KNOWLEDGE PRACTICES IN WORKPLACES (KP-LAB)

-CHANGE LABORATORY (CL) - AN INTERVENTION METHOD FOR SYSTEMICALLY DEVELOPING WORK PRACTICES IN THE RICH INTERNET APPLICATION.

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This paper takes a look how the university created knowledge and practices at the KP-lab are applicable to the business sector. The constantly evolving information technologies and accelerated spreading of World Wide Web has brought new opportunities to the learning process. As a consequence, the process of knowledge gathering has been relocated to the different e-learning environments. Some of them are able to support a kind of interactive communication between tutor and a trainee [1, 2]. However, such tools do not support neither the information nor the observation gathering during the learning process, or the knowledge gathering which might in return result as a faster problem solving. On the basis of these assumptions, Change Laboratory (CL) is an option for information/observation gathering. With suitable interface it does not only gather information and data from the learning process but it is able to support development of new practices in the process of task solving too. The advantage of such approach is that these practices can either be developed by individuals or collaboratively in a group. Also, these can be further used in other sessions and in new methods. Thus, knowledge and practices contribute to the community in a developmental cycle.

1 Introduction

Pöyry is a client- and technology-oriented, globally operating consulting and engineering firm. It has three core areas of expertise: energy, forest industry and infrastructure & environment. The Group employs 7300 experts in 45 countries.

The Group's business concept is based on early involvement in its clients' business development. Pöyry offers services related to consulting, project development and implementation, and operations management and maintenance planning in all of its business sectors.

As Pöyry has an expanding need of creating new knowledge within the company and in co-operation with universities and research institutions new learning and working methods are greatly needed.

The CL is based on the framework of developmental work research (DWR) which is built on three basic theoretical ideas. First of all, a collective activity system where the common activity has a specific object is the DWR unit of analysis. Contradictories are solved between components in the activity system which brings qualitative changes to the activity. Consequently, new tools and/or new techniques can emerge in process of deviation analysis. Change and development in the DWR is a long-term collective process. Not only individual mental change, but also a construction of these new tools, techniques or ways of work can be observed during this process. This type of learning is called expansive learning [3].

Secondly, in a typical project participants are involved in the analysis of their collective activity. This motivates them to develop and test new solutions for the problems they face in everyday work. Participants are constructing a “mirror” of their own activity by inspection and analysis of concrete material from the historical and present development of work. A generalization of this activity system and its components is made by analysis of specific information acquired through this “mirror”. From here, analyses of historical and present activity lead the working community in stepping forward to the future by forming their own development potential [4].

Thirdly, based on the previous assumptions, DWR is a reflective method. Reflexivity is actualized and formed through a “mirror” which is placed in front of the participants showing them concrete material about their work. This mirror is used for the analysis and evaluation of their work. So called intermediate analysis tools are needed to assist the participants to reflect upon the relevant aspects during the analysis. The Moderator, through which DWR is carried out, is able to collect and select concrete empirical material to be analyzed for disturbances and new solutions; it can set tasks for the participants to analyze their own work or build a new model of work. Also, Moderator can develop and offer conceptual tools for solving previously discussed tasks to participants [5].

2 Change Laboratory Working Environment

The heart of the CL should be formulated from the data that is being manipulated with and the data that structures other data into specific objects. Items that form application data model can be divided into structure items, data items, and annotation items on the basis of their existence and function that they can provide.

2.1 Structure Items

Structure items create a basic structure that aims to simulate the actual composition of CL process. This structure is provided to the data classification that is used within the working environment. A structure consists of CL process which is a sequence of sessions. Session consist of three areas which are model and vision; ideas and tools; and mirror material. Also, it may contain any number of themes which are objects of discourse that are discussed in the session. All themes have following three states: past, present, and future. States can neither be added to, nor can any of them be removed. Additionally, CL process includes homework assignments which are supplemental exercises that are carried out in a predefined timeslot. Homework submissions are very similar to the above mentioned sessions. They contain three areas and may also contain themes. Nevertheless, they differ in functionality. Sessions are generally held in a synchronous manner whereas homework assignments and submission are usually done asynchronously.

2.2 Data Items

Data items can be described as a material that is being handled and/or produced within the course of process. What is more, they can be set as belonging to one or more combinations of a specific state, a specific theme, and a specific area, where an area belongs to a specific session or homework assignment.

Data items include:

1. Triangle models which represent instances of CL activity system (a triangle model has to have at least these components: instruments, object, subject, rules, community, and division of labor).
2. Four-field models which are two dimensional planes with four textual labels marking the left, right, top, and bottom edges of the plane. An entry in a four-field model is a set of horizontal and vertical coordinates, marking a specific point in the plane, and with a textual label associated with it.
3. Notes which are simply snippets of text can be of any length.
4. Content items which are basic concepts of a piece of material with arbitrary content in the shared space.

