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Abstracts

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Dear Participants

We cordially welcome you to Helsinki and to our symposium *Activity2008*. The idea for this symposium emerged at the IEA2006 Congress in Maastricht, where we had a rousing one-day symposium on Activity Theoretical Approaches, arranged by Pascal Béguin, Chair of the IEA Technical Committee ATWAD. In Maastricht we concluded that activity theoretical approaches may enrich ergonomic viewpoints especially with view to the changing and increasingly complex work life.

We observe numerous contradictory phenomena in today's work as well as an increase in certain problems related to well-being at work. It seems obvious that the traditional model of *analysing present work – setting objectives – finding solutions – implementing new solutions* for improving work life is no longer adequate. Changes in work life challenge us to re-examine the meaning of the word *development* and our opportunities to promote well-being at work. What are our premises, theories, methods and practices in finding and unfolding new and unknown possibilities? Although ergonomists and human factor specialists have been successful in improving work life using versatile and participatory methods, it seems clear that the complexity of recent transitions in the realm of work require reshaping of our theoretical and methodological solutions.

One manifestation of the quest for new approaches is the large number of papers on the theme of intervention in this symposium. More than half of the abstracts to this symposium were sent under this topic. In this symposium, intervention is no longer seen only as an implementation process – albeit a participative one. It is considered as a process of joint knowledge and solution formation between different actors. Interventions as processes of analysing the proximal development of individuals or work activity constitute good occasions for gathering research data. In the course of this symposium, we will be able to learn more about a great variety of intervention processes.

Traditional ergonomics, design, and risk management are not dealt extensively in this symposium. Yet, these traditional themes are also challenged by workplace change. Our traditional understanding of continuity, stability and well-bounded work organizations is no longer accurate. By contrast, work life seems to be affected by an ever-increasing temporal and spatial discontinuity. In this context, what is the meaning of proper design or an integrated risk management process? Several papers address these issues.

In this symposium, two concepts are central: *work* and *activity*. We wish to encourage scientific debate between the participants on these two general and broadly-used concepts. We hope that the symposium days will offer a fruitful platform for discussions and produce new collaboration between researchers and practitioners with the aim of further developing work life.

On behalf of the Organizing Committee Kirsti Launis Team Leader, Work Development Team Chair of the Organizing Committee

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General information

Organizers

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Keynotes

Changing work through IT design: reflections upon participatory design

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In Scandinavia, research projects on user participation in systems development date back to the 1970s. The projects emphasized active co-operation between researchers and workers in the organization in question to help improve their work situation. In the Utopia project, the major achievements were experience-based design methods developed through the focus on hands-on experiences, emphasizing the need for technical and organizational alternatives. In recent years, it has been a major challenge for PD to embrace the fact that technology is no longer used as isolated systems in well-defined communities of work. At the dawn of the 21st century, we use technology at work, at home, in school, and while on the move. The keynote will discuss how participatory design and the IT instruments and alternatives developed have been used in the change processes at work. Moreover, it will elaborate on possible ways of responding to these new challenges.

Computer use is changing quickly, perhaps more quickly than they have done in the past. Use contexts and application types are radically broadening. Technology no longer consists of static tools belonging only to the workplace. They present users with the possibilities of working 24 hours a day, 7 days a week, while on the move, at home and in the public space. At the same time as work technologies permeates the boundaries between the workplace and human life in general, other technologies seem to expand from home life and leisure into the workplace. Text messages is a classic example and blogs a more recent one.

In Scandinavia, research projects on participatory design, cooperative design, or user participation in systems de-velopment, date back to the 1970s (Bødker, 1996). The Norwegian Iron and Metal Workers Union (NJMF) project took a first move from traditional research to working *with* people, directly changing the role of the union clubs in the project (Ehn & Kyng, 1987), and in general, the tradition has developed strategies and techni-ques for workers to influen-ce the design and use of compu-ter applica-tions at the workplace. These projects have emphasized the active co-operation between researchers and workers of a particular workplace to help improve their work situation. While researchers got their results, the people that they worked with were equally entitled to get something back; in the projects often this was learning and design method.

Methods for involving end users in all phases of design and development of IT support for their activities were in focus with the seminal Utopia project. The Utopia focussed on quality of training, technology and work in newspaper production. It promoted the connections between quality of work and quality of product in newspaper pre-press production, collaborating with graphic workers in all of the Nordic countries through their joint union. The major achievements were the experience-based design me-th-ods, developed through the focus on hands-on experi-ences, emphasizing the need for technical as well as organizational *alternatives* (Bødker et al., 1987). Graphic workers were involved in building new technology and the project invented methods such as low-tech prototyping, workflow wallpapers, and work organisation toolboxes (Bødker, Ehn, Kammersgaard, Kyng, Sundblad 1987). The Utopia project, furthermore, demon-strated the potentials as well as problems of working with one group of workers (printers and typographers) in a world (of newspapers) where also other groups, e.g.

journalists, as well as management have significant interests.

Since then the participatory design methodology has developed, (Bødker, Ehn, Sjögren, Sundblad 2000), and been complemented with a battery of other methods into strategies for involving users for better suited IT support, e.g. scenarios, video prototyping, vision games, and overall process design, e.g. Cooperative Experimental Systems Development (Grønbæk et al., 1997) which combined iterative cycles of general development of technology, and specific participatory design cycles in the two empirical settings, or MUST (Kensing et al. 1998) which provided an industrial method for the early phases of design.

As IT applications expands from the workplace into everyday life in general, participatory design in the Scandinavian tradition is now also used for home and leisure IT applications and for everyday communication situations. These domains move the methodological and conceptual focus towards culture, emotion and experience (McCarthy & Wright, 2004). However, as pointed out in (Bødker (2006)) this way of thinking often seems to be defined as the negation of work. In some instances this has led to a total, art-focussed breakdown (Dunne & Raby, 2001) without much commitment to the actual users of the technology (Fiore, 2004); away from a commitment to users towards a more exploratory take-it-or-leave-it approach where designers seek inspiration from use, e.g. through cultural probes. (Bødker, 2006) discusses how participatory design may embrace people's whole lives and transcend the dichotomies between work, rationality, etc. and their negations. I further point out how this emerging methodological wave seems strongly tied to a kind of con-sumerism or voting with the feet that differs from the underlying co-determi-nation framework of the Scandinavian societies. I propose to make use of people's experiences of cooperating and learning, hence supporting them in making informed choices that would transform their lives with technology.

Participatory design often seems connected with the idea of giving users what they like. It is believed that if you give users what they immediately like, they will buy more; and that users know what they want, and that their immediate concerns are what is also the main concern in the long run. In my opinion nothing could be more wrong. Kyng (1994) discussed how a process focusing ONLY on giving users what they want will be a very conservative, and conserving one. Participatory design needs to address long term motive, detached analysis, finding the new, and expansion. Many opponents of participatory design will probably say that those are exactly the elements that an expert driven strategy can provide, and to some extent that is true. This is exactly why participatory design has struggled to take seriously both the innovative insight of the developers and the practice of the users/workers involved in the change process.

From an IT-research perspective such processes are interesting because they emphasize alternatives as instruments of the change process, both locally and specifically among the directly involved participants, and in terms of providing technological alternatives at a general societal level. Such focus on alternatives is interesting, both because it involves a design process that is much less linear than the idealized commercial software development processes, and because the alternatives often involves a variety of technological forefront issues, rather than the safe and well-known.

In summary, the methodological challenges range from methods for observational and insitu studies in people's homes and similarly intimate situations, concern for learning and skilldevelopment outside well-defined work situations, to methods for creating thought-provoking prototypes and alternatives.

In the keynote presentation I will discuss a new project, eGov+ (- Exploring design and use of transparent and tailorable IT in local government, beyond web 2.0), which aims to bring Danish municipal govern-ment to the forefront as regards efficient, and de-mocratic e-services. This is achieved by making Web 2.0 meet participatory design, focusing on transparency and visibility of processes and decisions. We aim to make citi-zens more capable of helping themselves and each other, and to support the increased visibility within the municipa-lities and more, much needed, cross-departmental co-operation. Through the focus on transparency, adaptability, integration with existing services and tailorability (Gantt & Nardi 1992), design of governmental e-services needs a sustainable strategic perspec-tive involving citizens as well as groups of civil servants, completing and transcending current accessibility and cost effectiveness goals. Neither the current design strategies of municipal IT suppliers nor the current much acclaimed focus on lead-users (von Hippel, 2005) and personas (Cooper, 1999) are sufficiently facilitating such design processes, where the general meets the particular (Trigg & Bødker 1994) work meets non-work (Bødker 2006), the existing meets the new (Bødker & Christiansen 1997), standardization meets flex-ibility (Hanseth et al. 1996), and efficiency meets participation. eGov+ will develop strategic per-spectives as well as new participatory design methods in this setting.

- Bødker, S. & Christiansen, E. (1997). Scenarios as springboards in design. In Bowker, G., Gasser, L., Star, S.L. & Turner, W. (eds.), Social science research, technical systems and cooperative work. Erlbaum, pp. 217-234.
- 2. Bødker, S. (2006), When second wave HCI meets third wave challenges, NordiCHI keynote, NordiCHI 2006, ACM, pp.1-8.
- Bødker, S. Ehn, P., Kammersgaard, J., Kyng, M., & Y. Sundblad (1987). A Utopian Experience. In Bjerknes, G., Ehn, P., Kyng, M. Computers and Democracy–a Scandinavian Challenge. (pp. 251–278). Aldershot, UK: Avebury.
- Bødker, S., Ehn, P., Sjögren, D. & Sundblad, Y (2000): Co-operative Design perspectives on 20 years with the Scandinavian IT Design Model. Invited paper, Proc. NordiCHI2000, Stockholm, Oct 2000.
- 5. Cooper, A. (1999). The Inmates Are Running the Asylum: Why High Tech Products Drive Us Crazy and How to Restore the Sanity, SAMS.
- Druin, A. (1999): Co-operative Inquiry Developing New Technology for Children with Children, Proceedings of CHI99, Pittsburgh, May 1999, pp. 223-230.
- 7. Dunne, A. & Raby, F. (2001). Design Noir: The Secret Life of Electronic Objects. Basel, Boston, Berlin: Birkhäuser
- 8. Ehn, P. & Kyng, M. (1987). The Collective Resource Approach to Systems Design. In In Bjerknes, G., Ehn, P., Kyng, M. Computers and Democracy–a Scandinavian Challenge. (pp. 17-58). Aldershot, UK: Avebury.
- Fiore, S. (2004). Oppressive interactions: between expression and imagination. in Ubiquitous Computing, in Reflective HCI: Towards a Critical Technical Practice, Workshop, CHI.
- 10. Gantt, M. and Nardi, B. (1992) Gardeners and gurus: patterns of cooperation among CAD users, *Conference on Human Factors in Computing Systems*, 107-117.
- 11. Grønbæk, K., Kyng, M. & Mogensen, P. (1997). Toward a Cooperative Experimental System Development Approach. Kyng, M. & Mathiassen, L. (Eds.) *Computers and Design in Context.* (pp. 201-238). Cambridge, MA: MIT press.
- 12. Hanseth, O., Monteiro, E., Hatling, M. (1996). Developing information infrastructure: the tension between standardisation and flexibility. *In Science, Technology and Human Values*, 21(4), pp. 407-426. Sage.
- 13. Kyng, M. (1994). From subversion to hype: On political and technical agendas in PD, Opening keynote at PDC '94, October 27, Chapel Hill NC.
- 14. McCarthy, J. & Wright, P. (2004). Technology as experience. Cambridge, MA: MIT Press.
- 15. Trigg, R, & Bødker, S (1994) From implementation to design: Tailoring and the emergence of systematization in CSCW, in Futura, R. & Neuwirth, C: *Proceedings of CSCW* 94, pp. 45-54.
- 16. von Hippel, E. (2005) Democratizing Innovation, MIT Press.

Design processes: managing continuity and discontinuity between present and future activity

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Activity theories lay the emphasis on the need to deeply understand the users' present activity before starting any redesign process, be it of the technical or of the organizational system. This insistence should not be interpreted as a token of complete continuity between the users' present activity and their future activity, the determinants of which will only partly be the same as in the present situation. Designing systems is not adapting them to the observed activity, but creating new space for the development of future activity. Moreover, designing artefacts that are honestly intended for improving present problems may result in adverse side effects if the future activity has not been correctly anticipated. As a consequence, activity-driven design may not be based only on the quality of activity analyses in existing workplaces. An ergonomic contribution to design processes hinges on activity analysis **and** on an anticipation of future activity, particularly through simulations.

Activity-driven design requires forms of project management that combine two dynamics: • One is the construction of the will about the future. It is the duty of a "political" group, representing "the client" and its main logics. They will take the responsibility of setting the orientations of the project – after a multivoiced interpretation of the diagnoses about existing situations –, and of arbitrating the proposed solutions versus the available resources.

• The other one is the search for feasible solutions. It is the responsibility of the "designers". There may be different design groups working on the design of the premises, the machinery, information systems, work organization, and training programmes. Nevertheless, it is essential that there be a strong articulation between the "client's political group" and the different designer groups.

But the relation between "setting the objectives" and "finding solutions" is not a sequential process, where you would first set all the objectives then find all the solutions. Solution search raises new questions and provokes a need for more precised objectives. Activity analyses in existing situations and simulations of future work activity should feed an ongoing confrontation between the "will about the future" expressed by the "client group" and the "search for feasibility" expressed by the designer groups. The supporters of activity-driven design should therefore not concentrate on the activity of "shopfloor workers". Understanding and supporting designers' and decision makers' activities are also important steps.

Disasters, development and intervention at work: toward a formative methodology

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The well-established notion of high-risk and high-reliability (*high-R*) work organizations needs to be complemented and perhaps partially replaced with the emerging notion of high-greed and high-globalization (*high-G*) work organization. The former are traditionally associated with a primacy on continuity, stability, and well-bounded centers of control and coordination. The latter are associated with temporal and spatial discontinuity, crisis-like transformations, and drift. Disasters in the former are primarily understood to be rooted in technological complexity and human limitations (e.g., nuclear disasters), in the latter they are seen as rooted in market volatility and human excesses (e.g., the Enron disaster). In general terms, the shift toward high-G has aptly been called 'the rise of disaster capitalism'.

I will examine the shift from high-R to high-G as a theoretical and methodological challenge in three steps: (1) The shift challenges us to reconceptualize change and to put the management of change in the center of our notions of expertise and learning. (2) The shift challenges us to re-examine what we mean by development, in particular, it calls for an understanding of development as breaking away and opening up unknown possibilities, often through sideways moves rather than through vertical improvement along a predetermined path. (3) The shift calls for rigorous interventionist research methodologies, such as those based on the Vygotskian principle of double stimulation.

I will suggest six pricinciples for the emerging methodology of formative interventions: (1) contradiction and breaking away as starting point of intervention, (2) building up agency by means of double stimulation, (3) concept formation by means of ascending from the abstract to the concrete, (4) making textures of spatially distributed interweaving cognitive trails, (5) anchoring up, down and sideways in the generation of activity-level visions and action-level decisions, and (6) longitudinal processes with breaks and bridges between intensity and withdrawal.

I will elaborate on these six principles using data and findings from two intervention studies my research groups have recently carried out in Finland with the help of the Change Laboratory toolkit. The two sites represent public sector organizations threatened by the shift toward high-G principles and thus in need of viable alternative visions of development. The first study concerns the formation of a new mode of working in the central surgery unit of the Oulu University Hospital. The second study concerns the formation of a new model of service provision in the home care for the elderly in the health center of the City of Helsinki.

Reliability management as an individual/collective development process: a constructive ergonomics viewpoint

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Classical approaches to reliability have followed various paths aiming either at the elimination of errors (through automation or proceduralization of activities) or at detecting and correcting them before they have consequences (through the provision of detection aids or through the reciprocal surveillance of team members). It is argued that these approaches share a static view of work activities: sociotechnical systems are viewed as stable (while in fact they evolve over time; cf. the migration issue) and problems are seen as recurrent (while in actuality they change or can be borderline). Another approach is proposed, in which reliability is construed as the permanent sharing, discussion and construction of knowledge about work, work situations, and rules for decision-making. Rather than conjuring up the ability to find a solution for any problem that may occur, the solution is to strengthen group awareness and shared knowledge. In this constructive ergonomics perspective, an enabling environment is an environment that allows the individual and the group to constantly learn through experience and reflective activity. This approach will be illustrated by field studies in therapeutic decision-making and risk management.

Abstracts of oral presentations

Translation quality in production networks. From conflict to cooperation

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This ongoing study on translation production networks reveals the underlying principles and conflicts affecting the field of professional translation. Relying on the idea of productivisation I have proposed the development of a quality classification system to create a tool to improve the working conditions of subcontracting translators and to align the actors' differing definitions of quality.

The approach of the study is multidisciplinary. Translation production networks are examined using Albert-Lázsló Barabási's theory of self-organising, scale-free networks (2002), and my empirical ethnographic work including translator interviews between the years of 2005-2006 are analysed within the framework of Barabási's network theory, which can be considered as a kind of a map of the terrain. Furthermore, the study focuses on a certain part of the map in more detail by examining the relations of the various actors using an actor-network theoretic approach which also includes non-human actors (Callon).

The preliminary results of the study indicate that the traditional dyadic model in Translation Studies that presents the translator as an expert who is in a direct contact with the client is being challenged in the current translation market by a new structure that takes the form of a network. This new structure no longer has the client and the translator in direct contact, and the emergence of the translation company as a powerful intermediary between them has changed the dynamics of the field, resulting in a new configuration. This new configuration has been called a "production network", which is "a set of inter-firm relationships that bind a group of firms into a larger economic unit" (Sturgeon 2001: 2).

The interview data, translator union survey of 2005 as well as my own observations and experiences together with participant testimonies and discussions with actors in production networks indicate that not only has translators' expertise diminished but that a significant number of translators are suffering from symptoms of ethical stress while trying to negotiate the level of targeted translation quality. It is therefore maintained that creating a classification system of quality that extends throughout the network would improve translators' working conditions and also benefit all actors, users of translations included. While translators are encouraged to work as self-employed entrepreneurs, it is of paramount importance to create an environment that is free from ethical conflict regarding quality. Afterall, translation production networks cannot function without translators.

Abdallah, Kristiina & Koskinen, Kaisa: forthcoming. "Managing Trust: Translating and the Network Economy". Meta, Translation and Networks (eds Buzelin, Hélène and Folaron, Debbie).

Barabási, Albert-Lázsló (2002): Linkit. Verkostojen uusi teoria. (Linked: the New Science of Networks). Translated from English by K. Pietiläinen, Helsinki: Terra Cognita Oy.

Callon, Michel: "Society in the Making: The Study of Technological as a Tool for Sociological Analysis". In *The Social Construction of Technological Systems. New Directions in the Sociology and History of Technology.* The MIT Press, Cambridge, MA and London. 83-103.

Exploring dialogue as a method in a design process of complex technical environments

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The aim of the presentation is to study the dialogue in the joint knowledge production process of the practitioners and experts in designing complex technological environment. In the context of our research, dialogue is understood as an intervention-type method in the design project and process. In the dialogical events the actors communicate in face-to-face relations. The aim of the dialogue is to encourage communication based on equality and respect between the actors, supported by structures that foster collaboration (Gustavsen 2001). We argue that dialogical events support Mode 2 knowledge production (Nowotny et al 1994). The purpose of the dialogue is to promote learning beyond personal experience and across professional language boundaries, and thus create space for thinking of new kind of solutions and practices in the new technical environments.

On the basis of our case studies, we argue that the practices of the 'traditional participative design models' resemble a searching and working arrangement of the positivistic research. The expert designers represent the conceptual theoretical knowledge, and the practitioners or the actors with practical knowledge represent the objects of the research. The experts are collecting information about the behaviours of the practitioners for the design instead of being equal actors in the design process. This kind of 'participative design' may support the understanding of the users' present behaviour. However, this kind of relation between the practitioners and the experts leaves a lot of practical knowledge outside the design process. The practice can only be expressed in dialogues between actors e.g. by metaphors, examples and models (Bohm 1992, Johannessen 1999, Göranzon 2006).

We are interested in how expert actors and practically oriented actors create shared understanding regarding the common design task. This is a crucial issue when complex technical environments are being designed in a participative way. Practical knowledge, engineering knowledge and theoretical knowledge should conjoin in the design process in a way that is meaningful and reasonable for all the participants. In dialogue the actors examine the common object from different perspectives, which help to reformulate the common object. The building of common understanding can be called the building of a boundary object through boundary activity (Boland 1995). In the presentation, we will use two cases ('the design of a future production control system' and the research project 'the ecological design of an intelligent environment') to discuss on the possibilities of dialogue to support the integration of the users' practical knowledge into the design knowledge, and to transcend the traditional view of participative design.

A systemic-interactional perspective to the analysis and designing for safe practice.

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Objective of the Study

Most approaches to safety engineering are based on two assumptions rooted on a traditional model of human cognition. First, human cognition is subject to biases, oversight, forgetting, complacency and other limitations that make it vulnerable and thus unreliable when it comes to manage operations under safety-critical, high tempo, high workload conditions; hence human cognition needs support like decision support systems, visualisation displays, safety barriers, and so on. We call this the "limited-cognition assumption". The second assumption is that complex systems can effectively be handled by decomposing them into "modular" subcomponents and each dealt with independently from others (for a discussion of limits of the "modular assumption", see Chaiklin, 2007). The objective of this study is to propose a systemic-interactional perspective that overcomes some of the shortcomings of both assumptions showing their limitations in driving interventions in increasingly coupled and safety critical systems.

