

PROMOTING INNOVATION AND LEARNING THROUGH CHANGE LABORATORY: AN EXAMPLE FROM FINNISH HEALTH CARE

Hannele Kerosuo, Anu Kajamaa and Yrjö Engeström
University of Helsinki, Finland

Abstract: *The objective of this article is to introduce Change Laboratory as a new method for promoting innovation and learning in organizations and at work. Change Laboratory® represents an example of the social process of innovation during which new ideas are developed and put into action within an organization. We suggest that successful social processes of innovation can be promoted through expansive learning in Change Laboratories. Change Laboratory is based on cultural-historical activity theory and provides a set of instruments for innovating through expansive learning. In this article, we illustrate a process of learning on a case example from Finnish health care. The case shows how Change Laboratory was applied to develop a surgical unit of a university hospital in Northern Finland. The social process of innovation involved the development of a new organizational and leadership model. In conclusion, we suggest that organizations can improve their capacity to innovate through expansive learning in Change Laboratory interventions. In order to understand the process of innovation the contradictions and their transformations need to be understood in the scrutinized activity.*

Keywords: *social process of innovation, Change Laboratory, expansive learning, object of activity, activity system, contradiction, hospitals*

HANNELE KEROSUO – University of Helsinki, Faculty of Behavioral Sciences, Department of Education, Center for Research on Activity, Development and Learning. • P.O Box 26 (Teollisuuskatu 23–25), FIN-00014 University of Helsinki, Finland • hannele.kerosuo@helsinki.fi

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Introduction

Worldwide economic situation, technological change, market competition, new customer demands, and problems related to production, competence, as well as knowledge-intensive society put new challenges on work organizations. Meeting these challenges is especially demanding because the current techno-economic shift is driven by disruptive and multi-directional innovations (Freeman and Loucá 2000, Perez 2003). As a consequence, many organizations need to re-design their activity as well as re-configure their capacity to promote innovation. The challenge for re-design is urgent since the social processes of innovation are not necessarily carried out effectively, in part because managers do not design organizations for promoting innovation (Leonard 1998). The design of social processes of innovation is also often disconnected from organizational development and learning. However, these processes could be connected to learning. Design without a strong linkage to development and learning in practice is ineffective (Dunbar and Starbuck 2006). Innovation processes can also be closely connected to knowledge creation in the techno-economic shift. The models of so-called first generation knowledge management could be replaced or supplemented by second generation knowledge theories. According to second generation theories, knowledge is embedded and constructed in collective practices instead of being an individual property, trait, or skill that can be identified, codified and measured by objective evaluators (Ahonen et al. 2000: 283).

The objective of this paper is to introduce Change Laboratory as a new method for promoting innovation and learning within organizations (Engeström et al. 1996). We use the term innovation to refer to social processes through which new ideas, objects and practices are created, and developed in organizations (Slappendal 1996: 107–108). The starting point of our argument is that the techno-economic shift requires a new system of learning and learning practices in organizations and at work (Pihlaja 2005, Ahonen 2008). Traditional ways based on training in mass production need to be substituted by new methods and practices to enhance innovations and learning. In this article, we suggest that successful social processes of innovation can be enhanced through expansive learning (Engeström 1987) and the Change Laboratory

method. We illustrate the process of learning with a case example from Finnish health care in which a new leadership and management model was developed in a surgical unit in Northern Finland. The process of expansive learning involved the questioning and analyzing of an existing activity as well as modeling and implementing a new activity.

Change Laboratory is based on cultural-historical activity theory and its Finnish application in Developmental Work Research (Engeström, 1987; Engeström 2005). Change Laboratory constitutes a research-assisted environment of change in which participants can re-design their work activity and organization by creating new models, tools, and practices with the aid of researcher-interventionists. The Change Laboratory method has been applied in a variety of contexts during the past fifteen years, from paper mills, factories and hospitals to schools and newsrooms. Many scholars are using it in education, organization and workplace studies representing national and international contexts.

Change Laboratory provides a platform for promoting innovation and learning. Muniesa and Callon (2007) describe platforms as hybrid spaces that enable experimentation as well as exchange of various interests and new ideas. The example from Finnish health care shows how employees from different professional backgrounds and expertise can create new models of activity and practices within organizations and at work. Besides enabling better functioning of the unit, the new leadership and management model also enabled the use of new knowledge.