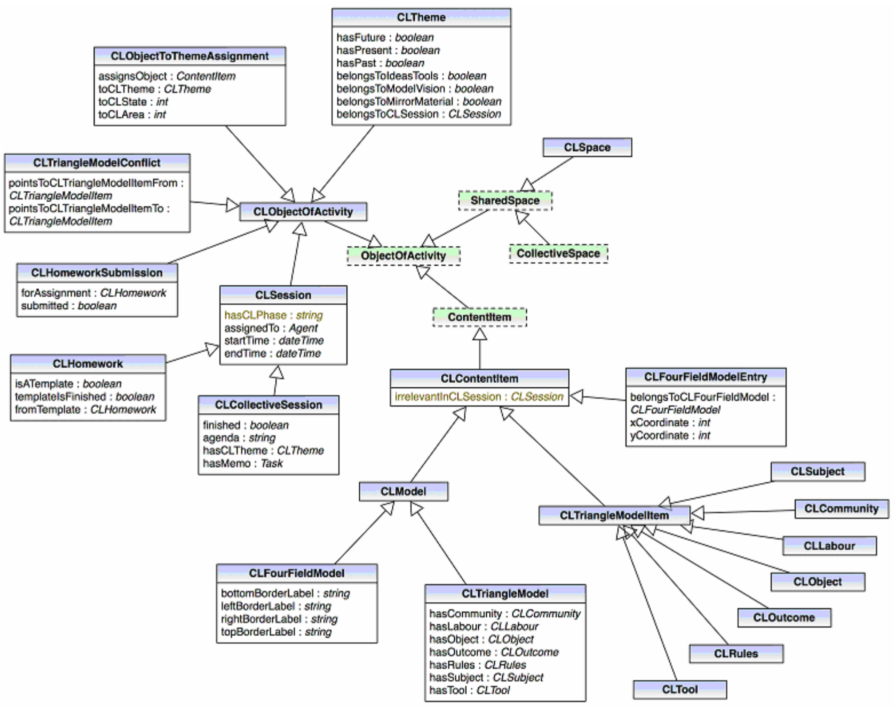

Fig. 1. Change Laboratory Application Ontology with fore mentioned Structure and Data Items. Objects which are not in solid squares are parts of KP-Lab System Ontology.

2.3 Annotation Items

Annotation items provide a more permissive way of classifying data items. They can be either Semantic Links (i.e. semantics that describe a relationship between two items) or Semantic Annotations (i.e. semantics that describe one specific item).

3 Carrying Out the Work in Change Laboratory

Traditional CL is an established practice where the benefits of including Information and Communication Technologies (ICT) to support the learning process are numerous. The Virtual Learning Environment, Virtual White Board, and Analysis Toolkit are some examples which can be used to support so called DWR.

3.1 Virtual Learning Environment

Various documents produced through the learning process are not categorized systematically, therefore, distribution, search, and use of those documents are considered to be difficult. A virtual learning environment can help the participants to organize the process and produced documents as well as facilitate discussion in a more tangible way. The Virtual Learning Environment should be able to:

1. Organize process data and documents. CL system can be made to classify created data by time, date, event etc. in order to make the body of data more accessible for the participants.

2. Facilitate discussion. ICT allows users to participate also in textual discussions compared to the (majority of) oral discussions of traditional CL. This will help in long-term discussions and in development of the ideas reflected upon these discussions.

3.2 Virtual Whiteboard

A specific application will be developed in order to facilitate the visual construction of new models and solutions in DWR process. This setting is based on traditional “physical” whiteboard setting with extended features, such as flexible editing and linking of concepts as well as presented digital material. Virtual Whiteboard should be able to provide following functionality:

1. Semantic annotation of presented and created material. Annotation and inclusion of semantic will enables a new dynamic way of representing the produced material and DWR concepts. This is positively in line with the dynamic nature of DWR process where common practices and the outcome of the process is negotiated and in a constant change throughout the whole process.
2. Flexible editing of material. Compared to traditional whiteboards ICT support will bring about more flexibility as intermediate steps of note taking can be made and edited during the discussions. Furthermore, already produced material is available for re-editing or copying.