Approach & Methods

We argue that the limited-cognition and modular assumptions are of limited value. In particular, if we were to support of a view of "distributed cognition", then limited cognition does not reside in the mind of single individuals rather cognition is a property of the interacting parts of a whole system of activity (Hutchins, 1995; Woods & Hollnagel, 2005).

The second assumption is that complex and highly coupled systems can still be decomposed into simpler elements and design problems addressed accordingly. Drawing on case studies on designing for safe practice in Civil Aviation, we remark that the dominant approach in safety engineering is to consider each "barrier" separately, much alike the well known "Swiss cheese model" where interactions among barriers and other components of practice are not addressed. To gain empirical evidence, we carried out an analysis of 12 reported incidents in Civil Aviation through the construction of multi-entry metrics. While focussing on subcomponents and individual responses, a number of interactions were searched for among these sub components. This highlighted what are the necessary interactions among elements of a practice concerned by the introduction of a new "resource".

Results & Conclusions

The analysis has confirmed the presence of well known oversights which interpreted in systemic terms, evidenced the presence of necessary interactions (e.g. among constraints) and behaviour that, while deviating from the norm, was functionally relevant to the constraints and interactions identified. Further, "faulty" actions had to be interpreted as a search for balance between to competing pressures that on the one hand tend to reduce the space of "normal operations" by introducing safety barriers and others, and on the other hand, forces like "On the job training", that tend to push the limit of acceptable performance further away. Thus while focusing on aspects of the practice is inevitable, he focus is not to "isolate" the parts, but rather to help the analyst to identify the "functional" interactions that make the achievement of the overall objectives possible.

Steering complicated projects with the help of system analysis

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Large projects are usually structured with the help of a hierarchy of numerous projects and sub-projects related to each other. This construction of a complicated and fragmented project organization can be seen as a multi-project system. However, this networked system structure with significant amount of interfaces between different sub-projects is a demanding task for the management. Therefore, the project management demands a versatile qualitative view-point utilized in a holistic analysis of the current situation of the project. As a consequence, the objective of proposed paper is to analyse project management in this complex situation. The new understanding gained by this analysis is needed in steering of organization's maintaining systems (control system, working system, information system, support system) and in order to focus the steering of project organization to system critical parameters.

The overview of system is reached via looking at an individual project from a variety of qualitative angles. The method used to collect data is designed for networked environment and therefore it utilizes Internet in order to reach project management in global scale projects. The project managers at the operative level are experts in the project implementation and they also should have knowledge about the external factors (environment, culture, local demands ect.) affecting the success of the project execution. However, this knowledge is often tacit in its nature and therefore difficult to capture and turn into an explicit knowledge for the project management activities. The proposed paper introduces a new linguistic method for collecting and analyzing of this qualitative information. The method converts the results reached from the practical level analysis into the explicit system level knowledge for guidance purposes of project management by utilizing fuzzy logic.

With the help of the introduced qualitative research approach information from two large projects has been collected. Firstly, from multinational oil drilling rig project (during years 2004-2005) and secondly from a large cruise ship building project (during years 2006-2007). Altogether eleven organizations where attending the research project involving more than fifty project management members. Empirical data collected was giving 360-degree view around the projects executed.

On the basis of research results it can be concluded that the key factors affecting project system steering are qualitative features, such as communications quality, understanding of cultural differences and diffusion of information in organization. With the help of quantitative methods it is possible to "price" the risks. In addition with the help of qualitative method used in this research, it is possible to comprehend and perceive the uncertainties existing in projects beforehand and turn them into opportunities.

Work-related burnout and the reconstruction of subjective agency

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My aim is to study work-related burnout (WRB) in the framework of cultural-historical theory of activity and developmental work research. Central to this approach is the idea that work-related well-being is constituted in work activity. The focus is on the object-oriented nature of well-being. Work-related well-being occurs when a person successfully accomplishes or has reasonable possibilities to accomplish his/her individual actions which are parallel with individual motives constructed from the collective object and motive of activity. If a person repeated ly fails to achieve his/her personal aims associated to work object, his/her resources related to subjective agency become worn out. WRB associates with the subjective construction of meanings: when a person experience failures of reaching personally significant goals in his/ her work, burnout is more likely to occur. Thus, WRB can be considered as a break-down of subjective agency.

In this study, the expansive cycle of individual learning, the developmental phase of workrelated well-being and the developmental phase of organization's activity are regarded as evolutional phenomena. The analysis will open new interpretations of the constructed nature of WRB. Through a development dialogue a person analyzes his/her own developmental possibilities and is able to reconstruct and strengthen his/her subjective agency. The aim is to recognize person's zone of proximal development and find sustainable alternatives to expand it. Furthermore, the aim is to analyze deadlocks of work activity, find new solutions and put them to practice, because subjective agency is seen to be strengthened by changing work activity.

Sources:

Kaskisaari, Marja 2004. Yhteiskuntakriittinen näkökulma työuupumustutkimukseen.

Työelämän tutkimus 1/2004, 25-35.

Launis, Kirsi, Pihlaja, Juha 2005. Työhyvinvointi ja toimintakonseptien muutokset. Konsepti 2. Verkkojulkaisu. www.muutoslaboratorio.fi

Mäkitalo, Jorma 2005. Work-related well-being in the transformation of nursing home work. Acta Universitatis Ouluensis. D Medica 837. Oulun yliopisto, Oulu.

Engeström, Yrjö 2002. Kehittävä työntutkimus. Perusteita, tuloksia ja haasteita. Hallinnon edistämiskeskus. Edita, Helsinki.

Intrumenting horizontal and vertical learning to develop research activity

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Recently Virkunen (2006) argued that "there is an increasing need for deep qualitative transformation in activities involving the development and implementation of entirely new concepts». Launis & Pihlaja, (2007) point out the need to focus on the real dynamics of workplace transformation and on the asynchronisms of new and old concepts. This communication focuses on the analysis of deep qualitative transformations of every day research work. Today, in France, research policies promote pluridisciplinarity as well as exploration and exploitation partnerships between researchers and socio-economic partners. How is it experienced by researchers? How such a work is or could be supported by research organizations?

To start addressing these questions, we conducted a study with researchers working in ten various participatory projects for the design of new work systems coping with issues of "sustainable development" in the agricultural industry. We adopted a two step approach to instrument researchers' reflexivity about their involvement in participatory design and co-configuration work with farmers or other professionals of the agricultural industry. Firstly attention was paid to problematic issues that researchers faced in the course of the project. Together with the researchers, we identify that such issues could be dispatched into four main categories: (i) the frame of action, (ii) the temporalities within the process, (iii) the translation processes (as defined by Callon, 1986), (iv) the mediation ones. Researchers produced then a narrative showing how such problematic issues arose and were solved. These narratives enable researchers to give account of their way to orchestrate a multi-voiced dialogue and to align their activity with the one of the other professionals involved in the design and use of new work systems. In a second step, researchers were invited, using a repertory grid method, to identify common researcher practices but also their contingency in the design projects. For instance, one main common feature is that a participatory approach changes relations between knowledge and power. In participatory approaches, the researcher has to accept to put his (her) knowledge into perspective: others might legitimately disagree or grasp things from a new angle. Researchers experience this dynamics as a source of uncertainty for their own identity. But this dynamics is also seen as a lever for co-configuration work.

As researchers experience disturbances in their activity, vertical learning is needed so that the research organizations recognize and value such approaches. We propose to instrument vertical learning through the design of a training space, labeled by the organization, in which researchers will exchange about their engagement in participatory approaches and coconfiguration work. We suggest that such a training space should be designed as a "boundary zone" between strategic and operational level of practices.

To conclude, we argue that there is an urgent need to better (i) qualify boundary zones in both vertical and horizontal movements, and (ii) identify the instruments that could support these movements. We suggest that such a topic could lead to the creation of a research network, at the European level, based on the ATWAD community.

Context and Collaboration

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How does the socio-economic and political environment mediate collaborative activity? Environment, or context as it is also often referred to, has traditionally been conceived of as a tack on or throw away term. In the activity theoretical literature context is often considered as situated with limited appreciation of the embeddedness of the socio economic and political context in our everyday activity. A case study of information technology institutions in the Australian state of Tasmania is used to investigate a) the ways in which contextual conditions influence institutional collaboration and b) the ways in which these conditions mediate learning in institutional collaboration. The institutions interviewed and observed in this study included a government department, the body representing private employers in the industry, a university department and a State-Commonwealth organisation established to allocate \$40 million to the fledgling information technology industry in the state of Tasmania. These institutions and a number of private companies collaborated to develop a Marine Information Technology Cluster.

Seven contextual conditions were identified. These contextual conditions mediated the social relations of production of collaborative activity. Production consumption and exchange generate social relations within collaborative activity. Collaborative activity is a process of production in that labour power is used or consumed through tools; tools and materials are distributed or made accessible to varying degrees within collaborative production to meet a need. Each institutional subject consumed, distributed or accessed, and exchanged tools and power differently. Institutions taking part in this study singled out properties "essential for developing [their] social practice" (Lekortsky, 1984, p.137). The process of singling out properties essential for social practice was mediated by the socio-economic and political contextual conditions embedded in the social relations of production of the collaborative activity. Collaborative activity between the three institutions was found to be a process of learning over four phases, evolving as the object of production (as opposed to the object of activity) evolved. The distribution and consumption of tools and power mediated the process of meaning making in each phase.

Understanding the ways in which contextual conditions mediate the social relations of collaborative production and phases of learning opens up opportunities to understand meaning making and thus better direct the trajectory of collaborative activity. This is important for all those involved in collaborative activity and for policy makers.

Changing teaching practices

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How do we change teaching practices and sustain these changes? Australian building and construction teachers in Technical and Further Education (TAFE) institutions are working in a policy context that demands flexible delivery. This has led to an increasing use of information technology for the delivery of institutional based teaching and workplace assessment. Curriculum documents have been replaced by Training Packages which list elements of competencies. Teachers have limited teaching knowledge and skills and work in a culture of compliance. A focus on content has been encouraged in the initial implementation of Training Packages through the use of workbooks. Not surprisingly, teachers are challenged to meet the demands and possibilities created by the policy of flexible delivery.

The purpose of the study was to investigate changes in the ways in which project-based learning and the use of information technology influence teaching and learning. Project-based learning was selected as it was an institutional priority. This case study used an intervention approach consisting of consultation, workshops and ongoing support repeated over two years. In 2006 (the first year of the study) researchers worked with a small team of teachers in the capital city of Tasmania. A profiling instrument and interviews were used to map teachers' information technology skill, confidence and purposes in using information technology for teaching and assessment. An analysis of this data and further consultation provided the basis for a collaborative design workshop. Researchers provided some support in the development of an information technology learning resource. The resource was evaluated by researchers observing the resource in use and interviewing students. A similar approach was used in 2007 working with teachers across the regional state of Tasmania.

We found that the tools used by teachers mediate not only the possibilities they perceive, but their roles as teachers and their role within the organisational structure. Within the organisational structure interaction with different communities of practice mediates social relations providing affordances or offering constraints. The meaning making of possibilities is in part mediated by the tools teachers have access to. The most important meta-tool for teachers is their pedagogy (teaching and learning philosophy). The pedagogy of teachers in this case study is focused on content as opposed to the learner and learning. The traditional masterservant relationship of apprenticeship is expressed in teacher-as-expert with power and control and apprentices as passive recipients. Typical apprentice comments were "You're the teacher, you tell me". Teachers in this case study did not use collaborative peer learning, peer assessment or problem-based learning strategies where they would be required to change roles to that of facilitator. An intervention strategy of consultation, some workshops and ongoing support and the subsequent development of information technology resources were inadequate in encouraging teachers to change their use of an historically based meta-tool. Currently there is a huge tension between the intent of the institution and the tools in use. This paper explores these tensions using the data collected in this small case study.

Designing Knowledge Transfer

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In a globalized economy regional industries can suddenly find their viability undermined by competition from overseas. National Governments seek remedies in policies to stimulate economic regeneration and alleviate the social impact of job losses. Foremost in the policy makers' arsenal are initiatives to promote knowledge transfer.

However it is more difficult to create a regional knowledge economy than policy documents suggest. There is a huge risk of failure in large complex policies and the success of many initiatives is ephemeral. Often the effort and expense of change is huge and those responsible for implementing 'knowledge economy policies' encounter insurmountable barriers.

In some ways a policy corresponds to a particular way of seeing the world and interpreting reality. In this sense a policy document is the closest policy makers get to a paradigm or theoretical framework. Traditional theories of 'knowledge transfer' conceptualize knowledge as a commodity. It is assumed that 'knowledge transfer' is a logistical problem of taking 'knowledge' from one context into another.

An alternative perspective is offered by Expansive Learning Theory (ELT) which focuses on the co-construction of knowledge during a dynamic process when the perspectives of different organisations are brought closer togther. This process is helped by using mediating artefacts or boundary objects to bridge different perspectives.

My paper contrasts the process of knowledge transfer in a large complex partnership with the process that took place in small more focused partnerships. The size of a 'partnership' and the power dynamics between the partner organisations have a huge impact on the outcomes that can be achieved. Two contrasting case studies highlight the impact of these important factors, which are often overlooked in studies of 'knowledge transfer'. My UK case study refers to the attempt by a huge public-private sector partnership to transform a traditional manufacturing and engineering region from 2000-2005. This is juxtaposed with a case study of textile innovation in Japan led by the Nuno Corporation, a small design company based in Tokyo.

Applying a multidisciplinary approach to analyze the use of ICT in a professional network

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This study deals with the use of ICT (Information and Communication Technology) in the sea fishing industry. Our study aims at pointing out the limits of the existing situation and to enrich the debate concerning the introduction of NICT (New Information and Communication Technology).

Methods

Because of the number, the distance and the heterogeneity of the actors involved, fishing industry may be seen as a network. We propose to integrate three theoretical and methodological frameworks into an iterative approach of this network: *i*) the Actor-Network theory proposed by the sociology of translation which focuses on the actors' interests and strategies and on alliances between actors, *ii*) activity theory which deals with networks of activity systems and *iii*) distributed theory considering the propagation of representations between actors (humans or tools).

Results

In general, it must be noticed that the objects which should be shared between the actors are not spontaneously shared and that many contradictions surround them. In this competitive framework of the fishing industry, where every group of actors sees their own short-term interest, existing instruments show their limits: transmitting information held by an actor, they are just types of media and may be used to transfer imprecise or incomplete data. As far as the communication satellite system is concerned, the communications cost curbs the information and object sharing.

These findings lead to three possible forms of innovation: the development of electronic devices automatically recording and transferring data but also the acknowledgment of local networks requiring specific ICT and a better enrolment of fishermen within the transparency process.

Discussion and conclusion

This study has been used by a professional union to back up a technical and economical demand. In order to optimize the sale of their products, fishermen propose to sale faster and better thanks to their integration from the fishing zone into the food distribution chain. In order to answer this need, they ask for a 'low cost' internet system using radio frequencies available, for small fishing vessels, on the fishing zones. Their need should be put together with the need for more transparency coming from the auction market and authorities. This would be an opportunity to convert this study into a research action.

How does activity analysis enhance occupational risk assessment methods? Applying MAPO index in Portugal

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Introduction

According with Stanton and Young (1998) professional ergonomists tend to restrict themselves to two or three methods, despite variations in the problems. The choice of a method is frequently oriented by questions like (Stanton and Annett, 2000): How deep should the analysis be? Which methods should be used? How much time and effort do they require? How much and what type of expertise is needed? The answer to these questions in ergonomics practice is also determined by restrictions imposed by the organizations related with the time available to complete ergonomic analysis and financial constraints. Also, the occupational risk assessment methods are easier and less time consuming to use what lead to their generalised application in detriment of classical activity analysis methods.

Objectives

The nursing work at hospital wards is extremely demanding related to patient handling tasks, poorly designed workplaces and inadequate equipment (Hignett et al, 2003). The analysis of the nurse's exposure to risk factors during manual patient handling is frequently done using MAPO (Menoni et al, 2005). In this paper we intend to discuss the results obtained by MAPO index in nine units compared with nurses' accidents and activity observations.

Methods

The methodology encompassed: interviews with nurses to investigate organizational factors; risk assessment using the MAPO Index ; data analysis and discussion.

Results

The MAPO Index results refer to 9 units in a central hospital. The results were 4.03 in the women's neurosurgical unit, 6.71 in the men's neurosurgical, 4,03 in the men's general surgery unit, 2,74 in the women general surgery, 4,37 in the mixed general surgery, 0,54 in the spinal cord unit, 1,23 in the plastic surgery unit, 4,17 in the orthopaedics and 3,03 in the internal medicine unit. According to Menoni et al (2005) an index level between 0 and 1.5 corresponds to a negligible risk, between 1.51 and 5 to a moderate and above 5 to a high risk of acute low back pain. These results indicate that nurses are exposed to a high risk of lowback pain in the wards, which could explain a high rate of patient handling accidents. However, the number of accidents is high even in the units with a negligible risk according to Mapo. What can explain this disagreement? What kinds of factors influence these results and are not considered by MAPO? From the activity analysis we can consider that the nurses age determine their individual behaviour in patient handling, different workers with the same exposure level can carry out a different number of patient handlings, some nurses do the patient handling alone and all patients are different in their weight and cooperation forms. Taking in consideration these aspects draw from activity analysis the risk assessment methods could be enriched.

Conclusions

There are new challenges for the development of ergonomics methods, namely the need to integrate complementary methods what offers a more comprehensive analysis of human – system interactions. The development of new methods should consider their integration with activity analysis.

Indicators and *markers* of drivers' activities in the conception of mobility systems

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The conception of a mobility system by bus, and the criteria that influence the construction of its scenarios, tend to be based in recent indicators, like modal distribution indexes, matrixes of most requested origins/destinations, or cost-benefit analyses of the services associated with each schedule (Vuchic, 2005). The reference to drivers' activity and to the evolution of their priorities, in the context of the transformation of these scenarios, is often absent or only considered in terms of registered validations, meaning the number of passengers transported as a function of the day and of the service. Our goal consists precisely of exploring the role of the arbitrations assumed by the drivers and the debates of norms with which they are confronted in the valuation of particular mobility options. In the scope of a project aiming at the conception of a mobility network, developed together with a group of engineers, mathematicians and geographers, our contribution, follower of the tradition of activity analysis and of the construction of *markers*. We defined them as happenings that mark and enhance the activity and its evolution. These happenings are the result of options, of values and *dramas*, which mark the history of the activity and announce the confrontation with new alternatives.

The results of the analysis of an urban line in re-conception made us realize that the number of passengers transported has increased in almost every service. The drivers point out a change in the logic of exploration of the line, based in criteria of profitability, as a new marker of their activity. The sense it has now been given and the contradictions promoted by the goals of competition take part in their debates: the fact that they keep away from the itinerary of drivers from competitor companies' buses allows them to transport more clients, but it implies that they do not always follow the schedule expected by the clients...

The indicators are characterized by instantaneousness. Nevertheless, they are in continuous oscillation. Therefore particular *markers* give access to the "intemporality" of the way the activity is developed and of its products. The conception of a mobility system without an anchor on the activity, without the understanding of how their indicators are produced and of the paradoxes inherent to their production, limits the integration of the knowledge it provides and compromises its future development. In this sense, we try to give visibility to the narratives that originate particular indicators – contributing to the discussion of the weight they are given in the conception, or introducing others – as well as we consolidate new cooperation possibilities among this multidisciplinary team.

Ergonomic intervention : from actor's mobilisation to organizational design

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Building efficient methodologies to change work organisation is a major research stake for ergonomics and occupational health. Two cases of ergonomic interventions carried out in the service field and the industrial field have led to a significant contribution to organisational redesign.

Those two interventions highlight the interest of a mobilisation of all actors (operators, management, executive management) for the organisational change. This mobilisation – a different notion from that of participation – requires defining roles and missions in the different spaces that are built for project management. The point is not only changing the workplace, but also changing the design process. Two conditions can be identified:

- the appropriate mobilisation of actors with a power to make design decisions on work organisation
- the training of these actors, mediated by the construction of collaboration situations which are an opportunity for them to acquire tools to think about work, to observe it, to think about change and its management. These situations are directly beneficial to the work change project.

The mobilisation of the management and the executive management in charge of the organisational redesign requires a deconstruction of the dominant representation which is based on rules and procedures, and under which any organizational malfunctioning is interpreted as the result of a lack of prescription. Nevertheless, organisation is an encounter between on the one hand rules, procedures and structures, and on the other hand human activities and interactions. The actors' interactions are only partially determined by the formal structure. The social nets that make up the organisation are thus confronted to the rules and procedures, without any complete fit between the rules and the human activities. Designing an organisation consists of holding together two contradictory dimensions: the work prescription to frame the work, and the actors' autonomy to go beyond the frame when the situation requires it.

From that standpoint, the workplace changes are an opportunity to foster new forms of actors' mobilization. The ergonomic intervention aims at a form of development of those actors. An enabling organisation can thus be defined: one which offers the workers an appropriate frame, but likely to support and even develop the workers' room for manoeuvre to cope with situations where prescription is not efficient. This room for manoeuvre concerns both the "hot" real time management of the situations and the "cold" changes of the frame to make it integrate the relevant data.

From Activity Analysis to the recommendations of improvements, the ergonomic accompaniment passes by the definition of policy guidelines.

