knowledge necessary for business operations can be created in an environment where the motives of structural capital development are constituted by quick distribution of information, the growth of collective knowledge, quicker management level decision making, and the growth of employees' productivity. From the customer's point of view, it is important to organise the resources and flow of information. Information networks can help achieve this goal by establishing bulletin boards, discussion forums, www-systems, and educational programmes. Stewart claims that the accumulation of information and wisdom produces knowledge and is, per se, a significant economically beneficial factor. The information networks enable a quicker and more extensive distribution of expert knowledge, and they support worldwide operations. (Stewart; 1997, 108, 110-113, 124.)

Stewart views structural capital as a substance of economic operations. Also, he considers an excess of information as the greatest problem in controlling the structures, and warns against making unreasonable investments in knowledge. By this he means that discrete pieces of knowledge and expertise should not be stored within an organisation unless they are structured in a way that utilises their integration and synergetic qualities, and benefit customers. Intellectual work is rarely routine since the transactions are unique. It is impossible to predict exactly what kind of knowledge should be obtained. Intellectual capital serves two purposes: it can codify the transfer of knowledge resources and, on the other hand, it can link people to data, experts, and knowledge producing units. (Stewart; 1997, 128-132.)

Customer Capital

The most important aspect of customer capital is networks that are aware of the customer's needs. (Stewart; 1997, 144-145.) It is sensible for organisations to establish electronic platforms for mutual contact in order to support the quick distribution and growth of information. Stewart regards the empowerment of customers, provision of individualised service, and profit sharing as business strategies. These strategies can be achieved if all the complementary functions of organisations co-operate in the shift from pure buy-sell operations to operative co-operation. (Stewart; 1997, 149-161.) (Figure 2.)

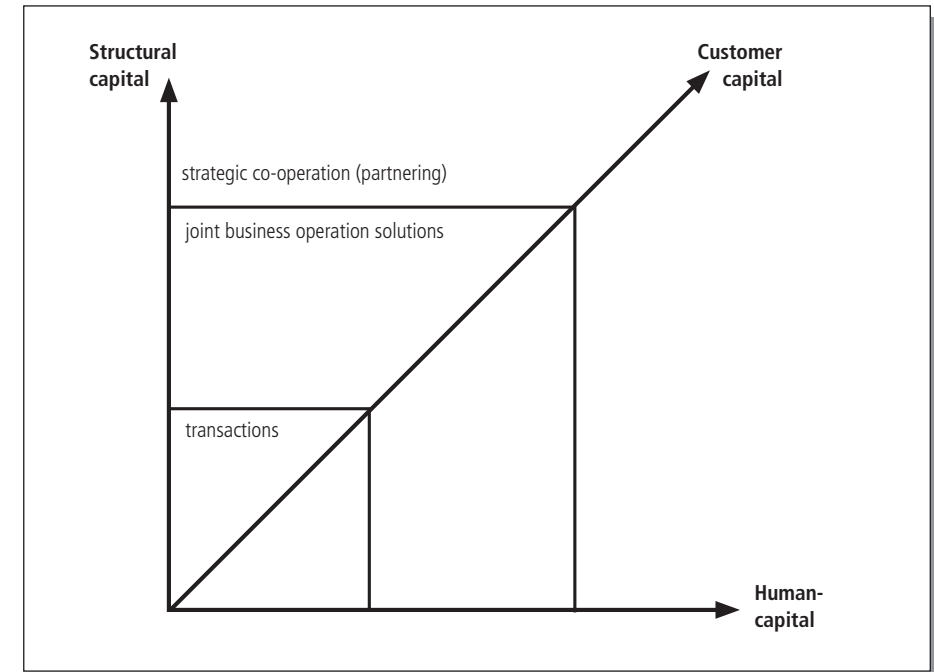


Figure 2. Integration of Business Operations as Intellectual Capital Functions (Stewart; 1997; 158.)

Intellectual capital consists of human and structural capital. The management is responsible for integrating the products of human capital into structural capital. In contrast to structural capital, human capital cannot be owned by a company. By evaluating and developing intellectual capital, a company seeks to improve its market position. Skandia limited considers intellectual capital, alongside values and technology, to be one of the three major factors facilitating development into an intellectual organisation. (Edvinsson & Malone; 1997, 45-48.) (Figure 3.)