We begin by explaining the activity-theoretical view on the social process of innovation and the key concepts of object of activity, activity system, contradiction and expansive learning. Subsequently, Change Laboratory is presented as a method for promoting innovations and learning in organizations. Then the case example illustrating a process of social process of innovation in a central surgical unit is analyzed. Finally, the summary of the case, conclusions and discussions are provided.

The activity-theoretical view on innovations and the key concepts of the study

In this section we present the activity-theoretical view on innovations and the key concepts of the study. In contrast to industrial and management innovations, the activity-theoretical view is introduced as a general paradigm to study transformations and social processes of innovation through expansive learning. The cultural-historical activity theory derives from Soviet cultural psychology (Vygotsky 1978, Leont'ev 1978) and has been further developed by many

scholars in Western countries (e.g. Engeström 1987, Cole and Engeström 1993). In this study, the original formulations of Vygotsky and Leont'ev of mediated action and object-oriented activity, further developments of these concepts in Engeström's work as well as Engeström's concept of expansive learning are used as basic concepts. The key concepts include object of activity, activity system, contradiction and expansive learning.

Innovation is commonly understood as a commercialized, technological invention (Freeman 1982) that is adopted for general use through a diffusion process (Rogers 2003/1962). Besides a technological invention, innovation can also be an idea, a practice, or a material artifact (Rogers and Shoemaker 1971). In order to be effective, an innovation process needs to be managed and organized in practice (Drucker 1985). In management and organization studies, innovation refers to a social process "through which new ideas, objects and practices are created, developed, or re-invented" (Slappendal 1996: 107). The key distinguishing feature of innovation is novelty, regardless of whether the idea or object is entirely new (Slappendal 1996).

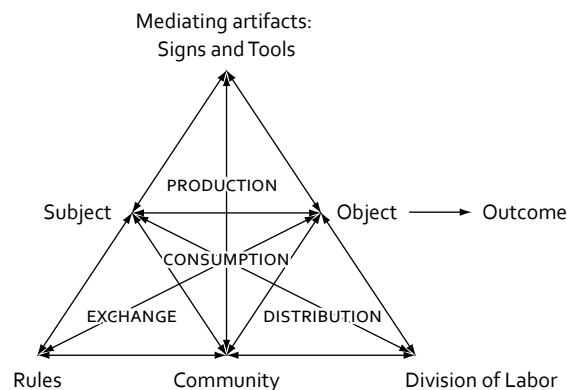
Cultural historical activity theory is not a special theory of innovations but a general paradigm to study human activity. The theory of expansive learning (Engeström 1987) focuses on qualitative transformations in the process of innovation and opens up a perspective on the process of innovation from idea generation to implementation and diffusion of an innovation. In this article, we use the concept of innovation to refer to social process of expansive learning. Thus, innovation is "a process of shared construction of a shared object, a mobilization of the necessary and complementary cultural resources as well as a process of mutual learning" (Miettinen 2006: 176, see also Miettinen 1996, Engeström and Escalante 1995). In order to understand the process of innovation, contradictions and their transformations need to be understood in the scrutinized activity.

An *object* of collective activity is considered as a basic motive and sense of human activity (Leont'ev 1978: 52). Different activities are distinguished by their objects. Object of activity is "both something given and something projected or anticipated" (Engeström 1995: 397). The meaning of the concept of object is limited in English language. German words 'Gegenstand' and 'Object' clarify the activity-theoretical meaning of the concept. The concept of 'Gegenstand' captures the ways an object is embedded in an activity, and is distinct from the notion of mere 'Object' referring to its materiality (Engeström and Escalante 1996: 361–362). From the activity-theoretical perspective, the creation of novelty and innovation presumes the creation of a shared object. The construction of a shared object is an essential characteristic of innovation and novelty (Miettinen 2006).

An object is rarely understood in an unequivocal way by subjects of an activity because participants may have different perspectives on it. As a consequence, an activity often emerges as inherently multi-voiced. The multi-voicedness of an activity is often a source of trouble and tensions reflecting the underlying contradictions in an activity. One of the tasks of activity-theoretical study is to bring these different perspectives into a dialogue and create novel solutions to contradictions. Therefore, the multi-voicedness of an activity can become a source of innovation. In the case example of this study, a diseased part of a human body in need of an operation is often understood as an object of surgical activity, whereas the object of anesthetic activity is to secure the vital function of a patient during operations. The different perspectives of surgery and anesthesia represent an example of the multi-voicedness in the case example.