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This communication is based on a research programs aiming to understand and enrich the ergonomists models of action. This presentation aims to question the use of data produced by the analysis of activity in decision-making in design projects. We think that the ergonomists role is more than carrying the concern of work but also to act strategically on the policy guidelines of the companies. We will use examples of an intervention aiming at improving the working conditions in a supermarket and with examples of design projects in Architecture to support our ideas. Ergonomics contribute to work's adaptation to the human. Historically, the heart of the trade of the ergonomists in France is to analyse work's activity (see diagram). The activity analysis carries a glance on the situations of work. We think that the use by the ergonomists of the activity analysis makes it possible to have a point of view on work but that is not sufficient to transform the situations of work. For that, ergonomists must question decision makers to activate the levers of action which make it possible to transform the situations of work.



Diagram of the Ergonomic accompaniment to the Decision-making: Progressive and Collective construction of the Solutions

The current models of intervention in ergonomics position the recommendations like a finality and a lever of work transformations. Considering the intervention as a design project the definition of solutions must result from a constructive and progressive step (Martin, 2000). Solutions are emerging from a dialogue between the political will and the technical feasibility.

While aiming a work situations transformation, it is possible to act on the work organisation, on the techniques means offered to the operator, on the raw materials of production or on the operator himself by the formation and the development of competences. The methods of action on these levers are not the same ones. The costs, the times and the consequences of these transformations are not negligible.Indeed the integration of the complexity of work requires political choices on the most level of decision in a company. Taking into consideration dynamics of the companies, the decision makers must anticipate the consequences of these transformations. To be durable the ergonomic solutions must adapt the future orientations of the company. The ergonomist must thus integrate this level of reflection in his step of solutions construction.

Emotions in Fire and Emergency Management: An Activity Theoretical Perspective

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Problem under study

The way people think feel and act has an important relationship with work activity. Positive affect enhances problem solving and decision making and can influence a variety of performance–relevant outcomes (e.g. judgements and risk taking). People who are engaged in high performance complex work (e.g. fire and emergency management) are involved in risky work because the focus of the work activity is on high reliability operations. Much of the work has high activity/accountability due to task complexity, is cognitively demanding and also requires interdependency. Yet there is minimal research in understanding the role of emotion in high performance, high reliability work.

Objectives

Preliminary findings from my PhD will be presented in this paper. The historical trajectory of theoretical approaches to the role of emotions in work activity will be outlined. The paper will also discuss IMT members' work-related emotions and how those emotions influence collective activity.

Methods

Data has been collected from 4 states in Australia across 7 different agencies. Experienced IMT personnel (n=75) were asked to talk about collective work activity and what they were experiencing and feeling when engaged in that work. Observational data has been collected in 3 real-time incidents.

Results/Discussion

The data reveals that while working in fire and emergency management provides job satisfaction, due to the challenges, sense of achievement and strong team spirit, stress is also prevalent. The media's attention, bureaucracy and political demands are stressors, which at times overwhelms them. IMT members indicated they are influenced by the collective mood of their team. Team cohesiveness and the sense that they are doing a good job actually inspire them to go on to bigger and better things. On the other hand, being under stress can impede on team dynamics and performance and in one incident led to fatal consequences.

Conclusion

Emotions have an important relationship with work activity. The majority of research that has investigated the linkages between emotions and learning and performance has not been conducted in high reliability environments. This research attempts to address that gap and aims to make a considerable contribution to team functioning, enhancing safety and developmental work practices within fire and emergency management.

The activity analysis with support of physiological data: the use of the captiv system in offshore platforms

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The purpose of this study is the development of an ergonomic technical specification for future projects of offshore platforms, in order to prevent critical situations, as currently observed. The designers, in general, have an incomplete or misunderstood representation of the operational work, since some, also, are not acquainted with an operating platform.

The study was made at the area of launchers and receivers of *pig* stations on an operating offshore platform (*pig* is a spongy object used to "clean" oil lines), being analyzed from two perspectives: operation and maintenance. In the operation activity, were observed great displacements of the operator for information reading and device intervention, as well as intense valves handling - some of them rigid and/or with difficult access. These conditions induce the operator to assume inadequate postures and to make constant efforts. In the maintenance activity - the lubrication of valves - the situation is worse, because the effort is more intensive: the valves are always rigid, since this operator is the responsible one for the valve softening (lubrication), and task repetition is bigger.

The Ergonomic Work Analysis (EWA) of the activity of the production operators and maintenance technicians was accomplished with the support of the CAPTIV system. This system is composed by software and a set of sensors that assist in the identification of harmful efforts and postures of the workers. In this study, a sensor of cardiac frequency (Polar) and a sensor for measuring angles of the fist (a goniometer) were used. The system usage consists of three stages before finally achieving a first diagnosis of the observed situation: 1) observation and data acquisition; 2) data treatment and *a posteriori* codification; and 3) statistical analysis of the information.

Thus, from registered physiological and biomechanical data in time scale through the different stages of the work activity, it was possible to identify the critical situations from the point of view of efforts and angles of the fist. The results suggest the necessity to rethink the project of the area in order to minimize the displacements of the operators and to improve the handling conditions of the valves. This is the basis for the results that supported the recommendations developed in the technical specification for the launchers and receivers of *pig* stations.

Analyzing training activity on simulators : the complementary of clinical approach and regulations approach

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The aim of this study is to illustrate the provision of the analysis of activity according to the regulations approach, as a supplement to the clinical approach of working activity.

This illustration is accomplished on the piloting of nuclear reactors. The clinical material is acquired from simulated situations on full scale simulator of nuclear reactor, and from analyses of events of industrial exploitation. By exploitation event, it is necessary to understand a gap between realized work and expected task. Any gap detected leads to a treatment (Fauquet, 2006) and is assessed according to the INES scale. Quasi entirety is classified at level 0 (« no importance from the point of view of safety »).

The event analysis of nuclear power plant of Chinon puts in an obvious place specific characteristic for some events, presenting specific characteristic resulting in the fact that the gap occurs because the control, although it is accomplished, does not allow to avoid this gap; this is due to an unsuitable object of control, or because it was not accomplished by the operator at good level: a kind of skip control phenomenon. Everything seems to take place as though the operator had wanted to control only a part of the activity, assuming that the whole activity would then be validated.

Analysis of activity according to regulations (Faverges, 1972; Leplat, 2006) has allowed to break down, on cognitive plan, the basic mechanisms occurring during the realization of activity. We noted that in the case of activities based on the skill of the operator (see model of Rassmussen, 1994), he approaches activity by defining for himself one or several objectives and achieves them according to one or several final controls. In term of regulation, the operator's control is seen as the use of a comparative module to confront acquired results and expected ones. If comparison is satisfactory, task is ended. If it is not, the operator re-injects this result into the curl to make an analysis, to redefine objectives, then to compare the new acquired results and expected ones.

According to efficiency research, the operator implements secondary curls, with each their secondary objectives and comparative module. But sometimes, as introduced above, the operator can have tendency to validate task as a whole on the basis of a secondary comparative module, only. Everything takes place as though, in situation, he forgot the main objective of the task and focused only on secondary curls, which can be seen as subordinate cognitive regulations.

This study has led to suggest to training instructors and to work analysts to treat this problem by identifying the secondary objective and make the operators think about the reasons that led them to identify such an objective. This can be done through a collective analysis supported by the clinical analysis of working activity as developed by Fauquet (2006), feeding the professional controversy. This helps operators to understand the skip control phenomenon and to adjust their control for further activities.

Debriefing as an analysis of simulated situations: comparison between nuclear reactors operators and civil aircraft pilots

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The pilots of civil aircraft of Air France, as the pilots of nuclear reactors of EDF, are training on full scale simulators. In both cases, training generally consists of briefing, work on simulator, and debriefing (Fauquet, 2007). Articulation and structure of these three stages introduce fundamental differences, partly given by the specificities of jobs.

Comparison puts in an obvious place a bigger nervous tiredness for the pilots of planes than for the pilots of reactors on simulator. This notably comes from the kinetics of tasks to be accomplished: in the cockpit of the plane, actions to be put in chains and the answers of the technical system are much quicker than in the control room of the reactor; on the plane, the scale of time is in the order of some seconds in some minutes, while for the reactor, it is counted in dozens minutes or even in hours.

Consequence is directly seen on the actors' decisions: the pilots of planes are led to put in chains decisions in a space of time which is counted in seconds, while the pilots of reactors have several dozens minutes in most cases. At the end of work on simulator (3 h 30 for the plane, 3 h for the reactor), the pilots of planes seem exhausted and express it so: « we are emptied » ; pilots of reactors do not use such expression.

Then comes the debriefing after a 30 minutes pause. For the pilots of planes, debriefing lasts 1 h 30 against 3 h for the pilots of reactors. Considering the physical and mental condition of the actors at the time of debriefing, we note that the pilots of reactors can be easily engaged in discussions about work practices in simulated situation, for two reasons: they are less tired, and verbal exchanges will be proceeded softly as there is more time for this.

Articulation of both debriefings is therefore accomplished consequently. Approach is directive for the instructor of the pilots of planes when it is didactic for the instructor of the pilots of reactors (Béguin & Pastré, 2002) or analytical (Fauquet, 2007). Study points out that, if competences of the pilots are not diminished by directive approach, there is a not exploited potential which the comparison puts in an obvious place.

It is the reason why, the Air France Human Factors Department has developed a methodology for observation and debriefing of CRM (Crew Resources Management) aspects (Fauquet, 2006). This methodology has been introduced for training sessions one year ago, so now, about one half of the debriefing is interactive on CRM aspects.

A conceptual framework for examining productive interactions between work and academic communities

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The aim of this paper is to present a synthesis of socio-cultural theory resulting in a framework for better understanding and promoting the transfer of knowledge between the university curriculum and the workplace. The theoretical analysis is backed up by fine-grained empirical research in which communications and developments in workplace and academic representatives meetings are analysed.

Transfer of knowledge to workplaces requires collaborative and integrative work between communities of academic and non-academic practitioners (Wenger). Differences between knowledge and practices at Work and within the academy are broadly acknowledged in the literature (Bernstein), yet the ensuing nature and complexity of interactions between these two communities in curriculum design 'on the ground' is poorly understood. A key question which is addressed in the paper is to recognize that integration as such cannot be the goal: the differences remain, but have to be turned into productive collaboration and joint development, for example, of a curriculum.

Productivity refers to the activity theorists' (Engestrom) concept of zones of potential development between two different, interacting activity systems. Productivity is then a measure of the extent to which new hybrid knowledge emerges in the interactive zone with positive outcomes for both systems. Ideally, the integrated curriculum elements look to both Work and academic knowledge. Such productivity involves the acknowledgement of pre-existing boundaries and differences between types of knowledge and the subsequent actions of actors in crossing these boundaries, all of which are identified in the research findings.

Activity theory in interactive tasks

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Research on Activity Theory and its implications so far mainly focused on monological, objectcentered tasks (e.g. Hacker, 2003). Concordantly, international standards including "characteristics of well-designed tasks" (EN ISO 9241-2; EN ISO 614-2) refer to tasks that are concerned with operating machines and visual display unit (VDU) work. Thus, communicative as well as emotional aspects of the job are not considered.

However, the majority of employees nowadays are occupied in the service sector (e.g. nurses, physicians, teachers, and sales people). The analysis and design of these interactive tasks at first necessitates theoretical consideration as regards *characteristics of well-designed interactive tasks, methods of analyzing* these tasks in consideration of client or customer contact, and finally the opportunities for the *design* of interactive tasks.

The presentation focuses on the conceptual development as well as its empirical verification for the work of physicians, teachers, nurses, and sales people.

Exemplarily the results for 419 sales tasks will be lined out shortly.

In a first step the different configurations of sales tasks were classified based on the core concept of task completeness vs. fragmentation (see Schweitzer, 1971; Volpert, 1974, 1979). In order to allow for the interactive subtasks of sales jobs the concept was thereby extended by a second dimension of task completeness. Based on the resulting system of object-centered and interaction-centered task completeness the utility of task completeness for the prediction of further task characteristics as they are, perceived task characteristics and mental strain was examined. The results show that retail tasks differing in their completeness vs. fragmentation do also differ in further task characteristics as they are as well as perceived task characteristics (perceived regulation requirements and opportunities, perceived learning opportunities, perceived mental fatigue, perceived mental satiation, perceived monotony, positive mood, nor in emotional dissonance and emotional exhaustion. This is due to lacking variance in emotional dissonance and perceived mental strain.

These results provide first evidence for the applicability of Activity Theory to interactive tasks as well, and thus suggest that its recommendations for job design cited in the standards (EN ISO 9241-2; EN ISO 614-2) might as well be transferred to these tasks with some modifications and extensions. Ongoing research will concern the applicability and generalizability of the core concept of task completeness vs. fragmentation to further kinds of interactive working tasks, especially to human service jobs requiring in-depth knowledge.

Developing methods for contextual activity sampling

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The purpose of the present paper is to introduce rationale and design of Contextual Activity Sampling System (CASS) that provides technological infrastructure for analyzing educational or professional activity in context. Traditional methods of behavioral sciences are individually oriented and focus on the participants' beliefs and other discursive entities rather than their practices as they occur. Conventional survey methods provide a frozen picture of participants' behavior rather than address processes of individual and social transformation. The central weakness of these methods is that the participants are asked to provide retrospective global assessments (Reis & Gable, 2000) of their beliefs and actions rather than measure activity unfolding in real-time. When measures are conducted only once, the most important source of variance is between participants and data analyses are, consequently, focused on examining individual or group differences. In the background of CASS are Experience Sampling Method (ESM) and Ecological Momentary Assessment (EMA) that are designed to provide a large number of measures (50-60 per participant) regarding learning activities across situations and contexts. Longitudinally oriented investigations involving variance between contexts (e.g., classroom and field) allows investigators to examine patterns of evolving activities. Generalizations are made by researchers (rather than participants themselves) in terms of aggregating observations or modelling changes across time by relying on time-series analysis or linear arowth models. CASS methods are used in conjunction with other methods, such as interviews or ethnographic participant observations.

The CASS-query tool is a Java-application for collecting process- and context-sensitive data. Research and development of the system takes place within frames of Knowledge-Practices Laboratory (www.kp-lab.org) that is a large integrated EC project. The system is implemented on 3G mobile devices (e.g., Nokia E70) with Symbian operating system. The system is versatile enough to allow different types of responses, such as using numeric scales, making an audio or video note of critical incidents, or taking picture of the object of activity, which are administered with a mobile phone. Queries for ecological momentary assessment are customizable to each user. The CASS system is intended to provide generalizable tools in open-source terms (i.e., adaptable and free of charge) that can, in a flexible way, be tailored and elaborated for particular needs and requirements of researchers and users. Administrator tool (XML-editor) enables investigators to conduct specific EMA investigations by defining type of sampling (time or event contingent), creating theit own questions, and determining types of responses (open text, Likert-scale, audio- or videorecording, or picture). Basic functionality of the system has already been developed and tested, but features needed for uploading videos to the shared database need to be further developed.

The present paper is focused on examining theoretically and methodologically how contextual activity sampling may be utilized in practice-driven research on learning and working. The CASS methodology introduced in the present paper provide technological infrastructure for studies of Vartiainen and colleagues (Studying hindrances and enablers in knowledge work) and Muukkonen and their colleagues (CASS-methods and tools for investigating academic knowledge practices). We propose that a workshop will be organized in which these three related papers are going to be presented.
Evaluation of a practice-based training approach for implementation of an evidence-based care plan

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Background and objectives

Evidence-based practice guidelines are an effective tool for improving the quality of care. Still, changing practice by program implementation is a complex process. Research shows that the existence of strong clinical evidence alone cannot improve practice. Unclear implementation objectives and deficient training strategies often appear as barriers. The centre of this study is on implementation, describing a pilot work aimed at putting an evidence-based care plan into practice at a local Swedish health centre by adapted training. The applied care plan, derived from regional clinical care guidelines prepared by Stockholm county council, ultimately aimed at improved treatments for depressions.

Method

The care plan was implemented by a practice-based strategy involving an expert (a specialist psychiatrist) giving guidance to district physicians in applying the care plan. In order to change practice behaviour, the expert provided detailed information and feedback intended to support the physicians learning and participation. Local conditions were related to the regional care guidelines and cases for treatment was analysed by the physicians at workplace team meetings. A process evaluation, including case study design, with observations of workplace team meetings and interviews was applied. The evaluation focused on the training activities and the physicians prerequisites to take action according to plan.

Findings and conclusions

Results show that the training provided positive prerequisites for the physicians to develop their knowledge on a) professional planning procedures and b) general depression syndromes. Results also show that consistent work methods can be developed through estimate scales and standardized guidelines for medicine treatment. Above all, this study demonstrates how evidence-based care planning can be integrated into the daily practice by the use of adapted training methods. In turn, the idea of practice integration might be a key to sustainable results, both for primary care health centres and for other specialities as well.

Mundane governance in modern research work

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In Finland, the implementation of the results of public research in various societal or commercial practices is a growing concern for both the government and the industry. As a consequence, the academic independence of public research organizations is strongly challenged by the government. New types of management tools are being introduced in the research organizations in order to better direct and control the objectives and resources of research work. Will the researchers accept a position as objects of the new type of managerial action? Will the new enterprise resource planning systems (erp) help research team leaders in their work, and build mutual understanding between team leaders and researchers upon the direction and priorities of research work?

The purpose of this paper is to open up a reflective discussion on the current transitional phase in managing research in public research organizations. We will present two empirical case studies. The Technical Research Centre of Finland (VTT) and the Finnish Institute of Occupational Health (FIOH) practise applied research (R&D) and are governed by Ministries. Both organizations were founded in the 1940s and together employ nearly 4000 researchers and other personnel. We contextualize the implementation of the new management tools by briefly highlighting the organizations' previous management practices. We compare our findings with the developmental phases of industrial R&D management, which has been one of the main drivers for successful economical performance in the Finnish industries.

We present an ethnographic study on the ways in which the work of an operative research unit is measured, evaluated and controlled. We explore the use of the new management practices and tools, and how they are experienced. We focus on two points of view: those of the research team leader and of the pioneer researcher. As a theoretical framework, we apply a developmental perspective inspired by Cultural Historical Activity Theory. The paper participates in the recent discussion on mundane governance, that is, the new techno-scientific arrangements for governing people in public. We trace tensions as well as potential expansive opportunities embedded in the mundane tools for controlling time, space, people, and patterns of organizing research work.

We report work in progress. The following questions are discussed in detail: (1) Will computer-based management systems serve as a tool for practising a new type of research management based on systematic use of rational information? (2) How do the new tools help research team leaders to understand and take action concerning the economic profitability and societal impacts of research work? (3) Will the new tools enhance discussion on the priorities and direction of research between the management and researchers?

Collaboration between the staff of an automated laboratory and the university of applied sciences in work development

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This paper describes a collaborative project carried out between a work place (a hospital laboratory) and a university of applied sciences (vocational higher education). Both have traditions of improving and developing collaboration between them. In this study the collaborative project was based on the collaborative activity theory, and the method used was developmental transfer (Tuomi & Engeström, 2003).

The study analyzed a project (2005 – 2006) in which one of Finland's largest automated hospital laboratories and a biomedical laboratory of one of the biggest universities of applied sciences in were together tackling problems arising from changes in laboratory technology. Participants representing these two different organizations met five times in their shared boundary zone (developmental forum).

The focus of this study is the situation at the work place. The research questions are: How are the workers' opinions heard in the developmental forum, and how do they want to develop their own work with the university of applied sciences? The approach of this study is classification and description by using content analysis.

The research material for the study came from observations and recordings in the developmental forum, and from the interviews of workers from both organizations (biomedical technologists, physicians, chemists, teachers, as well as students).

At this stage the results show that in this developmental process the voice of the workers (laboratory technicians) is heard. However, they are not willing to develop their own work in this way, because they object the fact that they are the targets of work place development led by the university of applied sciences (according to the Law, 2003). They would rather be collaborators in the development process. The other observation is that the workers are not ready to share their own theoretical knowledge with the students, whereas they are willing to share their know-how with a few persons at a time in actual situations at their workplace.

The results indicate that there are problems in both organizations. The analysis of the results will continue in order to eliminate the hindrances and to find the strong positive elements in the long-lasting collaboration between the university of applied sciences the hospital laboratory.

Understanding changing mediaconcepts and media production

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Three central issues (Napoli, 2003) make media industry an atypical industry. Media is a central institution in our society in terms of time and money spent on its consumption. Secondly media is a highly constitutive actor in Western societies. Thirdly media products are special as a commodity. Their business model consists of two tiers of revenue creation. First the media produces content which is sold to an audience. Secondly these audiences are sold the advertisers or other interested parties. This means that the content is still a key component in the media business.

Media as an industry functions in an increasingly changing and competitive environment. Digital technology transforms media products and their production in the newsrooms. Media convergence, online newspapers, blogging, internet and mobile platforms are changing the way journalism is produced and consumed.

To understand the effects of the changing media sphere media organizations and researchers need to understand and combine knowledge of technological change, publisher's interests, journalistic culture and audience needs into an integrated approach. With this aim we have developed the notion of "the concept activity" (Virkkunen 2006, Töyry 2005) to be used in media research. The notion of a media concept has been used e.g. in the development of a printed newspaper's new website and its change into a novel web-to-print –publishing organization.

Analysis of media concepts open up the historical development of the activity in question, the heterogeneous and complex relations between the components of the activity, its internal disturbances and tensions and the historically developed contradictions.

A media concept consists on the first level of the values and needs of the publisher, the audience and the journalistic culture. The second level is formed by the architecture of the whole - the organization and the structure of the media product. The daily practice of management, production and journalistic tools make up the third level.