⁵ The article by Campbell and Grantham (1998) is an exception. Despite the title, it relates to the general discussion on the theory of intellectual capital and the operational abilities of a company. The article concludes with an emphasis on the importance of customer relationships.

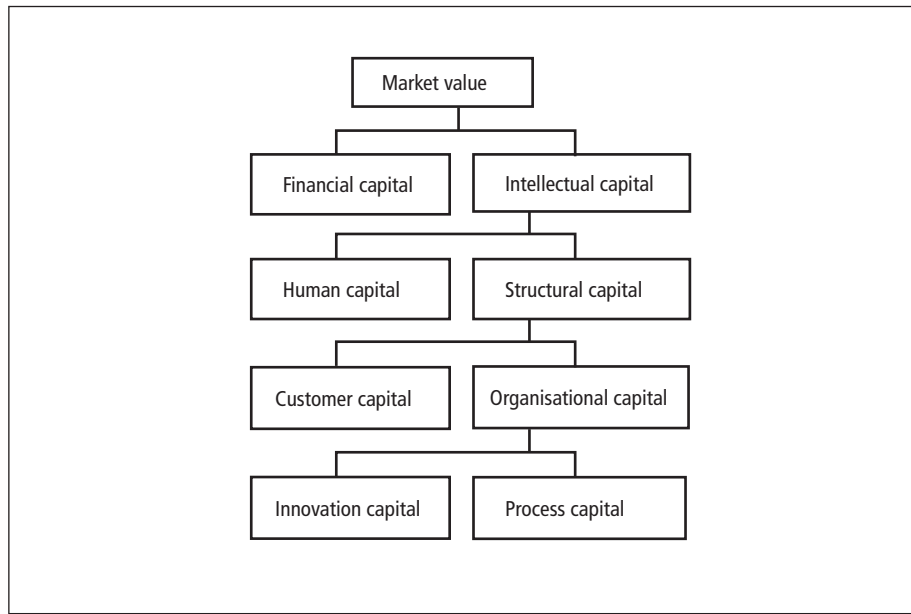


Figure 3. Value Description Model of Skandia (Edvinsson & Malone; 1997, 52.)

4. Intellectual Capital and Telework

The discussion on intellectual capital (IC) relates to telework especially concerning knowledge control. Sveiby's notion of focusing on the space where knowledge is created refers to the conceptual organisation of operations and work. Telework can be regarded as a special case of this approach. Structural capital contains the technological equipment and systems that enhance operations. In part, telework is based on information technology, thus the special features of information systems can be utilised. A third common interest for telework and customer capital is the platforms for mutual contact between organisations. The maintenance of customer relationships is said to be a particularly emphasised motive for telework.

In early literature concerning intellectual capital, there are only few references to telework, or any other unorthodox form of work organisation.⁵ Personnel is seen as operationally positioned, and the tensions between the personnel categories are regarded as static elements dictated by the organisational structure and professional competence. (Sveiby; 1997, 53-63.) This approach makes it difficult to realise the opportunities for change. The analysis of the nature of intellectual capital is affected not only by social issues, but also aspects concerning ethics. (Koskinen, 2000, 80.)

The problem with IC framework of reference is the lack of focus on operational spaces. Apart from Sveiby, at the beginning of the millennium there were no studies into the nature of work in a virtual or conscious space, or into the concept of time as an organic process factor.

The efficiency factors of telework are essential qualities of structural capital. They are related to the internal structure of the organisation, customer relationships, and operations in the chains of added value. Knowledge does not exist irrespective of space (Stewart; 1997, 171) but is manifested in mental space. This enables the processing of knowledge in virtual, physical and social spaces.

Intellectual capital is in relation to the production of paradigmatic change. Innovation is a change in the way people think and act. The organisation of work on the basis of virtual and mental space promotes the organisation's ability to produce innovations and wide-ranging conceptual changes that, in turn, will help adjust to the chains of added value and create networks. Telework is a way to enhance the production of innovations and ideas with added value.