Engeström (1987) models human activity as an *activity system* that consists of the subject focusing on an object of collective activity that is mediated by signs and tools, rules and division of labor in a community (Figure 1). Human beings realize activity as actions that are connected to a collective object through goals and operations directed by the circumstances and tools at hand (Leont'ev 1978: 63). For instance, a physician diagnosing a patient's illness with the help of diagnostic tools and knowledge is committing a goal-directed, tool- and sign-mediated action in surgical activity. The actions of a physician are regulated by societal laws and specific rules. A physician is a member of professional community and has agreed to follow a certain division of labor in health care activity.

Figure 1 A model of human activity (adopted from Engeström 1987: 78)



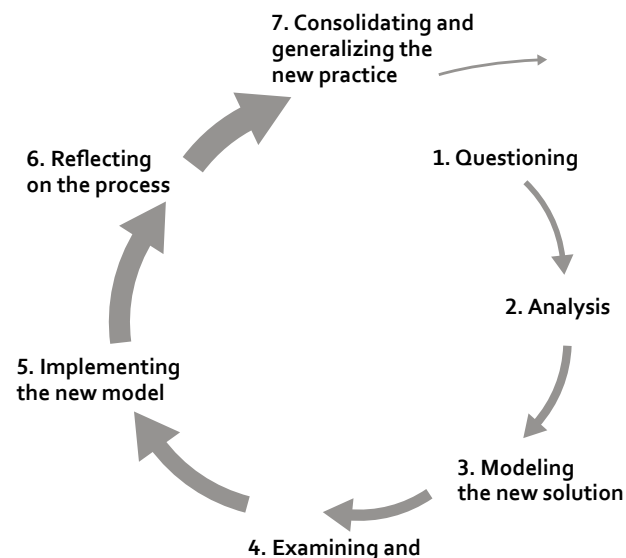
The activity system constitutes of four sub-activities called production, consumption, exchange, and distribution. The activity system enables the analysis of these multiple relations but it is essential to “grasp the systemic whole” in the analysis. From the perspective of this study, the activity system represents the cultural resources at hand for creating innovations in human activity. In recent studies, the activity system model is often used as a unit that constitutes of two or more activity systems. In the case example of this study, the surgical unit involves the activity systems of surgical activity and anesthetic activity (see the case example). Together these activity systems provide the necessary and complementary cultural resources for the creation of novelty and innovation in the surgical unit.

An activity system is not stable but rather in a constant state of flux because of internal contradictions within and between its elements. A *contradiction* is a structural tension between opposing forces in a societal activity (Engeström 1987). Contradictions act as driving forces of change as they generate tensions, disturbances and innovative attempts for development in social action. In units of analysis consisting of two or more activity systems, contradictions emerge as historically accumulated structural tensions within and between activity systems. For instance, there is a structural tension between bio-medical discoveries and their implementation in health care organization due to financial and organizational limitations (Kerosuo 2006). In this paper, contradictions are researched as driving forces for mobilizing the necessary and complementary cultural resources to enable innovation and learning. The concept of contradiction is also used as an analytical concept to examine the basic contradiction between the activity systems of surgery and anesthesia in the case example.

The process of *expansive learning* actions that enables innovation is depicted, in ideal terms, in Figure 2. The model of expansive learning is based on a dialectical thought of transformation during which a transition from activity 1 to activity 2 emerges. The process of expansive learning represents the process of mutual learning during which a new collective object of activity is created through solving contradictions and mobilizing the available social and cultural resources in an activity.

The starting point of expansive learning is the emergence of a state of need in an activity. The state of need is usually uncovered by actors questioning their prevailing activity. The questioning relates to primary contradictions of an activity that are usually latent in organization. Primary contradictions can become explicit through expressions of double binds in an activity. Engeström argues that double binds experienced by single human beings are psychological representatives of secondary contradictions that can act as drivers of change (Engeström, 1987: 165). A secondary contradiction often becomes

Figure 2 The model of expansive learning actions (adopted from Engeström and Sannino 2010: 8)



manifest between two elements of an activity system. For instance, a secondary contradiction can be uncovered between the rules and the object of surgical activity. In successful processes of expansive learning, participants analyze the contradictions and tensions inherent in double binds and model new solutions for an activity. During the analysis and modeling, a new object and motive as well as new instruments are created in an activity. Analyzing and modeling are followed by the examining and testing of the new model and instruments of an activity. During examining, the model and instruments are adjusted and enriched in an activity. After examining, the new model of activity and instruments are implemented in the activity. During implementation, contradictions between the old and new models of an activity can occur. For instance, employees can resist the use of the new instruments. Implementation leads to a reflection of the process of expansive learning. Reflection refers to evaluation and stabilization of the process. After evaluation, the consolidation and generalization of the new practice take place. Consolidation and generalization can trigger contradictions between the new activity and its neighboring activities, for instance in collaboration between the surgical unit and hospital wards. The model of expansive learning actions is applied in the analysis of the case example (see Figure 4).