The structure and tools used in our Mediaconcept Laboratories follow the levels of a media concept. Besides using concepts from activity theory and journalism research we have introduced the concept of an implied reader from literary theory (lser 1976) into Laboratory discussions. It has been used as a tool to analyze and develop who are journalists writing for, how they frame their stories and what are the needs of the audience. The reader's needs can be identified as including more than just information. The issues of identity, belonging to a group, being entertained, given options on what to think of different issues and forming communities are also important for people and central in forming lasting readership relations, which are at the core of a successful media concept.

The concept of an implied reader functioned also as a tool for discussion and debate on values of journalism and the changing identity of journalists in the digital media. It helped focus on the changing object of journalistic work –from just writing my own stories to creating lasting readership and community relationships.

Expansive learning and change methodologies in CHAT: A case study

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Problem under study

A central requirement of Cultural Historical Activity Theory (CHAT) based developmental intervention methodologies is for the external research interventionist to work in a close cooperative relationship with the practitioners of the activity of interest. This type of intervention (commonly known as a 'Change Laboratory") requires that the practitioners are available for a period of specific time and able to attend the same location. To do this the practitioners are required to temporarily distance themselves from their work to facilitate their ability to focus on and analyse the systemic causes of the disturbances in their work activity and to develop new forms of activity through collaborative inquiry. However, is this the only method that is appropriate? What other forms of intervention might be used that are sympathetic to CHAT and to the context of the activity? In the context of bushfire management in Australia, the 'Change Laboratory' approach would be problematic due to a number of relatively unique characteristics; such as, the diversity of agencies involved with indigenous object oriented activities, the geographical distribution of personnel, a large proportion of the workforce are seconded from other areas of the workforce or are volunteers.

Objectives

Firstly, this paper will provide an historical analysis of change within bushfire management and how the change aligns with CHAT. Secondly, it will expand the current change methodologies to incorporate the principles of CHAT. Thirdly, it will develop a methodological approach appropriate to this context.

Methods

An audit of reports produced from various inquiries and reviews where changes in approaches to bushfire management are mooted in conjunction with other contextual historical documents and narratives has been undertaken. In addition, the experiences and views of personnel were sought in regard to the current change approaches and observations of personnel during training exercises designed to reify those changes were conducted.

Results/Discussion

Change within bushfire management has occurred in an environment void of CHAT based approaches. Some changes are more robust and adopted with a minimum of conflict and tension while others prove more difficult to implement. This kind of context requires an expanded repertoire of change methodologies in alignment with CHAT.

Conclusion

The vast majority of changes to the management of bushfires in Australia are determined by processes and demands outside the experiences of the local actor. In order for such changes to be successfully implemented it is essential that those charged with the execution of such changes are included in their design and the reconceptualisation of the object of their work.

Personal development in professional activity with risk-conditions

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One of the main problem of many modern organizations in Russia is the quick changes and risk conditions. For the understanding of risk-conditions in changing social and professional world we consider identity transformation and professional activity.

The main problem of current research is how the professional activity and social background connected with the identity forming process in risk-conditions of manager's work. On the base of functional activity approach the activity is a dynamic system with some important structures: aims, motives, decision making process important for this kind of activity personal features etc. (Shadrikov, 1996). In this approach the professional identity can be a part of personal characteristics, which goes from professional and social development.

Professional identity forms during the activity development. This is one of the important results and in the same time basics of the development personality in professional activity in different conditions, including risk-conditions (Povarenkov, 2002). It's the personal characteristic for the self-realization in activity. Professional identity can be an important criteria of professional development and can show us how person think about own professional efficience; how activity can influence on the self-realization of a person; what is the main system of professional values and norm which are more important for this professional community (Ivanova, 2005). During activity the construct of values, norms, and traditions of professional group forms in personality. In the same time person study themselves and how he/she changes under activity and professional norms. Person recognizes own professional features and own place in a professional space, which include not only social background (colleagues) but and object of activity (Povarenkov, 2002).

We study the process of development of professional identity in different professions: managers, teachers, businessmen. For the understanding of levels of professional identity we used three aspects: criteria of professional development; personal evaluation of profession and own position; professional features of person. The structure of professional identity as a result includes professional values, knowledge, and motives.

From the empirical research we observed three different levels professional identity and theirs specifics in different professional development.

- A) The level of professional self-evaluation (person as subjects of activity can describe their own features which help or not to work).
- B) The evaluation of professional conditions (person can say what is he/she thins and likes the professional context, conditions and own professional carrier).
- C) The evaluation of norms, values, traditions, which is character for the professional community (person can what is his professional community as a hole and can describe how he/she like values, norm etc of this community).

The ergonomists discourse about ergonomic work activities in design process

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How can ergonomics as a scientific discipline contribute to improving design work systems? Moreover, what are the contributions made by ergonomists through their participation in design processes? How do ergonomists describe their activity in design?

Although such questions are recurrent in many ergonomic conferences and journals, it is clear that the traditional mainstream experimental approaches to ergonomic research neither aim to, nor have the methods to answer them. To reach an understanding of the specific role of ergonomists in the design process and their social activities, we need to bear in mind the premise that the use of Social Sciences research methods is fundamental. They are already employed in studies produced by other scientific disciplines – such as architecture and engineering – to generate knowledge about their professional practice in design processes.

We can observe in the ergonomics research literature an growing interest about ergonomists participation in design processes, that aims to understand, 'the 'how' in an ergonomic change team' (as Theberge et al. [Negotiating participation: Understanding the "how" in an ergonomic change team. Applied Ergonomics, 37, 239-248, 2006].

Two related aspects can be observed. Firstly we agree with Lenior and Verhoeven (Implementation of human factors in the management of large-scale industrial investment projects: a managemnet point of view and ergonomics practice. *Ergonomics*, 33, 643-652, 1990) that 'in many publications the development of human-factors practice has been placed in an historical context by ergonomics practitioners' (p. 643). Secondly, one important characteristic of these studies is that they used narratives implicitly, and therefore did not accord them a central place in the account of the research process.

This paper analyses then the discourse about ergonomists wok activity contained in the narratives about the ergonomists role in design processes. A critical reading of some studies based on fieldwork research was made to discuss the models and perspectives of the ergonomists practice and action in design. It can be noted that although there is an important trend towards reflective approaches to ergonomists activity, the technical rationality is still strong in the ergonomic discourse.

Change laboratory as a platform for sustainable change in a surgical operating unit

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Objectives of the study

In our paper, we discuss the possibility of creating sustainable change in organizations. For the purpose we illustrate how a Change Laboratory intervention functioned as a platform of sustainable change in a Finnish university hospital. Our research team facilitated an intervention process in a Surgical Operating Unit during the autumn 2006 to improve the situation of a hospital unit in crisis.

Approach of the study

Sustainability and spread depend on the substance, context and process of change. We define sustainable a process through which new working methods, performance enhancements, and continuous improvements are maintained for a period appropriate to a given context (Buchanan, Fitzgerald & Ketley, 2007).

Methods of the study

Our method of the study is based on the activity-theoretical intervention method called Change Laboratory. A multi-professional working group, involving participants from different hierarchical positions and representatives of anaesthesia and surgery carried out the intervention. The two professions had previously focused in developing their historically diversified practices separately.

Results of the study

The unit functioned in a contradictory situation with an increased need for operating patients and on the other hand demands of effectiveness. The Change Laboratory method was used to specify the contradictions and to find new solutions for solving these contradictions. The organization and leadership model in use was questioned during the intervention and suggestions for improvement were proposed. In the process the working group created a new organization and leadership model which was completed in December 2007. The model is now in its testing phase followed by us.

Conclusions

Creating sustainability in development efforts is a long and a complex process that requires engagement and participation of management and employees. Bridging the managerial level strategy making and the development of practices on the level of employees is required for achieving sustainable change. Development of work needs to be carried out in close relation to day-to-day work and implementation of development outcomes is a part of the intervention process. A long-term partnership between management, employees, and researchers is required to achieve sustainable change. New tools are needed for the evaluation of the process and process outcomes in sustainable development processes.

Preaching in Sunday Mass: a Co-Analysis of the Activity of Roman Catholic Priests – a perspective in « Clinique de l'Activité »

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This contribution, part of the panel dedicated to the methodologies of interventions in « Clinique de l'Activité » on complex and symbolic activities, will present a research conducted in Paris with a group of Roman Catholic priests who volunteered to co-analyse their activity in public preaching during Sunday mass, i.e. in the *homily*.

The homily, as part of the liturgical action, is dedicated to a free commentary of the readings of the Bible. The priests committed to this research with some expectations regarding transmission and renewal of their homiletic practices. We therefore conducted this coanalysis in a developmental perspective thanks to the methodology of cross self-confrontations. Indirect methodologies were necessary to get a better scientific understanding of the complex symbolic activity of public preaching.

This contribution will present :

- firstly, the three steps of the methodology of cross self-confrontations designing the framework of the intervention;
- secondly, the main methods requested to post-analyse the data recorded during the intervention;

- thirdly, some results regarding the activity of public preaching. This research emphasizes that the visible activity of the priests is hierarchically structured around complex processes, and results from a creative combination of technical and symbolic resources to face the contradictions and conflicts generated by the requirements of the social activity of public preaching : among them, first of all, the conflict between personal and institutional speech requires each priest to build an original enunciation posture to speak to the parochial assembly. These results will eventually enable us to further discuss the concept of activity we rely on.

Keywords : activity model, preaching, homily, cross self-confrontations, indirect methodology, Clinique de l'Activité

Clinic of Activity: Analyzing Complex Symbolic Activities

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The research of the French team « Clinique de l'Activité » from the Research Centre on Work and Development at CNAM, directed by Pr. Yves Clot, rely on interventions aimed at helping practitioners analyze and redesign their professional activity. We conduct our interventions on direct request of practitioners or within the context of research programs in order to contribute to the elaboration and development of work situations through the co-analysis of real, concrete activities.

Our theoretical framework is both inspired by Vygotskian cultural-historical activity theory and by French-speaking ergonomics. We derive our methodology from Vygotskian recommendations on «indirect methods» designed to study psychological processes and the development of consciousness. We intend to build methodological frameworks which transform the status of professional experience in order to make it accessible and visible, on one hand to the practitioners, on the other hand to the researchers.

This panel will be dedicated to tight examination of the intervention methodologies built to analyze complex, changing work situations whose main features are their symbolic mediations in the relation to others: symbolic function, symbolic techniques. We will present four studies dedicated to different activities : the activity of catholic priests in Sunday homily, the activity of public prosecutors in the courts of law, the activity of managers in a big industrial company, and the transmission of professional gestures in cardiovascular surgery.

Titles of the different papers of the panel :

Real dialogue in public prosecutor's juridical activity, Katia Kostulski, CNAM, Paris

Preaching in Sunday Mass : a Co-Analysis of the Activity of Roman Catholic Priests – a perspective in « Clinique de l'Activité », Laure Kloetzer, CNAM, Paris.

The usage of conflictuality in an activity transformation method, Yvon Miossec, CNAM, Paris The psychological function of collective work : an instrument of development of body, Jean Luc Tomás, CNAM, Paris.

Real dialogue in public prosecutor's juridical activity

Kostulski K.

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In the vygotskian field of "Clinic of Activity", subject is defined between "given" and creativity. Vygotsky (1925) wrote: « Human being is, at any instant, full of non-realized potentialities. ». Those potentialities aren't absent from the psychological scene but push down on what the subject does. If this quotation is at the origins of a definition of the subject, it explains also the way we conceptualize human activity.

In this way, activity is of course what a worker does and that we can observe, the effective or realized activity. But beyond this effective activity, activity is also what the worker doesn't do: what he tries to do, what he doesn't (or doesn't anymore) feel up to it, what he still doesn't manage to do, what he should do if the conditions were different, what he does in order to avoid doing what is expected... This part of activity, that is called real activity (Clot, 1999), is part of our psychological work analysis. The subject is at the center of this continuous arbitration that will allows him, with less or more felicity, to come out with his own real activity in order to do what has to be done. To come out also means to renew the real activity. The job, the job's history, its techniques, is a support to come out in each singular situation.

We will present in this paper a two years long intervention initiated at the ENM's request (ENM: National School of Magistrature). The intervention concerns the public prosecutor's work. In effect, after fast and important changes, during those fifteen last years, that have impacted tasks, conditions and organization of work, the school wanted to permit the public prosecutor to think about the new questions in this new frame.

We will present the intervention, its frame, the involved professional group and its demand. We will show out the different moments of our analysis method (the crossed self confrontation analysis), we will examine a singular jurisdictional activity situation, and we'll propose some hypothesis, revealed by the analysis.

Juridical action, field of the jurisdictional powers of the Prosecution; involves a juridical dialogue that necessarily implicates an historical juridical trio: judge, prosecutor, lawyer. This trio, in the history of justice, constructed a well-charted territory of dialogue, defining by this way the frames, the forms, and the possible contents of the juridical dialogue.

We will argue that the historical forms of activity realization come to support interactional activity with others actors of justice in the juridical activity situation. We will also demonstrate how, beyond the actual interactional realizations, the real dialogue, historically spined between the three entities of justice, fills Prosecutor's activity.

Key words: juridical activity, public prosecutor, dialogue, real activity.

Mediated relationship between humans and world – a potential focus for a design discipline

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The paper is a conceptual and theoretical study on defining a proper field of study for the emerging discipline of Design Research. There has been a long quest to find and define this focus, and numerous suggestions have already been made. Among them are design process (e.g. Simon 1969), artifacts (Dahlbom 2002), or designer-situation-material triplet (Schön 1983). Recently there has been interest in taking a broader stance, like suggesting design as one of the fundamental forms of human existence and activity (e.g. Nelson & Stolterman 2003). This discussion has greatly contributed to the self-understanding of Design Research, but despite all labouring no universally accepted focus or area has been found yet.

The paper suggests that a potential focus for a design discipline could be the mediated relationship between humans and "the world", and from the perspective of remediation of this relationship.

Tool use is a simple example of functionally mediated relationship between humans and world: tools enable us doing something and at the same time they limit other possibilities of action; they are in between us and world. But the mediated relationship between humans and world is more complicated than that: besides functional mediation there is at the same time also semantic/cultural mediation (see Krippendorff 2006), and because we seldom make our artifacts ourselves, the relation is also mediated by the social division of labour, production and economics. The paper will further explore this triple mediation, and suggest activity theoretical conceptualisation to help in dealing with it.

Selection of a relationship as focus has some interesting consequences. First, the definition is so general that it is capable to encompass all the diversity of the design field; there is no design without a change in the relationship. Secondly, it bridges the gap between artifact designers and experience designers: remediation always operates through changes in material environment, although not necessary through specific artifacts – computer programs, sound and light belong also to materiality. Thirdly, the relation is not timeless and general, but very tightly culturally and historically conditioned: it is thus not stabil but in a constant flux and evolvement. Different artifacts (and processes where they are designed) are just instances of the long-term flow in the development of the relation – which makes it possible to understand why it has been difficult to base a discipline on them. Because of the continuous development of mediation, the study of dynamics of different forms of mediation and their connections with each other, will open up as a novel field of study.

The paper will further explore the consequences of this definition of the focus.

Documents in use in shop floor activities – ethnography and design considerations

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The aim of the paper is to study work activity by investigating how documents are used (produced and transformed) in the course of the work process. Our point of departure is that documents coordinate activities not only at a local place but also by connecting them to actions and activities "done elsewhere and at other times" as Dorothy Smith says in her attempt to lay the ground for an "institutional ethnography" (2005, p. 166). The work activity we are studying is shop floor activity of two kinds. One is nurses work in a municipal organised elder care, the other is machinists' precision cutting of cast metal pieces. We think it is a point that the work activities we focus on have a suffering human body or some cast pieces as "raw material" objects. In contrast to white collar work, that is, mainly transformations of texts and talk, this is about document use connected to another distinct core activity. Beside ethnographic descriptions and analyses of the two work activities, the aim is to outline design ideas that might improve the documents to be used or the usage of the documents.

The approach is to focus on documents in use, and adding video recordings of the usage when possible. We always look at traces of transformations of the documents.

Results. A characteristic feature of the activity of the nurses is that they are on the move and on the go. This has the consequence that they until recently have preferred an old-fashioned mobile information system in the form of a bag on wheels (which they load with appropriate binders and documents). Now we find in use both the old system and a computer-based ICT, at first designed for administration purposes but later extended with more specific "nursing documentation" modules. A consequence is that the ICT desktop solution does not easily fit into their work practices. At least, the size of the graphical interface is a problematic issue related to the very mobile character of their practice. In the machinists' practice, an observation reveals that they are not only using paper, digital texts and pictures; preliminary machined cast pieces are annotated and used as intermediate documents at the shop floor. Another observation is that the machinists do not only use documents, they redesign them. This aspect of their work need to be acknowledged, and if a more standardized and comprehensive ICT will be introduced (it is actually planned), a machinist' access to an authoring tool, making it possible to edit data and format of the same ICT, seems as an important interface aspect.

The main conclusion so far is that both the nurses and the machinists face a contradiction between the rational (clean, logical) instructions and rules they are supposed to follow and the reluctant (dirty, illogical) reality they have to deal with. They handle the contradiction by transforming it into a dilemma to cope with. And they cope with it by "going between": interpreting instruction according to circumstance as well as rewriting the instructions.

Activity-driven design of collaborative tools for nuclear power plant control rooms

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Both nuclear power plants in Finland are modernizing their automation systems, human-system interfaces and control rooms. Due to this ongoing process, analog panel-based human-system interfaces will be replaced with digital instrumentations. The upcoming change is expected to have an effect on operators' work practices. We are participating in the modernization of nuclear power plant control rooms and in the design of new collaborative tools for those.

In the design of complex industrial information systems finding a proper balance between theory-driven and practice-driven approaches is essential, e.g. to decide how to exploit the information from studies of user practices in the functional modelling of the to-be-designed systems. We are convinced that a link between theory and praxis is at best developed in a collaborative communication process between designers, researchers and operators. The method we have used is a mixture of different types of techniques within the context of participatory design. A technique that has shown to be especially useful is based on dialogic communication between researchers and process experts. An attempt to build up a dialogic relationship between different stakeholders takes place in a special kind of future workshops arranged. The workshops aim to bridge the gap between and to integrate expertise of different actors in a way that makes possible to illuminate the phenomenon from different perspectives. The workshop participants first develop in small groups a future plan in which the actual state is imagined from the future perspective by considering which kind of problems they have at the moment and by which way the problems could be tackled within a longer term perspective. Secondly, reflective thinking is promoted by letting each group at the time to present their ideas while others are listening.

We have found that since the nuclear power process is very complex, profound expertise in the nuclear field is a key prerequisite for success in the design of new tools for the CR environment. We have also found that the development of mutual understanding between different stakeholders is a complex process that needs time. Even though the used dialogic method has shown to be promising, new ways to build communication and understanding between operators, researchers and designers are required.

Understanding the social context of failure: Applying activity theory to risk analysis

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This paper proposes to rethink risk analysis based on activity theoretical concepts. Risk analysis constitutes a standard part of engineering work, and technical systems are generally assessed for the probability and impact of failure modes. However, the current practice is often based on unrealistic assumptions about the conditions in which systems are operated and does not sufficiently represent the social context of use. This paper therefore proposes to rethink risk at the level of the activity, using the activity as the unit of analysis and conceptualising contradictions as possible sources of risk.

An analysis of one of the biggest disasters in the aviation history, the mid-air collision over Überlingen in 2002, is used to illustrate this new approach. The overall system failed due to maintain safe separations between aircraft due to contradictions on two levels. The first contradiction concerns that between production and safety: Air traffic control was upgrading their system in order to enhance safety, but maintained normal staffing levels during an abnormal situation. This led to a single controller attempting to manage traffic in different sectors, while several parts of the radar and communication system where unavailable. The two aircraft subsequently both received a warning and resolution advisory from their automatic warning systems (TCAS), which one crew followed while the other prioritized the instructions from air traffic control. This illustrates the second contradiction between human and technical means to maintain safe air traffic.

It can be argued that there should have been a more rigorous assessment in the implementation and use of technology. The way the collision avoidance system TCAS was implemented defined the system boundaries too narrow: TCAS is only effective if used consistently, and the technical system on its own was not sufficient given the legal intricacies and different practices in aviation around the world. Air traffic control should have assessed the risk of conducting an upgrade of their equipment more thoroughly, given that they had had previous near miss incidents of a similar nature to Überlingen.

An activity theory informed approach to risk analysis should therefore include the historical trajectory of the artefacts in the system, such as TCAS as an added piece of technology that was not embedded in the activity of the Bashkirian crew, neither technically in the aircraft itself nor in the working practices, nor was there a clear link of automatically generated instructions to the pilots to the human controller on the ground. Based on the analysis, recommendations for an activity theory-informed approach to risk analysis will be discussed. These include the consideration of the collective nature of activities, of intentionality rather than causality, and the development of the object over time.

Analysis of changing rail traffic control work as a central point in a network of activities

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The Finnish Rail Administration (RHK) is responsible for traffic control in the rail network of Finland. Traffic control ensures that trains operate safely, efficiently and on schedule. It includes the control and management of traffic required for traffic as well as traffic maintenance. With the introduction of competition due to the privatization of railways, requirements concerning transparency and neutrality in traffic control have increased. The concentration of traffic control and the expansion of remote control with a new comprehensive data system have set new requirements for the work. To support the implementation process of the new system in southern Finland, RHK and the Finnish Institute of Occupational Health (FIOH) launched a research project in 2007. The aim of the project was to analyse traffic controllers' work and workload in the new situation to ensure the quality of the implementation process and safe and efficient traffic control in the future.