As a form of work organisation improving and facilitating task completion, telework should conform to the methods intellectual companies are using. According to the theory of IC, knowledge production should be escalated within the organisation, especially in the customer and strategic partner networks. As far as it is understood as eWork, or work in the networks, these activities are extremely relevant in respect to telework.

5. Intellectual Capital and the Benefits and Disadvantages of Telework

Telework is a neutral form of work organisation. Its applications may be either beneficial or disadvantageous with respect to the employees, the organisation or environment. From the perspective of business operations, telework serves as a means of adaptation to the frequent changes in the organisation and environment. In Finland, an essential element of telework is that workers take responsibility for their task performance and become their own supervisors. Telework enables the choice of an innovative undisturbed work environment, the use of physical and virtual spaces, and the utilisation of network applications. The most significant benefits of telework relate to individual working practices, the organisation of workplace and working hours, and the combining of work and personal interests. (Pekkola; 2002, 232-236.)

The major disadvantage of telework is the increased number of working hours. Typically, this occurs when the personal responsibility or supervisory functions, and the lack of control from within and outside the organisation lead to changes in standard working hours. (Aitta; 2000, 156-157.) Another disadvantage for managerial employees might be the general increase of quantitative labour market flexibility. Also, a potential problem

arises if telework and its output share are not agreed upon by contracts. Other disadvantages are considered minor, although they are significant at an individual level.

When the benefits and disadvantages of telework are placed within the framework of the theory of intellectual capital, the focus is mainly on innovation and process capitals because the benefits are primarily obtained by individual employees. When work is organised in the forms of telework, it usually occurs independently of the company's or organisation's business strategy. The efficiency factors of telework are not absolute but relate to the nature of the business strategy and the developing stages of product and process innovation. Basically, the more comprehensive and integrated the policy of telework is, the more beneficial it will be. Fundamentally, the efficiency factors are associated with promoting human activities.

At an individual level, the benefits obtained in the area of innovation capital become apparent in the pacing of work and in the utilisation of suitable working environments. The production of innovations and ideas with added value is supported by expanding task processing and eliminating disturbances. Disturbances include the norm to increase working hours, the blurring of working and free time, as well as the quantitative labour market flexibility concerning expert positions.

The sphere of process capital includes the independence of work, decentralisation of work organisation, flexible use of human resources, the increase of employee input, and the utilisation of technological efficiency factors. A disadvantage is the potential friction among employees.

The benefits of organisational capital include, for example, the principle of emphasising the quantity and quality of the performed tasks, and the utilisation of employee and even customer premises. Potentially, the lack of sufficient negotiation and contract practices in respect to telework may cause problems.

In the sphere of customer capital, benefit is gained by maintaining customer orientation in telework, and directing operations towards value chains. Networks may contain parts that are common to several organisations, which is typically beneficial for teleworkers.

Benefits provided by the sphere of structural capital include the adaptation to organisational changes, utilisation of network applications, and temporal and spatial adjustability of work processes. However, the use of networks is constrained by the costs.

Human capital enables an extensive use of human resources and the combining of occupational and personal responsibilities through telework. Employees can choose not to commute or travel in business and thus reduce their impact on business expenses and environment, as well as rationalise their working hours. (Figure 4.)

Irrespective of formal status, lower white collar employees can innovatively organise their work through professional development. This is especially beneficial for female workers. (Cf. Sveiby; 1997, 53-63.) On the other hand, this also relates to the use of human capital or how competence is utilised and increased in the sphere of organisational capital, and in the processes and innovations closely associated with it.

The efficiency of telework is dependent on the distribution and production of new knowledge and innovations. Participation in a social process enables participation in a higher number of more diverse processes than would be otherwise possible. It also makes it possible to select the suitable processes and people participating in them. Telework offers tools for co-operation with several other people, while providing an environment for undisturbed individual concentration. The organisation of work facilitates concentration on individual and social levels. Efficiency at work equals to being present in a social structure in such a way that more space is created for individual and shared thinking. Produced efficiency is a process innovation.

In terms of intellectual capital, telework requires that the structure of the working spaces must support the production of ideas and innovations. The relationship between human and structural capital is essentially important. The elements of structural capital must enable the realisation of human capital. Human capital is not an independent part of intellectual capital, but the functions of human capital, such as education and well-being, become apparent in the ways human capabilities are expressed (present) in work processes, whether within an organisation or in relation to customers or other external actors. Finally, innovation and process capitals are derivatives of organisation and customer capital.