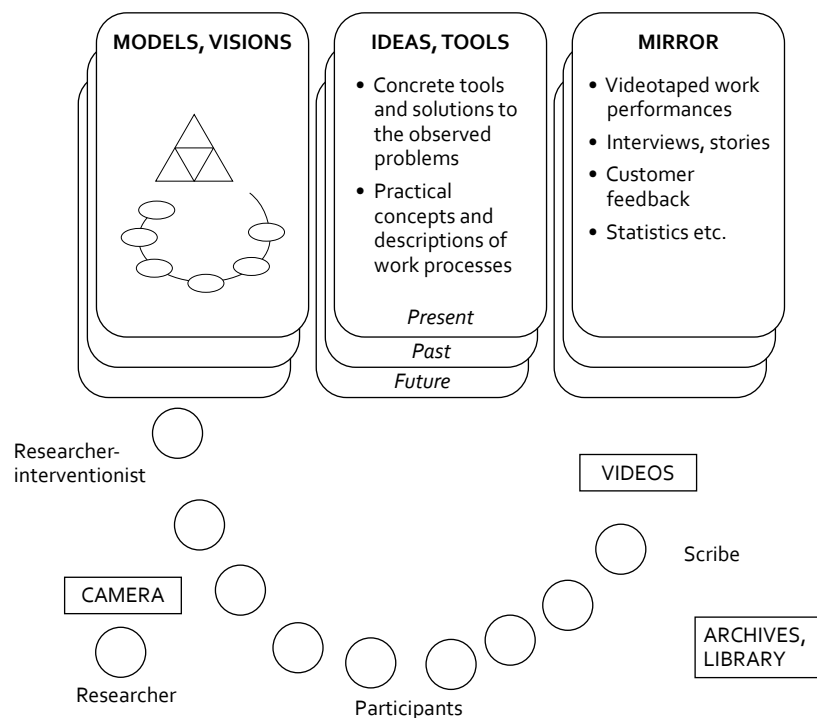
Change Laboratory as a method for promoting innovations and learning within organizations

In this section, we introduce Change Laboratory as a method for promoting innovation and learning within organizations. The techno-economic change in society requires the adoption of context-specific forms of learning and development such as Change Laboratory (Miettinen 2006). The aim of Change Laboratory is to support participants to redesign their work and organization. In Change Laboratory, participants engage in a process of promoting innovation and learning by focusing on critical tensions and contradictions in their work practices and organization. The critical tensions and contradictions are analyzed in connection to their historical and local context with the aid of activity-theoretical concepts introduced in the previous section (i.e., the concept of object, the model of an activity system, and the process of expansive learning). These concepts act as mediating instruments in Change Laboratory sessions. In Figure 3, the prototypical layout of Change Laboratory is presented.

Change Laboratory is located in a room or premises on a shop floor (or in close proximity thereof). It is equipped with a set of instruments for promoting innovation and learning. Participants work with wallboards aided by a scribe who is a staff member. In the basic setting, there are three sets of wallboards for presenting the work activity. The horizontal dimension of the wall boards represents different levels of abstraction and generalization (Engeström et al. 1996: 11). The “mirror” wallboard represents glimpses of daily work practices. Researchers gather data from day-to-day work and offer results for collective reflection as a “mirror” in Laboratory sessions. Mirror data can include, for instance, videotaped episodes of work, stories, interviews, and customer feedback. In the original Change Laboratory setting, the “model/vision” wallboard is used for analyzing systemic quality and interconnections of work activity. Theoretical tools and activity-theoretical concepts such as model of activity system and model of expansive learning actions are used in the analyses. The third wallboard in the middle is reserved for “ideas and tools” that are collectively created during the sessions. Intermediate cognitive tools such as schedules, process flowcharts, and organizational charts are used in the design of a new model for work activity. The vertical dimensions of the wallboards represent change in time, i.e., between past, present and future.