Several studies have been conducted on work in dynamic, uncertain and complex environments. Previous studies have mostly focused on complex tasks using core task analysis and cognitive work or task analysis. According to the studies, the physical environment at control centres has improved, but in disturbed situations many things seem to happen outside the span of control of the workers. In traditional ergonomic research, these elements are categorized as "environmental factors" caused by overall organizational changes in the sector. From the point of view of task analysis, they often seem to constitute factors that are given and accepted as such.

In our project, we started to collect data from several sources: 1) by interviewing the representatives of different activities around traffic control such as Rail Administration, Rail-way Company (VR), and Finnish Rail Agency (RVI), 2) by interviewing traffic controllers and following their every day work situations, and 3) by collecting various documented data on traffic control work (e.g. work specifications) and disturbances (delay reports, accident reports, etc).

The interview data showed that during the last decade the functioning of the railways was split into several companies (e.g. RHK, VR, RVI) that have constructed their own business logic, service concepts and mutual relations. Traffic control work constitutes a crucial connecting point in the whole network. The challenges for traffic control work seem to be not only to implement and operate the new data systems but to adjust the demands of the traffic actor network in every day work. In this changing network frame, we conducted a detailed analysis of both the consequences of the different concepts in the organization concerning traffic control work and the traffic controllers' daily work processes and tasks and disturbances in them. We will present the findings of this analysis, focusing especially on disturbance analysis and handling as a shared task of the network.

Models and tools for the consideration of the work activity in the investment design process

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In intensive technology-driven design processes human work activity is often poorly considered, leading to continuous corrective measures during the design and implementation process, and at the end, to unsatisfactory working conditions. The development project was conducted to create models and tools for the consideration of the work activity as well as other ergonomic aspects in the investment design processes at sawmills. Involvement of all personnel groups in design was seen as a necessity, and this principle was followed also in this development project.

The project was carried out by workshops, group sessions and communication by e-mail. The representatives of a large Finnish sawmill company participated in the project: managers, supervisors, employees and health and safety experts. Also representatives of the two manufacturers of sawmill machinery were included in the project group. The four experts from the Finnish Institute of Occupational Health guided the process and the sessions, and acted as supporting experts in the needed domains (ergonomics, organizational development, industrial hygiene and occupational safety).

The underlying methodological assumption was that, in the tight schedules of investment projects, the continuous communication between the designers and other personnel groups is crucial for the all-inclusive development of the systems. This communication is expected to gradually lead to mutual learning and to common understanding between the technology-oriented and human-oriented approaches. The communication and the practical design has to be goal-directed and supported by the appropriate set of tools, covering essential problem areas and methods of all-inclusive design.

The design process was described in detail in order to find out the possible practical ways to connect the planning of the work activity into the relevant stages of production design, machine design and the design of the premises. The entire process from the strategic design to the full use of the production line was covered. The emphasis was, however, in the preliminary design, as the description of work activity and other ergonomic requirements had to be included already in the specifications given to the manufacturer of the machinery.

The tools (design criteria and guidelines, checklists for the meetings or the design events, excel forms, etc.) were developed together with all interested groups, in order to make them practical, and thus to ensure their use in the future design projects.

In order to disseminate the use of these developments within the organization, they were compiled into an extranet application, and completed by associated explanations, justifications and instructions. This extranet is accessible for all personnel groups to facilitate the collaborative mode of designing.

A socio-cultural perspective to the study of the development of curriculum leadership: a Hong Kong case study

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This study is designed on the basis on the key premises of Activity Theory, in the development of curriculum leadership among a group of primary teachers in two innovation engaged schools in Hong Kong China in April 2005 and 2007. Three curriculum development teams were formed and their membership and leadership were manipulated to create internal tensions and contradictions among members in a flattened leadership context. The aim is to investigate the extent that teacher participation in curriculum decision making processes is mediated by the artifacts such as hierarchical power, roles and leadership styles. The findings based on the analysis of the interviews as well as the video taped meetings of the Mathematics and Chinese curriculum teams point to the varying mediation effects of the two artifacts, namely the roles of the consultants and the leadership styles upon teacher participation. On the effects of the roles of the consultants, two types of professionality were asserting different influences on the mediation processes. The restricted professionality focused on closed discourse between participants and the leadership style was power coercive. The extended professionality however, generated an open discourse with evidence of multi-structural interaction pattern. The nature of the former is didactic while the latter is more negotiable among members. On leadership styles, the personality of the subject head and its degree of domination was having effects on the discourse styles and participation nature, though the distributed leadership was in function in the curriculum development teams. Assertive subject head constrained the interaction pattern of the meetings while the less assertive one opened opportunities for exploration and experimentation by the members of the teams. In conclusion, various artifacts assert their influences in the mediational processes of the interaction among members of the curriculum teams and these mediational effects have either constrained or facilitated the learning opportunities for the participants. This study has posed questions for the school educators and curriculum leaders who have been over optimistic about the notion that teacher participation leads to teacher learning and development. The case of Hong Kong with a strong culture of loyalty and hierarchy may provide a cultural additional dimension to the study of curriculum leadership broadly and to the use of Activity Theory in the study of teacher participation in the school curriculum development.

Are nuclear industry organizations expansive learning environments from the viewpoint of experts?

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Currently the nuclear industry organizations face the challenge of preserving expertise, competence and knowledge despite of the ageing workforce and the reducment of new recruits and students entering the nuclear industry. Although many other industries share similar challenges, the preservation of expertise in the nuclear industry is even more important due to the safety-critical nature of the work done in the organizations. Research on work, expertise or their development in nuclear industry has previouly focused on the operators in the nuclear power plants. However, also the work of those who make decisions concerning the objec of work, equipment used in the plants, maintenance of the plants etc. has an effec on the reliability and safety in the nuclear industry. But their work has only seldom been studied.

In this research the expert work and HR functions that support the development and preservation of expertise in nuclear industry organizations were studied. The study is a qualitative cross-sectional case study with two cases from different nuclear industry organizations in 2007. The main data comprises of thematic interviews. 18 experts were interviewed about the nature of their expertise, it's development, and organizational support they receive in developing their expertise. The experts work mainly in safety management tasks, such as reactor monitoring, risk calculation (PSA), structural design, material technology, and radiation safety. Nine interviews have been carried out for managers to explore the managers' role in designing human resources and their insights on the current HR practices supporting the development of expertise. In addition, two HR representatives have been interviewed to uncover how HR functions, such as recruiting and training, operate currently.

The interviews revealed numerous ways of assuming nuclear expertise. A newly recruited person can develop into an expert e.g. by reading and updating documents, engaging in discussions with experienced experts, taking part in meetings and work groups, networking with experts within and across organizations, using technology (such as automation and simulation programs), schooling oneself in training courses and acting as a consultant. However, working in a meaningful and challenging project was regarded as the most effective way of learning. The experts assessed that it takes approximately five years before a new recruit is able to achieve a deeper level of expertise. This poses the challenge of how to motivate new recruits into working in a complex technical field, which is not easily mastered, for several years.

The interviewees listed different HR practices relevant for developing expertise, but they also had ideas as to how HR practices can be developed in the future. They proposed that a detailed risk management plan for expertise and knowledge would be done at the level of organizational units and more resources would be acquired to safeguard the expertise. Career planning should be more systematic and different career paths should be made visible. More and deeper cooperation with the universities was needed. Finally, job rotation should be made possible in some areas of expertise.

From Designing Tools to Designing Organizations: The Rise of Conjoint Collective Activity

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Actors' activities are framed by generic classes of activities of two kinds: (i) professional "genres" (Clot), generated by the history or the social institutionalization of professions, involving professional rules, tools, etc.; (ii) processual groups of activity (often called "processes" in organizations), i.e. classes of activities which are defined in a complementary way and combined to pursue a global purpose. For example, the generic "accounting" activity is a professional genre, whereas the combination of accounting activities with purchasing, quality control and inventory management activities to achieve procurement operations is a processual group of activities, the "procurement process". Activities belonging to the same professional "genre"characterized by their similarity - can combine into "common collective activities" (e.g. the purchasers of a firm accomplish the common purchasing activity of the firm). Processes are not "common", but "conjoint" collective activities. Those two types of collective activity can generate two types of communities: (i) communities of practice, with actors practicing activities of a given "genre", hold together thanks to shared professional values and "mechanistic solidarity" (Durkheim); (ii) communities of process, with actors practicing the distinct activities of a given "process", hold together thanks to "organic solidarity" (Durkheim: necessity to reach a global purpose, essential to each actor).

Whereas common collective activity must often deal with the institutionalization of common practices (education systems, professional regulations...), conjoint collective activity is closely related with the organization design and must deal with fundamental formal and informal features of the organization (division of labor, technological options, power delegation, coordination practices, measurements). The basic hypothesis of the proposed reflexion is twofold:

1. Instrument design tends to evolve from instruments dedicated to professional genres and incorporated in them, to process-based instruments, which address processual groups of activities, are multiprofessional, and, as a result, address whole organizations rather than specific actors; ERP are a good example.

2. Due to that evolution, the problem of instrument design can no longer be addressed by analyzing the utilization of the instrument in a specific localized activity, but requires the analysis of processes, involving macro-organizational analysis.

We shall try to identify:

1/ the main characteristics of conjoint compared with common collective activity, e.g. the importance of the time dimension, irreversibility, directionality, heterology (diversity of professional and cultural genres involved), heteroglossy (diversity of languages),

2/ the practical consequences: importance of irreversibility management, of translation activities, of "linking pins" actors, hybridization of competences.

It will be concluded with the resulting scientific and methodological challenge for researchers: since the design of instruments involves future activities closely interrelated with future organization, their study requires in-depth cooperation between organization studies and activity studies, and the development of research methods which allow this cooperation.

The usage of conflictuality in an activity transformation method

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We have been involved in a cooperation project with a leading electricity company for a number of years. Initially launched by the French Department of Health, the project is now being led by a committee of senior executives who require support on occupational health issues centred around work efficiency.

The project covers several categories of the workforce: operatives, technicians and local managers.

This presentation will describe the impact that our intervention has had on managers.

These professionals deployed the work analysis tool as an instrument (Rabardel) to develop their own activity. We will examine the outcome of their use of an indirect work analysis method (Vygotski): instructions based on one's double (Oddone, Clot).

The managers drew on work analysis sessions to re-rank the tasks they perform. Through this work, they were able to set their priorities (direct team work) and waiver certain reporting proprieties laid down by the organisation In their own words, they «mustered up the courage to refuse certain constraints». In so doing, they first extended their power to act (Clot). They then demonstrated to senior executives that they were the main protagonists in restoring the margins for manoeuvre (Coutarel).

We will demonstrate that the versatility of the work transformation method lies in the fact that it develops conflictuality at the workplace and into the activity). The detailed questioning of work sequences has rekindled work-related conflicts by reminding the managers that their current working method is just one option among other possible options. Far from laying down best practices based on a consensus, our investigations led to controversy between professionals.

Such conflictuality disturbs the subjects, arousing in them ambivalent feelings: on the one hand they rejected the approach, on they other they adhered to it (creative versus destructive discordance, Clot). We will draw on our analysis of this situation (the subjects finally bought into the approach) to highlight how the spread of conflictuality (collective, subjective, cognitive) leads to activity development.

Keywords: long-term intervention, conflictuality, work analysis method, experience

CASS-methods and tools for investigating academic knowledge practices

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The Contextual Activity Sampling System (CASS) research methodology and the CASS-Query mobile application have been developed for contextually tracking of participants' knowledge practices. By 'knowledge practices' we mean social practices related to working with knowledge, i.e., personal, collaborative, and institutional routines. These include repeated procedures for carrying out learning tasks, solving problems, completing assignments, and creating epistemic artifacts. The method relies on Ecological Momentary Assessment designed to trace real-time advancement of learning activities by frequent sampling during periods of intensive follow-up.

A central aspect of the present investigation is to examine the objects of the participants' activity across the follow-up period through pre- and post-investigation interviews, daily probing, and moment-to-moment tracking. By this design, we attempt to address the postulation that collectively cultivated knowledge practices, far more than personal dispositions or beliefs, determine the nature of learning. The paper presents a subset of findings from the first year data-collection from five groups of students, regarding their knowledge practices while studying in a higher education context. Affects, challenge, competence, and commitment are reported together with the information about interaction and context, collected using mobile phones in an intensive two-week follow-up period. Results revealed that different contexts were associated with variable combinations of challenge and competence. Within the three studied institutions, the students reported markedly different patterns of engagement in collaboration, suggesting that the design of the curriculum may have a major impact on whether students ended up working solo (more lectures and exams) or with peers (more projects and collaborative assignments). Further, studying in a library and a small group were related to the highest ratings of optimal experience and commitment. Methodologically, the fixed-interval sampling provided us a required baseline for further comparisons, but revealed that an eventcontingent sampling is required to be more descriptive on the object-oriented activities.

Keywords: knowledge practices, research methodology, experience sampling, mobile application, higher education

Acting with procedures in complex work – A challenge for work design

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The study discussed in this paper is part of a Finnish national research programme for nuclear safety within which human factors expertise is exploited in the modernisation and design of nuclear power plant control centres and work stations. The challenge for human factors experts is twofold. First, they have to convince designers of the fact that inherent to changes in tools is that transformations take and must take place also in working practices (Rabardel and Beguin 2005). Second, human factors experts must be capable of providing predictive knowledge of features that will have relevance in the future work. This knowledge must be applicable in the design process. (Papin 2002).

The specific problem of the present study is to understand the role of procedure-guided acting in the new concept of operations of complex process control work. The concept of operations (ConOps) is a description of the present and future way of operating in a particular work. One issue to be designed in ConOps is the role and type of procedures in achieving the aims of the work. Procedure-guidance is a typical way of organising desired task performance and team collaboration, and controlling the outcomes of acting. It also portrays the design decisions concerning the division of responsibility between human and technology as procedures can be considered one form of automation (Pirus 2004). While the motivation to control the human task performance in complex high-reliability work is clearly motivated, it has also been shown that too high level of procedure guidance is both unrealistic from the human activity perspective and un-optimal from the safety point of view (Filippi 2006). There is a clear need to understand more profoundly what is the psychological nature and structure of procedure-guided activity. Insight of these issues should be incorporated into design decisions. Process control work in nuclear power plant control rooms is analysed to understand operating with procedures using the Core-Task Analysis approach developed at VTT (Norros 2004).

The focus of the study is to understand the use of procedures in process control. The basic assumption is that procedure usage is an intrinsic feature of the work, independent of the level of the actual usage or procedures in particular situations. Moreover, we consider procedure as a medium that has three main functions: instrumental, psychological and communicative. In the present study empirical material is collected from experiments carried out of nuclear power plant full-scale training simulator. Operating situations used in the simulator studies are carefully designed and modelled. Models provide a possibility to create realistic test situations in which the researchers can make explicit which kind of informational, procedural, technical, and collaborative resources the operators have available, and based on which adaptive practices or patterns to maintain the objectives may become observable. In the paper we shall discuss the research hypothesis concerning the procedure usage and the first results of the analysis of simulator experiments. The results are also discussed in connection to the new concept of operations to be developed to nuclear power plant control room work.

Transforming Knowledge Practice in Cardiology

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The object of this study is to explore knowledge construction using a web-based learning environment in the cardiology unit in a regional healthcare institution in Norway. The healthcare institution is in the middle of relocation, transfer and reorganization, including reorganizing the physical context and workflow. The use of web-based learning environment is one of several cultural tools for skills training and competency development for improved practice and patient safety in this work-life context.

In the case study we follow one of seven pilots; "Function of the Scop-watch in Cardiology". The aim is to train, certify and re-certify nurses in all aspects of their scop-watch function; to assume responsibilities for continuous observation of monitored patients' heart rhythms. This course is developed by a team of four nurses, one from the hospital's competency department and three from the cardiology section, two critical care nurse specialists and one staff nurse. The target groups are nurses in the cardiology section in this hospital, and two other health-care organizations in the health region.

Our focus is on the pedagogical and didactical design and the healthcare professionals reasoning and negotiations around the knowledge construction processes in this social practice over time. In particular we explore how web-based tools can be designed for training purposes and for support of learning in work contexts.

We apply concepts from Cultural Historical Activity Theory in the analysis. The mastery of new concrete skills (i.e. object of activity) for patient safety (i.e. goal) is the primary unit of analysis and determines what action is directed towards. This is dynamic and can change in response to the available tools and signs at a given time. We focus on how affordances and components in the web-based design tool are perceived and utilised and how content is represented in the learning environment and how this relates to mastery of concrete skills and construction of knowledge considered valid for the scop-function by the professions (RNs and MDs in particular) and by the hospitals. The analytical work includes how participants negotiate and act, and the institutional context and history as framing the interaction data.

Our analysis starts by looking into how the affordances of the ICT-tool are articulated in the collaborative talk, and evolving negotiations of content, and subsequently utilised in the design and the use of ICT-tools to support learning of new skills. We follow the interactions and dialogues between participants and interactions between participants and tools. Our first reviews of data indicate the importance of negotiating a common ground and establish mutual understanding of the object. In the design phase, several aspects where identified as critical for patient safety, including early detection of signs of critical illness in heart rhythm monitoring, awareness of professional responsibilities, correct and shared understanding of work procedures and the correct use of technical tools. Affordances of the authoring tool (ICT-tool used for designing the course) played a structuring role in the pedagogical and didactical design.

Responsibility and patient safety worry in technological changes in health care

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In the culture of health care, patient safety is created through individual responsibility, personal expertise and informal but deep-rooted occupational roles. The processes of care are not very well formally defined. Organizational changes affect occupational roles and the processes of care, and thus also patient safety. There are tremendous pressures at health care to work better, faster, and cheaper. To accomplish this, new technology is introduced, activities are outsourced, and processes are streamlined. A challenge for research as well as practice is how to manage technological changes in health care in such a manner that the quality of care is not endangered. In this paper we study the effect of two dimensions on change; patient safety worry and responsibility. Patient safety worry means the personal feeling that the organization is not able to guarantee the safety of the patients. Responsibility refers to both formal responsibilities as well as informal sense of responsibility.

This paper is part of a larger project focusing on patient safety risks related to technological changes (SafeChange). In the project, case studies were carried in three Finnish health care organizations who were about to implement new technology (electronic patient record system at a central hospital, anaesthesia and intensive care information system at a trauma hospital and a new company providing telenursing services). In the project an organizational assessment was conducted for all cases before and after the change, and generic organizational phenomena relevant for patient safety were identified. The assessment was carried out with the Contextual Assessment of Organizational Culture methodology, which includes interviews, group work, seminars and an organizational culture survey. In the survey (n = 1110), there were four measures relevant for this paper: sense of personal responsibility, felt accountability, sense of control and patient safety worry. Altogether 40 interviews were conducted, where both formal and informal responsibilities were enquired.

Results indicate that patient safety as an issue was seldom an explicit concern for the personnel. Some expressed worry about patient safety in the survey (mean 3.1 on a six point likert scale with SD of 1.4) with nurses expressing more worry on the average than doctors but in the interviews safety issues were rarely explicitly mentioned. Patient safety worry did not correlate statistically significantly with sense of personal responsibility or felt accountability, but some negative correlations were found between sense of control and patient safety worry. Patient safety worry seems to indicate a mismatch between the current perceived state of the system and the ideal state. Interview results indicate that personal responsibility was emphasized by both doctors and nurses as important for patient safety. The technological changes made transparent the extent to which patient safety had been based on informal responsibilities. Patient safety was felt endangered since some of the responsibilities were questioned and the functioning of the system was thus threatened. In the paper the significance of responsibility issues in change situations in comparison to other patient safety risks is considered.

Enhancing effectiveness in emergency incident management: Emerging organisational forms

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Problem under study

Risk management focuses on understanding how individuals and organisations foresee and manage threats to their work. However, in emergency management, mitigating risk is embedded directly into the work activity. When an emergency occurs robust organising occurs at short notice. The workforce to support these ways of organising are often drawn from people engaged in other kinds of day-to-day work. The Incident Command System (ICS) is a form of organising to both escalate and deescalate in an emergency.

There are tensions created by other forms of organising that are not part of an acknowledged ICS activity system that spring up outside of an ICS. This involves media, communities at risk and altruistic self-organising helpers. A new concept is needed to represent the interaction of these organisational forms.

Objectives

This paper will outline a history of organising activity for managing emergencies in Australia and will analyse the trajectory of work. The paper will outline some of the tensions embedded within the ICS as it interacts with other formal and informal ways of organising and analyse the potential of these to act as driving forces for change. The paper will establish possible future trajectories and set the scene for a discussion on which kinds of change interventions might be appropriate for this enable the development of this form of work.

Methods

Interviews have been conducted with 75 experienced personnel involved in fire and emergency management. In addition observations were conducted of planned and unplanned emergency incidents over the 2006-2007 fire-season.

Results/Discussion

Managing incidents in Australia is increasingly more complicated by changing physical environment (drought, other environmental concerns); increasing expectation from community members for real-time accurate, and relevant information and needs of other stakeholders.

Conclusion

There are a range of organisational forms, these include centres of coordination and spontaneously organised groups, which interact in times of emergency and new approaches, are needed to achieve timely integration of services. This analysis provides an alternative view of Engestrom's "high-greed" globalised organisational types because these developments are both localised and altruistic.

Good start of the regional development project - does it bear?

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Laurea University of Applied Sciences participated as the main coordinator and partner on a regional development project regarding cooperation network of a Hospital's and five Health Centres' laboratory and imagining services in 2002–2005. According to the outcomes of the basic analysis in 2002 the development project was planned to further enhance the professional cooperation between laboratory and imagining personnel. The work was implemented in groups of multidisciplinary experts. The groups were 1) data processing and logistics 2) work-related well-being of the employees 3) calculation of efficiency and 4) quality control. 10 experts and 42 students from Laurea with 81 laboratory and imagining specialists took part in the project.