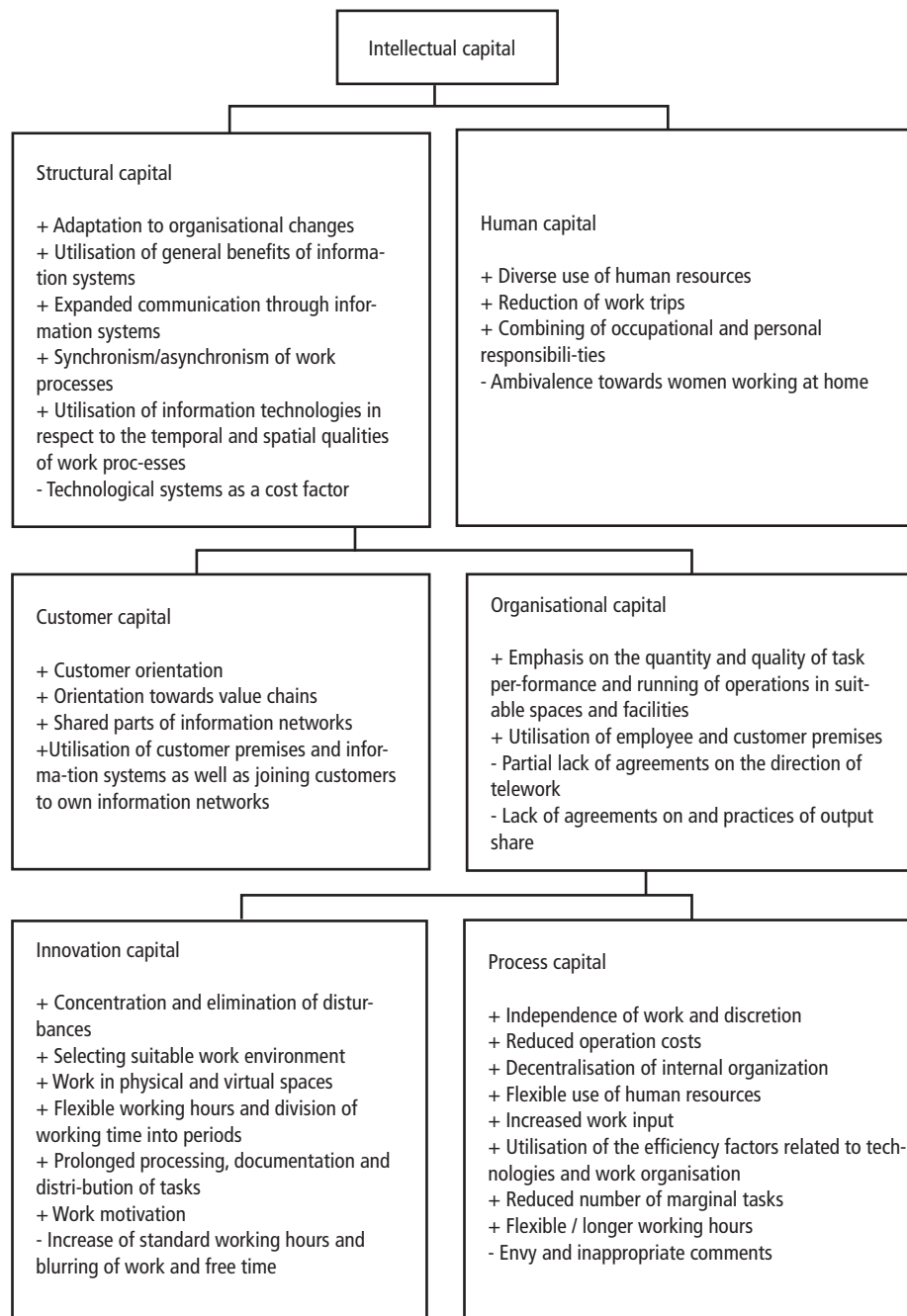


Figure 4. Intellectual Capital And the Benefits And Disadvantages of Telework

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