Change Laboratory often begins with a collective analysis of present problems in an activity. The roots of the problems are usually traced from the history by modeling the past activity system. Subsequently, the present activity system is modeled, including the internal contradictions of the activity. As Engeström and his colleagues (1996) emphasize, analyzing current internal

Figure 3 Prototypical layout of Change Laboratory (modified from Engeström et al. 1996: 11)



contradictions helps participants pay attention to essential sources of tensions in an activity. Next, participants envision the future model, including a plan for examining and implementing the new model. The expansive learning process is realized during several sessions in Change Laboratory. The process typically lasts from three to six months.

Change Laboratory is based on Vygotsky's method of double stimulation (Vygotsky 1978). In the Change Laboratory setting the "mirror" represents the original task or problem described in the original idea of double stimulation. The theoretical models, e.g., the activity system model and the expansive learning model, are used as neutral objects or instruments (i.e., secondary stimuli) in the Change Laboratory design (Engeström 2007).

Novelty is created in a demanding process of expansive learning in Change Laboratory settings. During the process, meaningful solutions (expanded objects, new tools, new constellations of communities, new rules, and a new divi-

sion of labor) are usually transformed into a specific device that is meaningful for the subject in a given situation (Engeström 2007). Thus, Change Laboratory can be characterized as promoting the creation of novelty and innovations. In the next section, we will present our case example from Finnish health care in which Change Laboratory was used as a platform for innovation and learning in an organizational context. The case example describes a social process of innovation during which new ideas were developed and put into use in a health care organization.

Case example: Change Laboratory in a Central Surgical Unit

Case description of the Central Surgical Unit

Study data was gathered in a research and development project in a central surgical unit of a university hospital during the years 2006–2007. The project was part of a larger project called *Stabilization and diffusion of innovative forms of work and learning* that was funded by the Finnish Work Environment Fund during the years 2004–2007. A group of surgeon specialists, anesthesiologists, specialized surgery nurses, anesthesia nurses and members of hospital management joined the researchers to create a multi-professional working group. The task of the working group was to analyze the tensions and contradictions in the surgical unit, find a solution for the analyzed tensions and contradictions, and implement a new model in the surgical unit. A new leadership and management model was created and implemented as an outcome of the process.¹

As part of a public sector hospital, the Central Surgical Unit provides elective and emergency operations requiring specialized surgery for the population of Northern Finland. The unit has sixteen operation theatres and about 300 staff members, most of them nurses specialized either in surgery or anesthesia. The number of elective operations is about 10,000 per year whereas the number of emergency operations is about 5000 per year in the Central Surgical Unit. Its surgical specializations include orthopedics and traumatology, plastic surgery, hand surgery, urology, heart and thorax surgery, neurosurgery, vascular surgery, gastroenterology and general surgery. Day surgery is provided by another unit and the number of such operations is not included in the

¹ The case is also reported in other studies (Kajamaa 2010, Engeström, Kajamaa, Kerosuo and Laurila 2010). Anu Kajamaa is also working on her PhD thesis based on this data.

above figure. The hospital in question is among five largest university hospitals in Finland.

The Central Surgical Unit is a part of the Profit Center for Surgery and Intensive Care. The Profit Center has a matrix structure that consists of eight medical units, the Central Surgical Unit being one of them, and of nine surgical specialties cutting across the medical units. The Profit Center is managed by a Profit Center manager – head doctor in surgery – and a charge nurse with two assistant charge nurses. Each surgical specialty and anesthesia is led by a head of medical specialty. The daily activity of the Surgical Unit is managed and coordinated by an operations manager – an anesthetist by profession. Two head nurses and six staff nurses conduct operational management in anesthesia and surgery. Surgeons join the Surgical Unit to conduct operations. Besides the Surgical Unit they also work in surgical wards and outpatient clinics. Members of the anesthesia staff mainly works in the unit but currently they also provide services to other parts of the hospital, e.g., to the laboratory unit and the maternity ward. Surgical nurses are usually specialized on one or more sub-specialty in surgery but they work with any sub-specialty on emergency duty.