The innovative and advanced knowledge was generated by means of coding, compiling statistics of laboratory and imagining performances as well as calculating output-based costs and calculation on costs. Coherent research guidelines were produced to both patients' and employees' use. Guidelines were introduced also to preserving and transporting of specimens, procedure manuals and radiation safety of x-ray equipment and to x-ray and laboratory audits. The statistics and codes of laboratory and imagining research were integrated. Principle plan and cost calculation of municipalities were also introduced. As a result of the project customers' laboratory and imagining service encounters have enhanced, the delay time of services has decreased and the delivery time of research results to attending specialists has shortened considerably compared to initial situation. Integration of operation models has deleted unnecessary and overlapping examinations.

The outcomes of the project were meaningful in the purpose of developing networking, learning new working functions and methods and building an interactive community crossing the traditional boarders of theory and practice, municipalities and organizations, and increasing experts' influence and participation on development of their own expertise work. The project can be seen not only 'multifunctional' and multi-disciplinary but also productive. But how did we do that? Could there be found some methods used at the very beginning of the project which 'bear'? It can't only be that nice people do nice collaboration. Could it be that in addition to nice people and good experts there are also other influencing things as e.g. 1) experts as initiators – 'bottom–top'-method 2) sharing opportunities – to share knowledge of different contexts and agency of work 3) opportunities to share with the others your best knowledge and your tacit knowledge 4) atmosphere which allows and feeds ideas and innovations – not 'white or black' thinking 5) the feeling of to become listened and honoured and 6) multi-voices in collaboration? Do these 'bear' and fix the group into creative collaboration – is it the sense of togetherness?

Multimodal Activities in Technology-mediated Training

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The presentation consists an ongoing study concerning training practices in air traffic controller *ab initio* training. The study is concerned with the nature and the dynamics of social interaction between the trainee and the trainer. The study develops a perspective from which to investigate interactive training as situated accomplishments that emerge from their practical management within language, social configuration and material resources. Talk is the primordial site at and through which trainer and trainee express their understanding of the training situation, and negotiate their division of roles for participation in it. Talk makes the sense of the social activities intersubjectively available, amounting to what Heritage (1984) has called the architecture of intersubjectivity. However, talk and social actions are not two separate plenums, talk being the medium for orchestrating activities through emerging agencies.

It is not talk as such, but the coordination of talk and action that establishes the sense of the ongoing action (Goodwin 2000). Coordination is especially important in high reliability organizations such as aviation in which multimodality dominates. The air traffic control involves organized ways of coordinating technically assisted teamwork that counteracts potentially hazardous errors and safety gaps. The goal of air traffic control is to handle large volumes of traffic both safely and efficiently. The work is characterized by the redundancy which can provide "back-ups" in case of possible errors. Our study shows how multimodality of interaction makes sense of the ability to respond, to monitor and to anticipate with irregular events and potential errors.

The video-taped research data was gathered during the years 2006 – 2007 from two environments, the aerodrome control simulator and in real work settings in tower control during on the job training phase among *ab initio* trainees. The analysis of video recordings combines the study of oral interaction and visually observable physical actions. The spoken interaction is transcribed using the conventions of conversation analysis, and visual actions are linked with the stream of verbal actions. We will show how intersubjectivity, the shared understanding of ongoing training action is accomplished by multiple modes of communicative resources (Palukka & Arminen 2005) These resources include verbal and non-verbal practices in interaction and technology use in on the job training. The interactive training practices cannot be reduced simply to speech acts and practices, but are distributed through multimodal communicative practices and technological artefacts both in simulated learning environments and an authentic work environment.

As a hole, the study discusses how talk and other activities as ongoing achievements contribute to the emergence of social actions, not merely trying to understand talk or the organization of action. It identifies salient forms of interactional patterns that constitute to establishing the social world as perceived.

Development in professional cleaning work brings challenges to training in ergonomics

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Professional cleaning work is a fast-developing and fast-growing labor-intensive branch. Domination by women, low appreciation, part-time employment, and ageing, young, and multinational workforce are particular features of cleaning work. Musculoskeletal disorders are common among cleaners even though working methods, equipment, and machines have improved greatly.

The aim of the present study was to evaluate the ergonomic risk factors in professional cleaning work and their effects on musculoskeletal disorders during the ten-year period. Ways to improve the level of ergonomics through regional interventions were also explored.

The material was collected in three interventions: in the Kemi-Tornio Region in 1997, in Rovaniemi in 2001 and in Oulu in 2006-07. The interventions began with a questionnaire charting cleaners' work and occupational competence, health and disorders, and cleaning equipment. Typical cleaning sites including offices, supermarkets, hospitals, and schools were then selected as the objects of the ergonomic surveys. Cleaners were observed in their daily work, and the ergonomic risk was assessed. The interventions included training courses and series of lessons about ergonomics, and discussions about interaction between cleaning and other maintenance work of premises and facilities. In addition, training material was prepared and published in the internet.

According to the questionnaires, musculoskeletal problems caused by cleaning work most often appeared in the neck-shoulder region and in the back and arms. Pain in the neck-shoulder region increased evidently with age. The cleaners themselves estimated that the repetitive movements and continuous moving caused the greatest physical stress in their work. Cleaning equipment and machines were estimated as fairly good.

Based on the surveys, cleaning work was assessed as moderately heavy containing heavy work phases such as lifting garbage bags. Use of water was associated with physical stress, and it has decreased during the years. The cleaning equipment and machines fulfilled the ergonomic requirements. However, the spaces to be cleaned were often impractically furnished. The mopping of floors involved repetitive movement of arms. Mopping technique was generally good but sometimes the handle was too long. Bent postures of the back were common and hands were often above shoulder level.

Cleaning is done mostly with the hands and the body, and cleaners are able to plan their own work to some extent. This enables them to influence the physical work load and musculoskeletal disorders. Cleaning techniques, tools, and machines have recently undergone major improvements, which has resulted in training needs for cleaners. The conclusion is that professional cleaners would benefit greatly from relevant training in ergonomics and working techniques arranged at vocational schools and at workplaces.

Teamwork brings well-being to premises and facilities maintenance work

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The focus of the development project was premises and facilities maintenance work, which consists of cleaning work dominated by women and building maintenance dominated by men. Earlier these work areas functioned separately. Since the object of the work is the same, the building or buildings and the surrounding area, most enterprises nowadays offer to their clients an all-round concept supplemented by a range of optional services.

The aims of the project were to promote the health and well-being of cleaners, maintenance workers and their foremen by studying their work practices, and to form a common concept of three separate methods of approach: risk assessment, safety management, and developmental work research. Two enterprises participated in the project. Both of them selected as their object a single large piece of real estate the whole maintenance of which was organized by the same company.

In the beginning, all researchers collected preliminary data with their own methods. The data was discussed in meetings held between the research team and representatives of the enterprises. Ergonomic risk assessment revealed challenges in the instruction and guidance of new employees in the use of cleaning equipment, as musculoskeletal disorders caused by repetitive movements were common. Need for improvements was also identified in the management of chemicals and use of personal protective equipment. With superiors, a risk of mental overload was associated with excessive daily and weekly working hours. The survey of safety management conducted in the enterprises stressed the importance of reporting and feedback of work accidents, near misses, and dangerous situations. The disturbances at work were emerged from the interviews carried out based on the developmental work research method, and they seemed to associate with the incomplete shift in the branch of business.

These results formed the basis for the interventions, which consist of five team meetings with the tasks between them. Teamwork will increase its importance in the field of real estate maintenance in the future. The project is still going on, and the final results and conclusions will be presented in the conference.

Discovering the collective objects of activity by analysing personal senses and societal meanings

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In Activity Theory, it is suggested that any investigation of 'activity' has to include the discovery of the object that directs it (Leontiev, 1978): "Properly, the concept of its object (Gegenstand) is already implicitly contained in the very concept of activity. The expression objectless activity is devoid of any meaning. Activity may seem objectless, but scientific investigation of activity necessarily requires discovering its object (p. 52).

The problem for researchers when analysing the collective object of an activity is that we can come to different results depending in which perspective we are looking for, e.g. managers or workers. Actually, the object as a material thing may say too little about why an individual is participating in an activity. For example, nowadays in the industrialized society, for a farmer producing a pig, the pig does not motivate him because it is a meat to be eaten but rather because it can be sold in the market and exchanged for other products. According to Leontiev's (1978) the object of an activity is twofold: first, it has an independent existence (the societal meaning of the object) as subordinated by itself and transforming the activity of the subject. Second, it is the image, a psychological reflection realized as an activity of the subject (a personal sense), and can not exist otherwise. It means that the object is both subjective and objective, given by society and constructed by the subject.

Following Leontiev's (1978) suggestion, I will propose that any analysis aiming to discover the collective object of an activity has to consider not only the societal meaning of the object but also its personal senses. It will be schematically represented by O = (Societal meaning and personal sense). I will test this idea using data from a case of a collective activity of onfarm biogas production. I take a case from Brazil in which biogas is being produced in cooperation between a food industry and swine producers. The data is mainly from documents and interviews. I will analyze the individual senses of the objects, in order to better understand this environmental activity. Furthermore, I will discuss if/how these senses of the object manifest some of the historical contradictions of this activity.

Integrating a risk management tool into state organizations' activities

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Due to globalization and rapidly changing environments, risk management has become important in the Finnish civil service. A new risk management tool, the Kaiku-Luotain model, has been designed for government institutions. The Finnish word Kaiku-Luotain, meaning an echo sounder, is a metaphor for mapping, analysing, and handling an organization's risks.

The novelty of the model is that it simultaneously covers a wide range of risks arising from personnel's well-being and also the development of organizational activities concerning personnel, management, leadership, clients, interest groups, operational prerequisites, and the organization of operations. It is a tool to be used throughout organizational hierarchies and possibly across functional tasks. At its best, systematic risk analysis may help personnel and organizations foresee and manage changes in their operations.

In the year 2008, risk analysis and management processes will be evaluated in the following four pilot organizations: Finnish Customs, Finnish Forest Research Institute, Finnish Meteorological Institute, and Prison Service. With the Kaiku-Luotain tool, the process starts with an analysis of the objectives and basic tasks of the organization and proceeds with an assessment of the organizational activities and the recognition of risks with the aid of a SWOT analysis and a list of questions. On the basis of these results, control measures and action plans will be developed for the chosen risks.

The objective of the presentation is to answer the following questions:

1. What risk areas will be analysed with the Kaiku-Luotain tool?

The pilot organizations will choose a risk area according to their needs. The presentation will explain how the risk areas in two pilot organizations were chosen. Often the assessed organizational risks concern safety or economic management. Does the use of the Kaiku-Luotain model stay within these domains, or does it extend to other realms?

2. Who are the actors who undertake risk analyses using the Kaiku-Luotain model, and how do they collaborate?

As the need for enhanced risk management with the Kaiku-Luotain model comes from statecontrolling agencies, it is not self-evident that the organizations and their personnel are motivated to use it.

Depending on the risk areas chosen, the risk assessment is either carried out in one or two units or it may require wider collaboration between different actors. How will the testing of the Kaiku-Luotain model be organized? Does this model build new intra-organizational collaboration?

During January–May 2008, the Kaiku-Luotain tool will be put to use by selected groups or departments within the pilot organizations. The questions above will be answered using data from the meetings in which the risk analysis steps, as well as the use of the model, will be discussed.

By answering the two questions presented above, the aim is to determine 1) whether risk assessments made using the Kaiku-Luotain model become integrated into normal activities of organizations and 2) whether the model seems to change the objectives and activities of risk management within state organizations. At its best, the risk management by the Kaiku-Luotain model may promote organizational learning processes and well-being at work.

Minds ahead. On anticipatory activities as design leverage

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Compared to the variety of uses that can be supported by a paper artefact, digital technologies are often regarded by users as lacking flexibility. In our research we have often encountered such user comment, as we have been dealing with the transition from paper to digital in the redesign of a computerised patient record in an oncology department.

The patient record acts as a coordinating artefact for multiple actors. It reflects what we might name a "multi-voiced use" of the artefact, as various actors' instances are embodied into it. User participation might seem a natural candidate to improve its design. However this opens the question of which users to involve. In our study, we observed that the current patient record was mostly informed by people in a management position or with a high organisational status. This resulted in an artefact oriented to data collection, in order to monitor overall system performance. Noticeably, even these key users are not satisfied by the resulting artefact and are questioning some design aspects.

The main issue to address does not seem to be a lack of user involvement, rather the choice of which users to involve. We would need more disciplined principles to prioritise users' instances, to be able to identify "primary users" and corresponding privileged uses. We have first reasoned on the strong points of the proposed technology and how they can be matched with existing activities. In our work setting, many activities are coordinated mainly because users are able to anticipate others' actions, thus modifying their behaviour in advance. However, only few actors engage in explicit anticipatory activities, basically only the nursing staff heads and some of the head physicians. The resulting design choice has been to focus on anticipatory activities as the key leverage points for redesign. The current conception of the patient record as a data entry device can then be shifted to a more operationally-oriented definition of the artefact as a planning device.

We contend we need to move away from individualistic user models, as for instance *personas* to summarise user requirements (Cooper, 1995). Conceiving the user as an individual might result in "an overcrowded design", especially in complex socio-technical systems. Nor it is a viable solution to select users on the basis of their organisational status. In our case, we have shifted the emphasis to activities, by identifying with users which are the system properties to be fostered by digital technologies. Design has been driven by the requirements of anticipatory behaviours. Such a shift in the design approach also results in guidance on which users to involve and on the nature of their involvement. We contend we should involve those users that to some extent engage in anticipatory activities as part of their work, e.g. head of nursing staff in our case. Those users are in a privileged position to bring into the design process other users' voices, as a core part of their work is to take colleagues' perspectives in order to coordinate the various activities.

Artefact based learning laboratory: mirroring and questioning issues while designing a cognitive tool

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This communication aims at presenting and discussing a developmental intervention performed during the design process of an artefact. We name our method "artefact based learning laboratory". The term "laboratory" refers to the conditions needed to perform the intervention within an organisation. The term "artefact based learning" means that we organized the design process as a dialogical mutual learning process between users and designers (Béguin, 2003). The artefact here is as a software prototype meant to enable the analysis of large data sets collected on field experiments which are set up to assess wheat cultivar performance against various environmental conditions.

We performed this intervention to allow boundary crossing among participants: those who put the prototype into shape, e.g. ourselves (ergonomists) and some agronomists, and those involved in wheat cultivar assessment (breeders, cultivar registration officers and advisers). The developmental issues were not only on the side of the potential users, but also on the side of the designers of the prototype: the aim was also to question the modelling assumptions underlying the design of the prototype. Being involved in both design and developmental intervention, we kept a reflective stance by collecting data on the process itself and sharing it in a community of practitioners handling similar interventions.

The prototype is central in our artefact-based learning laboratory as it is used by the interventionists to perform both mirroring and questioning. We will show how it supported mirroring as the participants used it against their own data sets, e.g. how its use allow the identification of problems and disturbances in the cultivar assessment activity. We will also show how it allowed questioning among participants during collective debriefings organized by the interventionists owe to the visualisation of some outputs of the analysis which a given user saw as irrelevant in respect of his(her) expertise.

Other instruments were also important for mirroring and questioning. For instance the registered debriefings sessions were material used to enable agronomists to question their modelling activity and to imagine new techniques for collecting and analyzing data to assess cultivars. So instrumentality is central in the artefact-based learning laboratory. We will discuss how each mediation tool is used to reflect on and eventually expand engineering activity or cultivar assessment one. Meanwhile, we will point out that this central role of instruments is embedded in the ontological property of human action, e.g., what Rabardel & Béguin (2005) called the constructive part of action. We will also highlight how these tools enable dialogism in a design process.

Finally, we will discuss the "nomad" dimension of this artefact-based learning laboratory. Nomad means that also meetings took place at the designers' workplace, others were organised at the users' one. As well the software had been implemented in each working place, enabling the participants of the laboratory to use it during their working time.

Introducing a holistic evaluation framework of innovation and learning networks

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In the past decade, new types of broader networks such as innovation networks (Miettinen et al., 1999), regional modules (Gustavsen et al. 2001) and learning networks (Alasoini et al., 2005), which aim to achieve widespread effects in the working life have emerged. These are typically based on interactive innovation approach, where knowledge is created jointly together with diverse players. However, we have rather little empirical evidence of the network outcomes. The challenge is, how to measure these complex processes. This article presents a new holistic evaluation framework for innovation and learning network projects. The framework integrates the evaluation of three different elements: structure of the network, learning processes and the expected outcomes of the learning networks for diverse participating players. The structure is based on the expanded triple helix approach (Ramstad, 2005; Ramstad & Alasoini, 2007), i.e. collaboration between workplaces (private and public), R&D units (e.g. universities, polytechnics and consultancies) and policy makers (e.g. labour market organizations. The process of the framework refers to diverse types of learning forums that aim to improve the collaboration and learning in between the players. Learning forums can include traditional forum such as steering groups, expert groups of researcher and developer groups, preparation of publications, organizing education, different types of joint research and development projects of workplaces, but also new innovative ways of learning that will be studied in the paper. The outcomes can be specific for the individual participating players, but also more generative results can be gained. The holistic evaluation framework has been partly tested in the earlier studies from the workplaces' and R&D units' point of view (Ramstad, 2008). In this new paper, the broader framework will be contested with the empiria, in this case learning network projects of the Finnish Workplace Development Programme. So far, the programme has supported 17 pilot learning networks (Alasoini et al., 2007). The results show that the holistic evaluation framework offers a useful vehicle and more comprehensive understanding of the collaboration of diverse players, their different tasks, learning processes and outcomes gained from the networks. In addition to the evaluation purpose, the framework can be used as an innovative tool when building new innovation and learning networks. The framework has a holistic and systemic approach to the development of working life, while focusing on the development of workplaces, R&D infrastructures and broader innovation policy.

From action to reflection: use of a multi-perspective system representation to support a health care system improvement

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The study presented was carried out as a collaboration with an Emergency Department in the North of Italy. The study aimed to develop an ergonomic analysis of the work system and was conducted by three researchers with different backgrounds (both in physical and organizational ergonomics).

During the first phase of the project, a qualitative study was performed to point out environmental, instrumental, cognitive and organizational aspects influencing nurses', physicians' and other operators' work activities, focusing the attention on the normal functioning of the system. The second phase, that is proposed to discussion in the present paper, aimed to discuss the results of the analysis with mixed groups of operators, and to identify priorities for improving working conditions within a participatory model.

The elaboration of data made it obvious that the perspectives on the system were quite divergent between the two main groups of operators, i.e. physicians and nurses. Instead of selecting the few common issues, we decided to visualize the two different representations of the activities, as a starting point of the mixed groups' discussion.

We did not use the traditional task analysis. Although this technique has certainly proved to be an important tool for the visualization of the work activities, in fact it informs us about "what" is done, but not about "how" it is done. It informs us about what is "expected to be done", but not on what the operators "actually know is done". It represents the process, not the perspectives on the process. We therefore choose to visualize by different means (video, images, reports) the two main representations of the work activities, including the events and actions performed, the possible alternative courses of action, the tools utilized, the people involved, simulating the "vistas" [Gibson, 1986], i.e. the ecological perception that the operators develop while performing the activities.

This first step proved very useful to make the physicians aware of the workload and of the real difficulties the nurses deal with, and vice-versa, and gave the possibility to start to elaborate a shared representation starting from the awareness of the different perspectives on the system. On that base, it became possible to elaborate a common "operative image" sustaining operators to move from an individual or group view on the work system to a shared symbolic representation of the activities performed, the difficulties experienced, and the priorities suggested.

This simulation represents for us an effective cognitive tool to develop, within a participatory model, a socially validated rationale of the technical solutions to be adopted to implement positive changes in the work system.
Activity theory as a means to broaden the perspective of ergonomics from micro to macro

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Ergonomics has expanded rapidly since it was first introduced in 1949, and today covers a variety of sub disciplines. However, there is still a need to better understand how ergonomic knowledge produced can be brought into more effective use. This paper reports the findings of an exploratory study focusing knowledge processes on ergonomics in the sales and marketing process of a work tool, a fork lift, designed according to ergonomic principles. Integrating ergonomics in the product development process is a first step toward improved work tools in working life, but how are these ergonomically improved work tools brought to the market?

The purpose of the study was to investigate how employees of the sales and marketing function in a company with strong ergonomic image learn and use ergonomics in practice.

Data production comprised of interviews with five sales representatives. In addition eleven persons of the sales and marketing department, the chief engineer, sales trainer and quality inspector were interviewed. Sales manuals, marketing material and the company web site were also analyzed. Interviews were transcribed before analyses and further data reduction. The constructed data was analyzed and interpreted using activity theory and learning theory.

The results showed a contradiction between the ergonomic image and lack of knowledge sharing on ergonomics in the company. As a consequence sales persons hesitated to argument the benefits of the ergonomic design features and close deals with customers. The results also showed an example where good understanding of ergonomics made it possible for a sales person to shift perspective. He was able to take the perspective of the customer and argue the benefits of the ergonomic features from the user's perspective. He was the one who managed to close the most deals with the ergonomically most advanced fork lift.

The study implies the benefits of using activity theory to broaden the perspective of ergonomic knowledge from micro to macro, from a health perspective to business perspective, from a goal in itself to a tool to be used in several contexts. The next step is to understand how ergonomics needs to be named and framed in new contexts in order to make sense to e.g. more business oriented actors.