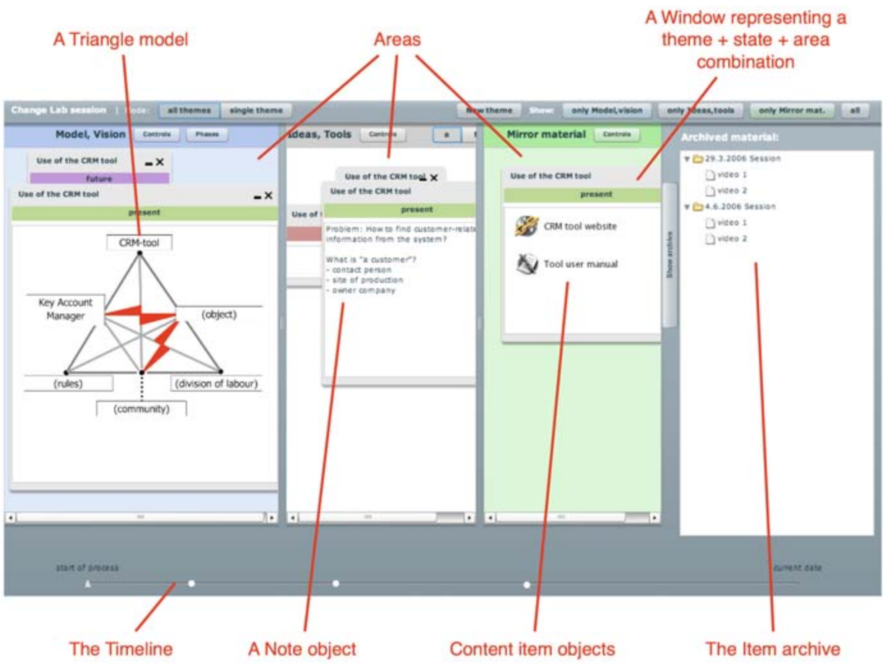

Fig. 2. Virtual Whiteboard working environment.

3.3 Analysis Toolkit

Since there is no doubt that this process is research oriented, ICT support can be developed for multimedia annotation for analyzing video, audio, graphical, and textual data. This is carried out by using ontology of theoretical activity framework to perform preliminary analysis of activity by marking, classifying and linking relevant segments of data. Analysis of supporting functions, such as profile on activities, predictive analysis of CL process, or glossaries of theoretical concepts may be implemented as soon as sufficient amount of material has been collected.

4. The Special Impact of KP-lab for professional development in Pöyry

Foremost, KP-lab provides a tool for the Pöyry organization how to effectively manage business in an international environment. The greatest management challenge of this century is in achieving significant improvements in effectiveness of knowledge work. This is also true for engineering companies, which in addition must make sure that their plant designs are accepted by the society and other stakeholders.

Social Infrastructure

The engineers and designers are working in expert teams in several companies. The companies are not only located in several countries, but also in most case in different continents. Expert teams and individuals are using ICT based KP-Lab tools for communication, knowledge sharing, knowledge creation, innovation and learning.

Technological Infrastructure

The KP-Lab is providing flexible and extensible ICT system composed of a cluster of interoperable applications that organize participants' collaborate activities around advancement of shared knowledge artifacts. Ubiquitous user agents provide end-users with inter-institutional access to KP-Lab services such as shared collaborative working spaces, semantic knowledge repository, and real time multimedia communication for individual's as well expert teams.

Field Work in the near Future

Tools allow expert teams and individuals to create, store, modify, share and annotate knowledge artifacts. Furthermore, re-usability of knowledge artifacts by subsequent users is enabled. Trialogical technologies invite user interfaces that allow one to take a visually represented or other type of idea or innovation and put it into the centre of discussion and start annotation, commenting, and discussion the object in question.

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Curriculum Vitas:

Ali Rantakari: graduated as B.Eng, Media Technology from EVTEK University of Applied Sciences in 2006. He did his final thesis for the Knowledge Practices Laboratory (KP-Lab) project at EVTEK's research and development department, and later worked there as a project engineer, developing a GUI application central to the project. He is currently employed as an application designer for Pöyry Forest Industry, where he is working on the design and implementation of Change Laboratory tools.

Michal Raček: obtained M.Sc. degree from Technical University in Košice, Slovakia in 2004. He has finished postgraduate study at Department of Cybernetics and Artificial Intelligence at Faculty of Electrical Engineering and Informatics of Technical University in Košice in 2007. During his study he was involved in several national research projects and participated as a software engineer in few software projects as well. Currently he is employed as an application designer in

Jaakko Pöyry Group where he focuses on design and implementation of the Change Laboratory front-end service (part of KP-Lab project supported by EU IST program).

Mikko Höynälänmaa: graduated as M.Sc., Process Technology from University of Oulu, Finland, 1975. He joined the Jaakko Pöyry Group in 1989 as a Process Engineer in the Pulping Process Department, Pulp Technology Division. From 1990 to 1997 he was the Department Manager of the System Department, Pulp Technology Division. In 1997 he was nominated Development Manager of Information Technology in the Electrical Engineering and Process Control Department. Mr Höynälänmaa has been involved in various national and European research projects on eLearning, Knowledge Management and Networking. Currently he leads a national development project. The target of this project is to develop business models using new ICT technology possibilities.

Hannu Markkanen: M.Sc. (Eng.) is a Researching Lecturer in Media Engineering at Metropolia and will be Metropolia's project leader. He has been involved in and coordinated EU funded R&D projects in the field of learning technologies for past 15 years. His R&D experience includes knowledge-based expert systems, network-based learning environments and collaborative learning environments.

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Katriina Schrey-Niemenmaa: M.Sc (E.Eng) degree and MQ (Master of Quality) from Helsinki University of Technology. She has been in her current position as a project director at the EVTEK University of Applied Sciences since 2001. Prior to that she has worked for 20 years at the engineering education and industry - university co-operation interface focusing on competency management, life-long learning issues, quality in education and new learning solutions. This has included positions with Nokia, The Finnish Association of Graduate Engineers, TEK, and Kone Corporation.