Facing the future – an ICT company's activity system in a turning point

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A radical innovation along with stable customers has earlier been the success factor of an ICT company. However, the situation of the company has slowly been changing because of fast technological development and growing competition. The perception of business environmental changes that also include changing circumstances of individual customers has not become entirely evident for the company management. The initial trials to tackle customer claims rising from the changing needs and circumstances have mainly been reactive and minor compared to the increasing challenges and opportunities that the present ICT paradigm is expected to provide. The contradicting past and future activity of the company is still to be untangled.

The nature of products and services that the ICT industry is providing can be characterized as highly critical to the customers' activity system. According to the customers of the case company the role of ICT as well as the organizational function responsible for data administration is transforming from a supporting role to a strategic partner of the management. Customers also claim that ICT will be a salient tool in the development of organizations. The digitalization of the public sector is a general example of the above change in the technoeconomic paradigm of ICT.

These transitional conditions contribute to the developmental circumstances that constitute the frame for a zone of proximal development of the ICT Company. The products and services that ICT Company is producing can no longer exist on their own but rather include integrated, customer-oriented and boundary-crossing applications and solutions. This forces the company to develop closer relationships and qualitatively better activities with its key customers and orientate more clearly and systematically to the external factors instead of focusing only on transactional and reactive interactions. The essential competitive factors for the future seem to be excluded from the activity system of the case company.

The presentation will deal with the above contradicting conditions based on a study conducted for supporting the development of the case company. In the framework of the culturalhistorical activity theory the purpose of the study (and the whole intervention process connected to the study) is to create new tools, methods and a whole new learning system for the identification of new business possibilities.

On the diversity of mediation. A Vygotskian unit of analysis for activity analysis

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In this paper we present a methodology for the design of human activities and of the mediating artefacts therein. In accordance with the Law of Semiotic Mediation and with the General Law of Cultural Development (Cole, 1996; Vygotsky, 1986, 1987; Wertsch, 1985), we take as our unit of analysis the relationship of Subject, Object and Artefact. This implies a slight departure from the idea of an expanded unit of analysis, as suggested by Engeström (1987) and other authors in Activity Theory. Instead, the original unit of analysis is adapted and modified: i) by articulating the artefact in three different types of mediating resources: Hardware (H), Software (S), and Liveware (L);¹ ii) by defining the type of design intervention that is required and suitable for the current design activity.

The three types of mediating resources are defined as follows:

Hardware is a resource that may mediate the direct transfer of energy from the subject to the external world. Its terms of reference are physical matter and energy.

Software is a resource providing the subject with the knowledge required to use a particular artefact for her/his objectives. Software does not exist by itself and it intervenes in the activity embodied in Hardware and/or in Liveware resources.

Liveware is a living resource mediating the interaction of a subject with the external world. This taxonomy addresses different mediational characteristics that often appear in combination in a single artefact or interact in an activity.

One of our key challenges of any intervention is to understand both the critical and the successful configurations of the three mediating resources with the subject, in order to inform the design activity. The type of analysis to be carried out depends on the kind of activity we are studying, and on the design objectives we intend to address. To address this issue, we adopt a model of intervention levels called the *egg model* (Marti & Rizzo, 2003), where the three levels of design refer to the changes we would aim to achieve in the object of the activity.

In our work we have used the above methodology to support the analysis and design of new technology. Our paper presents cases where the unit of analysis has been used in the activity analysis and in the re-design phases. As for the activity analysis we show its use (i) to structure the results of field observations and user interviews, (ii) to support users in the identification of crucial success (or failure) factors in a given activity. For the re-design phase we discuss how it facilitates participatory design sessions with operators, as it provides categories on which to articulate redesign proposals.

The proposed methodology has been elaborated and applied in the last decade in complex activity settings (as education, railways systems, air traffic control) and it is still being applied and refined (Rizzo, Marti, Decortis, Moderini, & Rutgers, 2002; Rizzo, Pasquini, Di Nucci, & Bagnara, 1999; Rizzo, Pozzi, Save, & Sujan, 2005).

¹⁾ The names of the three resources are inspired by the SHEL model proposed by Edwards (1988) in the domain of safety critical systems.

Where does knowledge work take place in the office? An observation method

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Knowledge work (KW) is performed in different workspaces that have impact on the way work is performed. KW involves the creation, distribution or application of knowledge by highly skilled workers using tools and theoretical concepts. In this study we focused on: Where does KW take place? How do people use different workplaces in an office building? What are hindrances and enablers of KW?

For studying these questions we apply a number of different methods, of which one is an observation method focused on knowledge workers and their workspaces to identify potential hindrances and enablers. Based on the literature we designed an observation scheme which is divided into observation of physical and social workspaces. The physical workspace observation included the items like artefacts, available facilities and tools, views, sense environment, signs of personalization, workplace policy. The social space items focused on interaction and communication, pair or group activities, workplace policies, signs of interruptions and emotions. Furthermore, we observed spaces that provide privacy, concentration and interaction. Following the idea of walk-through methods, observations, meeting rooms, restaurants etc. The observation was performed in a large IT company and was part of a Postoccupancy evaluation of the new office solution of a large open plan office. Two researchers observed for two full days. We documented observations with written notes, drawings on a lay-out chart and photographs. After the data collection, we analyzed and compared our notes. We summarized findings and reported results to the company representatives.

Although observation can only cover part of KW activities, with this method we found results in the following fields: (a) Lay-out related items refer to the current office space in which we found: specific walking paths, noisy and disturbing spaces, under- and over-utilized spaces. (b) Activity related items, for certain activities, employees prefer working in more closed areas (e.g., telephone calls). (c) Interaction related items resulted in e.g., where (space) people would interact, how often, with how many, formal or informal interaction. (d) Work-space policy related items, like clear communication and signs were important to create an understanding of the new way of working. (e) Ergonomic aspects connected to the fact that mobile workers have no fixed desks, e.g. they carry their tools and materials.

Based on our experiences, this observation is quite simple and a fast evaluation method to provide an overview of the office environment including its hindrances and enablers of observable aspects of KW. It provides descriptive information about KW and some indicators how well the environment supports work and easily generates suggestions for improvements. The observation method will be applied in several case studies in order to create a validated method that companies can apply.

Workers' active participation decreased work-related traffic accidents

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Active participation of workers is the essential element of a group discussion method developed by Kurt Lewin. He found that after free discussion in small groups the workers of a sewing factory increased their productivity by 12%. Later studies in Japan and Sweden had shown that it was possible to reduce the number of work-related traffic accidents even 80% by using a group discussion method. The aim of this study is to implement the Swedish model of discussion method in Finnish working life.

This study was carried out in a Finnish electric company, where 172 electricians participated in 19 teams. Each team selected one worker, who was then trained to use the method and chaired the sessions in his/her own team. The safety committee of the company organized the discussion process together with the researchers.

The Swedish model had three discussion sessions: In the first round, the teams discussed the problems related to their driving during working hours. Then the safety committee made a summary report of problems that had come up. On the second round the teams suggested solutions to the problems. On the third round, the teams made after free discussion decision about the changes in their driving behaviour.

In the first discussion round, the 19 teams reported 183 problems in work-related traffic. During the second round, the teams produced 594 suggestions to solve these problems. In third session, the electricians made decisions on 53 commitments to change their driving behaviour. The number of traffic accidents during working hours decreased 72% during 8-year follow-up period.

The discussion method used in Japan and Sweden was also successfully implemented in Finland. The strength of the discussion method is that employees participated together in the preparation of the decisions in several phases and were more willing to follow the decision. The other factor helping to maintain the decisions is group pressure, when co-workers remind each other to respect the decisions. Reducing work-related traffic accidents is important, because half of fatal work accidents in Finland occurred on public roads.

Activity Theory as an Activist and Interventionist Theory

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This paper contributes to current discussions on potential shortcoming of contemporary works within activity theory. Critiques strongly emphasize the necessity to overcome the lack of focus on subjectivity in the second and third generation of activity-theoretical studies. In these discussions, limitations of the triangular representation of activity are often highlighted as if they were evidence of omission of key issues originally central in the works of the founders of activity theory. The paper discusses the main arguments used in the critiques from the historical perspective, viewing activity theory as a theory grounded in interventions in social practices. On this basis, the paper argues for a reorientation of current discussions in activity theory toward interventions.

The paper is organized in three sections. The first section documents the history of activity theory as an activist and interventionist theory. Activity theory has the distinctive characteristic of developing as an integral part of the historical turmoil through which activity theorists have lived. Two main phases of turmoil in the development of activity theory are the Russian revolution, which triggered the engagement of the founders, and the radical student movement through which activity theory was rediscovered and further developed in Europe. Activity theory stands historically as an activist theory of development of practices, which may be traced back to Marx's idea of revolutionary practice, emphasizing that theory is not only meant to analyze and explain the world but also to generate new practices and promote change. Since Vygotsky's works with illiterates, practically all the founders of cultural-historical activity theory, for instance, Luria, Leont'ev, Galperin and Davydov, have engaged in various kinds of interventions in multiple settings..

The second section of the paper argues that advances in activity theory depend on the ability of those who work within this framework to establish fruitful connections between the classic heritage and challenging possibilities of societal change. The main arguments of critiques of studies in activity theory are examined in historical perspective. I will present epistemological implications which lead to a view that differs from the critiques on subjectivity and on the use of conceptual models such as the well-known triangles. Combined with design and implementation of material transformations, structural models of activity do not exclude subjectivity, sensuous experience, emotion and ethico-moral issues. Instead, these dimensions of activity are embedded in collective change efforts in which both the models and the voices of the subjects act as mediators.

The third section of the paper indicates a possible direction to reorient the current discussions. Two examples of interventionist methods developed within the framework of activity theory are discussed, namely the Change Laboratory and the Clinic of Activity. A comparison between the two methods highlights complementarities. It also points toward ways of elevating the themes of subjectivity and conceptual models explicitly to the level of methodology. A type of research intervention configured as a process of experiencing is proposed as a possible common springboard for future discussions.

Training as a moment of confrontation of two activities

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It is our intention to reflect on the activity of the trainer in training situation. More precisely, on the way trainers try to articulate their activity with the activity of the working trainees, in a context of continuous training. Despite being true that the disarticulation between work and training has been widely discussed, the point of view normally assumed refers to the need of placing trainees' activity in the centre of the training situation. We believe that a reflection on trainers' activity is not as common. Trainers engaged in a particular training structure and confronted with predetermined goals, under particular conditions (of time and space), with particular tools conceived with the aim of achieving clearly set results.

To discuss this subject, we rely on the analysis of a training process at a certified professional training centre, in the fishing sector. This training process, directed to fishing professionals, had, as a goal, the attribution of a new professional category (and this was the only possible way to this professional progression).

Considering the global aim of the training process, trainers organized their sessions as a function of the prescribed contents, of the existing time, of the target-people, setting as reference the idea that this new professional category presupposes a new look over the activity of fishing: a more reflected look. This way, the theoretical training moments were conducted starting from the definition of the basic concept to explain the relation networks established with other concepts and the way they are organized (close to the logic of scientific concepts acquisition developed by Vygotsky, 1934/1997). In the moments of practical training, the principle was the use of theoretical knowledge in non-spontaneous but close to real activity situations. Exercises were made, mainly "paper/pencil exercises". But the resolution by the trainees of a concrete exercise, in the navigation class, called our attention to the differential strategies of trainers and trainees. This exercise consisted of solving one of the necessary procedures for the navigation by nautical chart – the "head conversion". Each trainee solved it individually, and the verbalizations about the exercise itself and about the solving procedure were registered.

The results from this analysis allow us to bring forth that the trainees either undervalued the exercise, because in their usual practice they don't do navigation by nautical chart, or they solved it using strategies conceptually more concrete. On the other hand, the trainers either kept their logic unchanged, hoping that at least one of the students was well succeeded in the suggested learning, or facilitated the resolution of the exercise, using simplified logics and some condescendence, justified by their knowledge of the these trainees' activity besides training. In fact, some trainers considered that they could not prevent trainees from being succeeded, especially when the community acknowledged their quality as fishermen. But what is the cost of this condescendence considering the expectations of the trainer towards what his/her activity should be?

Instrumentalities in boundary crossing interventions: exploring mirroring and questioning in producer-buyer collaboration

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In interventions based on developmental work research usually the starting phase of the process is dedicated to collaborative analysis of work activities in question. This is done with the help of different tasks that aim at revealing for discussion the history, relations, tools and objects in that work. The aim of work analysis tasks are, first, to reveal and to *question* the terrain of the work for defining its 'problematique' to select experiments later on. The questioning as a learning action is part of the intervention process. Second, the tasks hopefully help in forming a shared understanding of this terrain. This is especially important in so-called *boundary crossing interventions* where participants can be distanced from each other in terms of space, organisations, ways of working, or culture. The interest of revealing the evolution of work in time is not only historical but, possibly, to find out the strategic dimensions and concepts along which work activities can be developed. And, as the tasks for work analyses are located among the first initial meetings of the intervention, they may also serve the purpose of creating an 'intervention community' which is necessary for both the participants and the group to gain agency and thus being able to work together in a useful way.

In fact the issues to be learnt in starting an intervention are many: it is not only the content but also the many-sided methods and principles of the intervention that need to be negotiated or decided in some other way. The interventionists design the work analysis tasks using different *mirroring* materials from the work that are analysed with visual representations of either theoretical or tailored tools. An important part of the tasks are the questions and comments said by the interventionists. Besides, the participants contribute to the tasks by bringing in differing perspectives, opposing, silencing or acting in many other ways. It is the setting, tools and materials used and talk that together form the *instrumentality* in doing the tasks for work analysis.

How do interventions in practice succeed with such complex situations? The aim of this presentation is to describe and analyse some work analysing tasks done in an intervention project aiming at enhancing collaboration between local small-scale producers of food and their large-scale buyers. What was the emerging instrumentality like, and what seemed to be its essential parts in mirroring and questioning the work? In this case it is necessary that the instrumentality takes simultaneously into consideration both the evolving work activities and the crossing of the boundary between producers and buyers. What was the role of the interventionists in managing this instrumentality? And how did the tasks shape the later intervention process and the selection of experiments? The objective of the analysis of the instrumentalities will be to understand better the role and content of mirroring and questioning in the complex and many-sided context of boundary crossing interventions.

Change and transformation of agency in the work career

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Change, growth and restoration of agency are subjects of growing interest in research as well as are the facilitators of change. In this study the primary interest is to deepen understanding and explore the process of change or transformation of agency itself. The process is studied by using the method of double stimulation. Theoretically this work relies on cultural-historical activity theory. The source of individual agency is seen in a person's capability to use external artefacts to control her/his own behaviour and to transform a given frame of action.

The method of double stimulation is used in a context of development dialogue. Development dialogue procedure was originally created by a Danish researcher, Laura Mott. She argued that in system development the aim should be put on development of the system bearers. Development dialogues are dialectical processes that aim first on the determination of the participant's individual zone of proximal development and secondly on the developmental project to cross the zone.

The first stimulus is drawn from the idea that there has been a crucial shift in traditional work careers which has caused disappearance of external guides for sequence of work experience. Individuals face indefiniteness of their future career paths, multiple and meaningful, still vague or insecure opportunities. That leads to subjective organizing and internal self-generated guides. The first stimulus is offered in the beginning of the developmental dialogue when the participant reflects her/his career in a dialogue. The second stimulus is offered only to one half of the participants in the latter phases of development dialogue process. The second stimulus is an expansive learning cycle. One major challenge for research is to find out if and how the stimulus is drawn into an individual participant's process, and how it takes on the function of a sign and what is the significance of the sign in the transformation of one's agency.

Engeström, Y. (1987) Learning by expanding. Orienta-konsultit, Helsinki.

Mott, L. (2002) Systemudvikling. Ph.D.serie 3.92. Handelshojskolen i Kobenhavn. Gylling, Narayana Press.

Vygotsky, L. (1997) The history of the development of higher mental functions. Teoksessa The collected works of L. S. Vygotsky. Vol. 4. New York, Plenum.

Weick, Karl E. (2001). Making sense of the organization. TJ International, Padstow.

Development Organizations and Dialogues among Services for Elderly

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Communicative action research – HOTEVA-project

The focus of this paper is to describe the development organizations and the features and themes which evoked in the dialogues during the communicative action research project called *"The factors of welfare"* – HOTEVA-project. The local participants represented horizontally and vertically all hierarchical, functional and political levels of the municipal services for the elderly.

Tasks

The mutual framework was x-effienciency theory of organizational economics. The goal of the development work was to improve both productivity and the quality of working life. Therefore, the main themes of the dialogues emphasized the organizational and individual productivity and wellbeing factors. The developers used and tested different dialogic development tools and created dialogue forums.

Theoretical framework

In this paper the interpretation of the results is focusing from the framework of the x-efficiency theory to the level of individuals. Results show the main effects of the dialogical development to work behaviour, work efforts and to individual's willingness and ability as well as obstacles to the horizontal and vertical co-operation and transaction.

Results and effects

The promoting factors for dialogues, especially among employees, were safe and confidential atmosphere, opportunity to express freely and openly, and also by writing personal opinions and experiences. Developers also facilitated forums for dialogues, such as work conferences and multi professional task forces.

There were also many delicate themes which had earlier been covered under so called non-interference organization culture. Such hidden phenomena were harassment, bad treatment of the aged clients, fear against the dominative and "difficult" persons, non professional work behaviour and "bossy" or "non management".

In many workplaces the positive effects of dialogues were learning at work, shared values and objectives and agreements of "the rules of the game". These agreements lead to update psychological contracts, especially in vertical relations and between employees and employers, which intensified the learning processes.

Research-assisted project for developing meals and cleaning services in Kainuu – ATPU project 2006-2007

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Objectives and the theoretical reference framework

ATPU project was aimed at improving the competitiveness, productivity and quality of meals and cleaning services by developing the personnel's expertise, the service provision process and organisation. Theoretically, it was about creating a purchaser-provider model as a learning network between service providers and purchasers. The project used the theoretical reference framework of Sirpa Syvänen's doctoral dissertation 'Pressures at work and the costs of non-interference' (2003).

Development structure

The development involved various levels: provincial, regional, municipal, task area, work community, team and individual. The participatory development methods used included multiprofessional and representative development groups, a work conference, a survey on work welfare, proactive dialogue, thematic training sessions, personalised letters, a quick survey on work load, DiSC work behaviour profiles and verbal and written process assessments at various stages of the project.

The development structure was as follows: The primary task in the beginning of the project was to involve the entire personnel and provide them with as much information as possible on the project. Information events were organised in all of the municipalities, a communication plan was drawn up and the documentation created was compiled in an on-line platform (internet), to which all those involved in the project had access. The flow of information was further enhanced by the information contacts appointed for each of the municipalities. Problems relating to work welfare were mapped through a survey conducted as an initial measurement. The results were used as a basis for the development work. Representatives of all of the essential quarters were appointed as members of the multiprofessional development group. The development group and its working groups grew to be the main forum for the joint development discussions prior to submitting the issues for further processing by the municipalities' development groups, during personnel events, at workplaces and within teams. The work conference and service strategy were used to evaluate the current state of the meals and cleaning services and analyse the development challenges and future trends. The mapping of expertise established the current state of competence and target levels of the various occupational groups.

Results

The development work led to a high level of commitment to extensive joint consultation and network-like operation. Co-operation increased and became deeper, more open and confidential. Core products were defined and the cost structure of the services was outlined through the productisation of meal services. Price gaps were narrowed and costs were cut, which improved productivity as measured by economic and efficiency metrics. The project offered the opportunity to test and analyse the applicability of the X-efficiency theory in the meals and cleaning services task area and its suitability as an interpretation framework when analysing the cost impacts of the development of the production process. By using different means, the project also succeeded in breaking the non-interference organisational culture that is typical of municipalities.

Actuationism and ergonomic wok analysis: questions and contributions

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This paper, based on the new paradigm of cognitive sciences, invites an ontological rupture with the objectivist approach to the Operating-Representation in cognitive ergonomics. Actuationism is the embodied-enactive view. According to this approach, cognitive processes are seen as emerging or enacted by situated agents (workers). The actuationistic approach is an important underpinning of several contributions in ergonomics. This work is the result of a study done on real production systems using ergonomic work analysis. It has identified and characterized an ontological failure historically present in the operating-activity analysis: distinct actuation between different observers results in differences in perception, interpretation and action that have historically been built. Gaining deeper knowledge about the functioning of the work process is impracticable if the person doesn't have a embodied experience. Actually, the processes appeared to be routines, parceled and manuals, lodge a new competence notion, the actuationistic or cognitive competence, necessary to treat continuity and flow in the productive processes. We can describe the patterns of ongoing interactions as image schemas, grounded in our embodiment but which are not internal representations of an external reality. This leads to an account of an emergent rationality that is embodied, social and creative. Embodied Realism, in contrast to Theories based on "representations", rejects the notion that mind and body are two ontologically distinct kinds, and it therefore rejects the attendant view that cognition and language are based on symbolic representations inside the mind. Knowledge that emerges under specific conditions and whose effects remain obfuscated i the vast heterogeneous field of singular work situations. Something that happens in these worlds that is not visible to the observer, resulting form the integration of the worker's mind and body in daily tasks. But prior to housing only the repetitive, trivial or conventional work lodges, in its reality, obscurities, nebulous points, ruptures, points of discontinuity that remain in the field of the intangible, of the non symbolizable and of the unsaid.

The body that acts is the body that learns via temperature, posture, noise, odor, by touching the objects in the physical world of the reality of work. The mind that has the capacity to reflect on its acts, in activity is that which depends, in order to articulate this reflexive potential, on the intentional lines that leave the *perceptive* and *sensorial body* in direction of the consciousness molded in work and vice versa. Knowing that is, at the same time, a new mode or "*being in*" or "*being –in-the world*" that is, of an ontological nature, tied to the *acting* in work activity, using its own physical, cognitive and psychological resources, letting the situation request them and provide not just their use, but also the conflicts and the impediments linked to the context of action. In the present research, the analytical focus has been to comprehend the emergence of meaning and abilities of abstraction in the experience of workers, involving understanding how events, signs, symbols, objects and instruments of production acquire significance for the worker and how this relates to the body.

A participatory ergonomic intervention process in kitchen work

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A participatory ergonomic intervention was carried out in 59 municipal kitchens. The kitchens with at least three full-time workers developed their work over an 11-14 month intervention period. The approach was based on active group work: the workers identified ergonomic problems in their work and generated and evaluated solutions for them. The foodservice management and technical staff were also invited to participate. The role of the ergonomist was to initiate and guide the process, train the participants, and be available for consultation. In groups of three to five kitchens the workers participated eight times for a workshop. In the workshops the workers analyzed their work tasks, selected the targets for development and planned the implementation. During the intervention phase the workers received relevant practical training. The workshops were held alternately in each kitchen of a series. The aim of this study was to evaluate a feasibility of the intervention process and the effects of the intervention on ergonomic knowledge and awareness of the workers, as well as their expectations and perceived effects of the intervention on work load and musculoskeletal health.

Evaluative data were collected using research diaries, questionnaires, and focus group interviews.

A total of 402 changes implemented during the intervention phase were assessed by the researchers to be beneficial with regard to the load on the musculoskeletal system or occupational safety. 113 planned changes were not completed. As hindering factors for implementation, lack of time and motivation, and insufficient financial resources were mentioned. The intervention model proved feasible and the participatory approach was mostly experienced as motivating. The workers' knowledge and awareness of ergonomics increased, which improved their ability to tackle ergonomic problems by themselves. The visits to the other kitchens were considered very useful by the workers. The changes in ergonomics were perceived to decrease physical load and to improve musculoskeletal health. According to the questionnaire the workers' expectations of the effects of the intervention phase. The participatory approach was a new concept for the workers and therefore training in team work could have been helpful in getting off the ground faster. Furthermore, the workers expressed a wish for more support from the management, technical staff, and ergonomists.

The Culture Laboratory promotes intercultural learning

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Working life is becoming more and more diversified and people with different ethnic and cultural backgrounds work together. What kind of methods and instruments are at our disposal in this challenging situation. My presentation will focus on research and development work done in Helsinki City College of Social and Health Care. The objective here is to analyze a new application of the generic Change Laboratory method, which was called a Culture Laboratory. It is an intervention method for change efforts in which the emphasis is on cultural or ethnic diversity among participants, instruments, and circumstances. It shows and explores the dynamic movements of intercultural encountering, and how these movements can enrich learning and development.

The participants consisted of a group of 17 students who were natives of eight different countries (Estonia, Russia, Somalia, Iraq, Chile, Italy, Afghanistan, and Japan), teachers and other staff, project personnel and me as researcher. As a methodological choice I favored developmental work research because it offered useful practical and theoretical tools in the new situation immigrant students and the teachers at the College were facing. The empirical material comprises the nine sessions of the Culture Laboratory, 20 hours altogether, which were both audio- and videotaped.

I found that the Culture Laboratory offered a solid basis for intercultural learning and development of educational practices. However, many kinds of practical and discursive disturbances were identified. This revealed the presence of multiple scripts and activities in the Culture Laboratory. The analysis revealed also a presence of a shadow script in intercultural encountering. According to Engeström (1998, p. 64), we are not always aware of the scripts we follow. I would like to add that we are not always aware of the scripts that follow us. Furthermore, analyses showed how the cycle of expansive learning can start from externalization instead of internalization in a multicultural and multilingual situation such as the Culture Laboratory.

To conclude I state that intercultural space is a tension-rich area in which different interests, pasts, and presents intermingle. However, it is a potential developmental space in which seeds for new ideas and practices are sown and work places should acknowledge this and give time and space for cultural reflections. The hybrid process of observing, comparing, and creating is one of inter-activity on the borderline between various cultures and activities. It involves making invisible cultural practices more visible to all participants as well as producing new ideas to develop the activity.

"Radar" as a Tool for Developmental Intervention in Learning Network

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Objectives of the study

This paper analyzes the introduction and co-creation of tools for work development in a learning network. We are interested in tools that are born in the intersections of specialized theoretically driven concepts given by interventionists and practice oriented development efforts by in-house developers. Thus they are simultaneously tools developed on a theoretical basis to be generalized across use contexts and tools becoming meaningful in a context of local use. We will examine a tool named "Radar" in an educational project of the learning network of Southern Savo coordinated by Tuula Syrjälä. The core of the model is composed of the cycle model of expansive learning by Yrjö Engeström, applied in the Developmental Work Research. Other research-based elements derive from the notion of multiple levels of learning in networks by Hanna Toiviainen and the importance of creating tools for boundary-crossing in a multi-professional activity by Hannele Kerosuo. Besides these theoretical sources the concept of "radar" as such is widely used both in its use environments of natural sciences and as a model and metaphor in various domains of activity such as the management research and consulting.

Research questions

How does our understanding link to and deviate from conceptions of "radar" while bringing in the activity-theoretical conceptualization of expansive learning? What options of use does the radar afford for developers and are the options supportive to the underlying developmental interventions in a learning network?

Approach and the methods used

Besides analyzing the conceptual affordances of "radar" on a theoretical level, the discursive episodes of the early implementation of the radar will be examined. This means following the topic of radar in the workshop dialogue among the researcher-interventionists presenting the model and in-house developers making sense of and embedding the use of the tool in the context of their workplace projects. This way of analyzing the implementation differs to some extent from the "waterfall" models of design approaches.

Results obtained

The concept of "radar" and how we came to create it is an example of micro-level innovations that the cross-boundary collaboration produces even though they are seldom recognized. While the invention of a heuristic concept was greeted with a joint delight, the concept will have to be reopened and subjected to critical examination. New tools are not emerging from nowhere. They carry history and involve knowledge, which are not equally available for all participants of a learning network.

Conclusions reached

We hypothesize that the more the tools allow looking at the diversity inherent in complex networks the more useful and open to a further elaboration they may be.

The psychological function of collective work: an instrument of body development

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Inside our research team, one of the main subjects is the central relation between body and work. When we analyse a professional activity, we focus on the relation between a concrete person and the collective work. And for us, activity, subject and collective work build the body of person. The body is at the same time given and in construction (Canguilhem, 2002). If we follow Vygotsky (1930/1985, 1935/1985) and Wallon (1942/1970), the source of this construction is social. The physiological organism is the body which contains.

The body is the product of a double and simultaneous construction. First the body is the product of a subject's activity on his organism. Secondly this production is never independent of the collective work story.

To demonstrate this thesis we propose a specific work situation : the transmission of professionals gestures in chirurgical situation.

Novice surgeons are placed in learning situations without explicit debates on the well-done working gestures. For example, the operation chief's surgeon can help novice surgeons to place his hand in the right position.

Novice surgeons must follow the way of gestures without understand exactly what and why. But at the end of their stage, we observe their bodys become a mean of action.

Ergonomics in designing integrated automation for tractors and implements

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Aspects related to ergonomics construct a part of Farmix project - Integrated automation for tractors and implements (2006-2008). The main goal of the project is to clarify challenges in making integrated control systems over tractor and implements and to develop methods to render these systems. The project partners are Helsinki University of Technology, Agrifood Research Finland (MTT), University of Helsinki and TTS Research (TTS). The project is funded by Tekes (the Finnish Funding Agency for Technology and Innovation) and several enterprises. MTT and TTS are responsible for ergonomics aspects – designing usability and safety of user interfaces – in developing integrated control over tractor and it's implements.

In the study two work processes – combined seeding and fertilizing, and levelling sand roads – and the operator's activities and perception of the tractor-implement system during various tasks of these processes are described – at first when using conventional machinery. The operator's capacity to process information during various tasks is estimated by using the multiple-resource theories of divided attention. This knowledge is then used to recognize time-sharing situations wherein automation should primarily help the operator, and to find out which kind of information and activities best fit in various divided-attention situations. Requirements for functions of controls and displays (including especially virtual terminals) are presented and ergonomics guidelines collected to design them. After implementation of the tractor the operator's activities and perception of the tractor-implement system during various tasks will be described again and the impact of the new technology on the information load and safety will be estimated.

The operator receives mostly visual information and the responses are mainly manual. There are several time-sharing situations where automation could conduct some operations instead of the operator. In some of these cases it is even possible to add new functions into an operation and, at the same time, make it easier to control the operation. It is possible to add auditory signals – in the future also tactile signals – into the system, especially in warning and alarming. Vocal responses are not yet used at all. The ergonomics guidelines have been used to plan and design user interfaces of visual terminals by using PoolEdit User Interface Editor. This editor has been developed in the Farmix project by Helsinki University of Technology.

Tractors and implements usually have separate control systems. Electronics has been applied to agricultural machines, but there is still much potential to increase it. With integration of tractor-implement system the operator's work can become easier and more efficient, accuracy and quality as well as safety can be improved. In order to attain these advancements, characters of humans – ergonomics – must be taken into account already when planning the system.

Studying hindrances and enablers in knowledge work with CASS-method

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The purpose of this paper is twofold: First, to describe new CASS-method to study knowledge work and its hindrances and enablers. Second, to present first experiences gained from using this method by a group of researchers. The need for this kind of methodology is urgent as knowledge workers are increasingly multilocational and mobile.

The distribution and mobilization of activities in organizations has increased dramatically over the last decade as these organizations seek to reduce costs, get closer to their customers, ally themselves with other companies, and engage the best talent, wherever it may be. The use of different locations characterizes knowledge workforce. This trend has been made possible by mobile technologies, which have liberated work from being bound to a particular space and time. For this phenomenon, the term "multilocational work" is used (Vartiainen et al. 2007). It implies that people work wherever it suits their work tasks, business schedule, and/ or lifestyle.

While staying and working in multiple physical locations and traveling between them, people are simultaneously embedded in their virtual, social and mental spaces. The working contexts are combinations of these spaces and can be outlined from both individual and collective perspectives. From the individual point of view, each individual exists in a psychological field of forces that determines and limits his or her actions. This implies and underlines the meaning of personal perceptions and interpretations of the contexts in use. This study explores factors that hinder and enable multilocational and often physically mobile knowledge workers.

In order to study knowledge workers, we applied the Contextual Activity Sampling System (CASS) methodology. It has been developed in the KP-Lab project for the investigation of learning and working practices (Muukkonen et al., 2007). The CASS methods and tools provide contextualized data that allow the analyzing and modeling of within person changes across time. In this study, the CASS is tailored for the needs of studying knowledge work in different workspaces. We prepared the questionnaire consisting of 24 items grouped into four different categories of workspaces. In each space, enablers and hindrances are asked by open-ended and Likert-scaled questions. In addition to writing, open-ended questions can be answered by speaking and by taking photos.

We tested this new CASS application with the group of researchers from two universities. They collected data concerning their own work during a period of five days. Respondents answered a questionnaire concerning their ongoing work with a mobile phone several times per day triggered by changes of places and events. Rich data is analyzed both qualitatively and quantitatively. The study reports results regarding researchers' experiences of the CASS-method.

In addition to showing main hindrances and enablers in the working spaces of knowledge workers, the possibilities of using this methodology to study work activities in business context of companies will be discussed in this paper.

When workers transmit their trade : a source for redesigning diplomas

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This presentation focuses on the relationship between work analysis and vocational training. More precisely, it deals with the issue of designing *"référentiels"*, i.e., standard reference frames for the diplomas in the French vocational training system. For each target occupation, these frames provide both a list of the technical, organizational and social competencies required to carry out the tasks (*référentiel d'activités*) and the corresponding conceptual and technical knowledge to be delivered during schooling. Diploma, reference frame and curriculum design is carried out by joint commissions representing industry, labour, the ministry of education and job experts. However, describing the work of employees in low-qualified jobs of the service sector – and consequently designing an appropriate reference frame - has proven difficult due to the variety of job situations and to the elusive nature of workers' activity in that field. As a consequence, the French ministry of education, in charge of vocational training and diplomas is funding research on this problem.

Using a clinical approach in work psychology, developed in France by Clot in reference to Bakhtin and Vygotsky, our research team engaged, with a group of employees, in a joint analysis of their work activity which consisted in the back office management of thousands of medical files in a large public health centre for Paris City personnel. We are at present working with office workers from a temporary employment firm, whose jobs entail frequently changing and partly unpredictable working periods and contexts.

On the basis of our findings, we consider that reference frames should not be seen only as expert means for objectifying and prescribing work. Making activity analysis meaningful, they can be appropriated for transmitting experience within work units and to novices by the workers themselves. As instruments for the development of their own activity, these artefacts enable employees to mediate their everyday work experience into potential concept development. However, from a methodological point of view, this requires introducing other interlocutors into the associated research unit: vocational teachers as knowledge and reference frame experts as well as vocational education students as potential future workers. Within this framework, the assessment, redesign and development of reference frames as well as the development and transmission of employee knowledge are viewed as inter-dependant.

Expansive development of a new form of work development in an organization

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Traditional view of work in bureaucratic organizations is based on the formal position and authority ascribed to the position the individual occupies. Learning is seen as a process of acquiring the competence to fulfill the requirements of the position. This view applies within an established form of activity. Applying a new idea and knowledge that does not fit to the established order, calls for agency to break away from the given frame of action and take the initiative to transform it. According to Vygotsky this is possible with the help of symbols that function as psychological tools of self regulation as well as practical tools for acting on the external world.

When braking away from the given frame and developing a qualitatively new form of an activity, one runs in contradictions with old concepts and practices forming the given frame. The expansive development and learning of the new way is therefore to a great extent based on innovative expansive resolution of these contradictions. There is, at the same time, however, a pressure to adapt the new idea to the existing frame. In order to maintain and expand a new form of activity actors have to find innovative solutions to the contradictions between their new insight and the existing frame and to extend both the object and the community of their activity.

The Change Laboratory is a new intervention method that supports expansive collaborative transformation of an activity. It differs from the traditional forms of work development in two fundamental aspects: First, in its orientation to the object and purpose of the activity instead of the rationalization of separate functions and inner processes, and secondly, in its emphasis of joint developmental activity and practitioner involvement. The forms of division of labor and collaboration in work development the method calls for differ fundamentally from those, typical to existing forms of work development.

The Center for Activity Theory and Developmental Work Research has trained practitioners in various work organizations to use the method and created a network of collaboration to support the use of the method. In our paper, we analyze the development of the agency of an in-house developer and the new form of development activity in an organization. We focus on the various kind of contradictions between the new form of work development and the existing conceptual models and organizational frames of work development in the organization, the accommodations made to the method and to the organizational frame, and the role of external support and interventions in the sustaining of agency and expanding the new form of developmental activity.

Disturbance load and normal work load – two windows to work-related well-being

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The increasing rate of change has intensified the work life. Burnout and numbers of workrelated stress symptoms have increased although at the same time the traditional occupational risks and work load factors have to be managed (Doherty, Forslin, Shani & Kira, 2002). Accelerating change challenges also our research partner, Northport Ltd, a ground handling supplier at Helsinki-Vantaa airport. The past five years have been turbulent in the organization involving many organizational and functional changes due to increased air traffic and security demands, tight turn-around schedules or market penetration of low-priced airline companies. The changes have resulted in problems and disturbances in everyday working practices. Employees at the airport considered their workload to be heavy and suffered from various health problems. Sickness absence rates have been high. Individual measures to reduce workload and improve work atmosphere have been unsuccessful. All these result in extra problems for the organization in a situation of fierce competition in the market (Launis, Virtanen & Ruotsala, 2007). This arise a question: how to conceptualize and manage the work load and the well-being of employees?

Within the framework of the Activity Theory and developmental Work Research, disturbances are considered as a part of the change or the need state for a change. Anyhow, they are developmental potential for qualitatively new activity (Engeström, 1987) because activity systems are not stable but in constant movement and internally contradictory. The systemic contradictions, caused by changes in work system, are manifested in disturbances and also in innovations in everyday work, and offer possibilities for developmental transformations.

After analyzing disturbances in the work activity of City Home and Country Home Mäkitalo (2005) came to the conclusion that to be able to manage the disturbances the employees have to do extra work. It, in turn, increases work load, which Mäkitalo called the disturbance load. In our paper we examine disturbance load in ground handling work. We try to understand the differences between "normal" work load and disturbance load due to the ongoing changes. One crucial view point within these two approaches is also the conceptualization of work-related well-being.

We use Van de Ven's (2000) *Diamond Model* as an analytical tool. The Diamond Model constructs of four interrelating components: reality, solution, theory and model. In our presentation we use case examples of disturbance load and so called normal work load. The questions we are going to use in analysis are: who are the participants in the cases, how the problems are constructed (relevance of the cases), how the theory is constructed (validity), how the cases are planned and carried out (reliability) and how the problems are solved (impact).

The analysis of professional risks at the working patients, suffering diabetes

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Object under study. The purpose of research - to study professional risks of working patients with diabetes.

Method of research. The group of patients has been generated by a method of casual sample, n = 253.

Results. According to the lead research, among working patients with diabetes on the first place in structure of professional risks the stress has been marked. The given type of a professional risk was noted with 74, 8 % of employees, 79, 5 % of doctors, 81, 3 % of teachers, 89, and 8 % of workers of sphere of service. The greatest number of the persons, who have noted stress as a professional risk, has been marked in age group of 35-59 years. On the second place in structure of risk factors, working patients with diabetes have noted unsatisfactory operating conditions. To them, the majority of the investigated patients (64, 3 %), have attributed an unsatisfactory temperature mode. Absence of comfortable operating conditions in a combination to stressful loading promoted development of diseases (first of all neurological). Prevalence of neurological diseases at employees has made 57, 9 %, among doctors of 61, 4 %, at teachers of 73, 2 %, at workers of sphere of service of 69, 7 %. In structure of neurological diseases of working patients the diabetes marked an osteochondrosis of a backbone (54, 3%), a neurasthenia (31, 3%), and dystonia (13, 4%). With neurological diseases were combined cardio logical. So, at 43, 2 % of employees hypertonic illness, at 48, and 3 % of doctors - a stenocardia was marked. Among teachers and workers of sphere of service, the most widespread disease was hypertonic illness - 51, 2 % and 53, 4 % accordingly. The third on frequency of occurrence a risk factor was infringement of a feed (an irregular feed). The given risk factor was noted with 13, 2 % of employees, 11, 4 % of doctors, 13, 4 % of teachers and 14, and 6 % of workers of sphere of service. Working patients with diabetes have attributed the increased visual loading caused by work on a computer to one of the major risk factors. This risk factor was noted with 11, 7 % of employees, 9, 6 % of doctors, 6, and 4 % of teachers. In this connection the circumstance, among the investigated patients had been distributed eye diseases. Most frequently met myopia I-II degrees. The share of this disease made at employees of 21, 4 %, at doctors of 19, 8 %, at teachers of 31, 4 %.

Conclusions. Among the working patients, suffering diabetes, to the most widespread professional risk factors it is necessary to attribute stress, unsatisfactory operating conditions, the irregular feed, the increased visual loading. For decrease in influence of the given risk factors, it is necessary to develop the program promoting decrease of influence of these factors on health working. The given program should be adapted for each professional group, in view of the experience of work, operating conditions and age.

Knotworking-type formation of school activity: intervention in multiple learning trajectories

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In traditional school activity, the object of educational work is classroom-based teaching that transfers the given contents of textbooks to individual children. Educational institutions are tightly closed (though autonomous) activity systems that have little impact on societal activities outside the real life-world. In contrast, activity-theoretical research and expansive learning approach projects that advocate school changes have concentrated on the mutual reconceptualization and the expansion of the meaningful object of educational work and the subject's agentive potentialities of people involved in schooling: teachers, students, parents, etc. To go beyond the closed idea of school, this paper reports and analyzes a hybrid activity called New School (NS) in Osaka. It is based on a partnership between a university and a local elementary school that also involves other social actors and institutions. In the NS project as an intervention, these parties are involved in designing and implementing such new forms of school learning as children's project-based learning and networks of learning to bridge the gap between school activities and the productive practices of everyday life outside the school. The paper illuminates and analyzes the emerging new forms of school learning in this hybrid activity. The idea of this intervention is that expanding school activity is carried out not from the inside alone but by creating hybrid and symbiotic activities in the real life-world. In particular, the analysis explores how the multiple partners involved in the intervention can expand and share the object of their hybrid educational activities. This intervention in the expansive development of the school must consider the complex learning trajectories of an individual, collective, or whole organization as new emerging objects of education. Such multiple learning trajectories are produced in collaboration among schools, various providers (e.g., universities, experts, workplaces, community organizations), and the learners themselves. The analysis of NS intervention leads to the preliminary finding that a joint engagement and contribution was truly needed for the school, the university, and even the children themselves to collectively generate powerful learning trajectories in developing project-based learning units. Analysis is useful of this emergence of joint engagement with the help of the concept of "negotiated knotworking" from Yrjö Engeström and his colleagues. Knotworking refers to partially improvised forms of intense collaboration between partners that are otherwise loosely connected but engaging in solving problems and rapidly designing hybrid solutions when required by their common object; in knotworking, there is no fixed single center of authority or control. The paper concludes that expanding the object of school activity requires that learners, schools, and various producers of learning engage in knotworking to connect and reciprocate all the potential resources of learning trajectories.

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