In 2006, we – a group of researchers from the University of Helsinki – were invited to facilitate a Change Laboratory at the Surgical Unit. The practitioners in managerial positions defined the functioning of the unit to be in crisis. The operations manager explained that they needed to conduct an increasing number of operations because of new nationwide legislation instituting time limits for access for care. The health authorities would impose penalties on hospitals if they failed to meet the time limits for care. However, the daily resources to carry out the number of operations as expected had decreased in the unit. For instance, the number of sick leaves had increased and there were difficulties in hiring new staff – especially anesthetists and nurses. Another challenge was that too many patients required anesthesia in the other parts of the hospital. The staff members further reported that patients had become more demanding than before as complex and challenging cases were referred to the surgical unit and “simple” operations were served at the day surgery. Long waiting lists and the lack of resources were presented as contradictory demands, latent tensions, and problems representing developmental contradictions in the daily practices of the Surgical Unit.

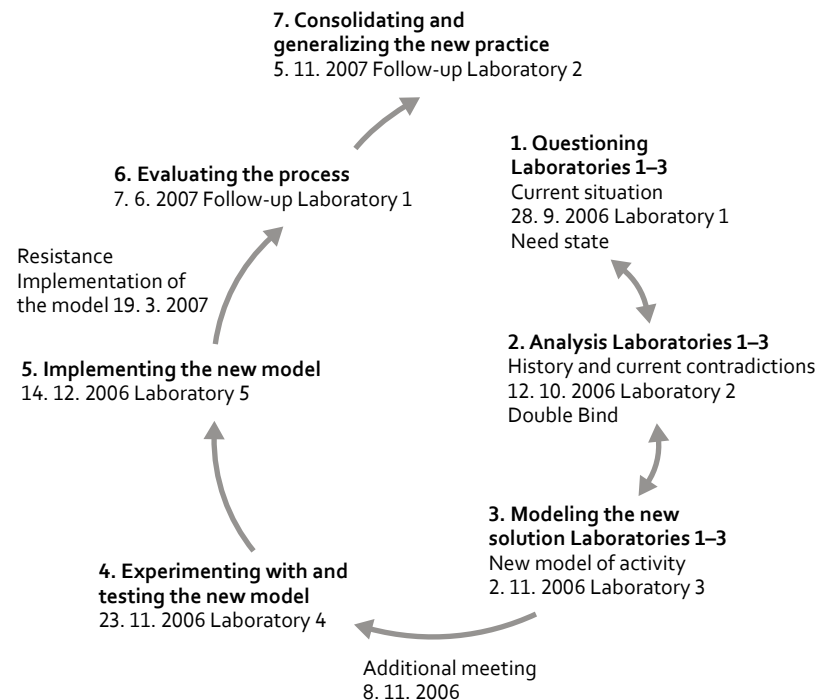
During the research, key informants of the hospital were interviewed. 17 scheduled interviews with informants from different organizational levels were gathered, and interviews were carried out “on the spot”. The field research included 5 days of observation in the hospital during which the control room and recovery rooms were observed, and the workday of the operations manager was shadowed. Furthermore, patients’ care paths from ward to op-

eration, recovery room and back to the ward were recorded by one member of the research group (Kajamaa 2010). The data from interviews and observation was used as “mirror” data in Change Laboratory sessions. Altogether five Change Laboratory sessions and two follow-up sessions were conducted. The sessions were videotaped and a research assistant transcribed the recordings. The research group also held two videoconferences with the management of the hospital and recorded them as research data. Furthermore, the researchers participated in a training afternoon organized for the staff of the Profit Center of Surgery and Intensive Care. Three benchmarking interviews were conducted with other hospitals and hospital documents were gathered for research data. The staff members were given an opportunity to comment on the problems and challenges at their work in an email questionnaire before the intervention and during the period of implementation. A television document was also created from the project in which the staff members of the unit were interviewed. In this study, the data of the five Laboratory sessions is used to illustrate the social process of promoting innovation and learning in the Surgical Unit.

The social process of innovation in the Surgical Unit

In Figure 4, the social process of innovation is analyzed with the help of the conceptual model of expansive learning actions, as presented in Figure 2. The process of innovation was based on the script of expansive learning actions. However, the script was broken up and reformulated by the practitioners, as is shown in Figure 4. The special characteristics and key points to be observed in Figure 4 are that the first, second and third learning actions are intertwined and bidirectional, whereas the other four learning actions proceed unidirectional. Next, we present our analysis session by session.

The expansive learning actions of questioning current situation, analyzing contradictions and modeling new solutions took place as early as in the first Laboratory session and continued to be subject of discussion in the second and third sessions. In the first session, the researchers provided “mirror” data that uncovered problems and challenges in existing activity. Interview data was gathered before the first Change Laboratory session and presented as edited video clips. The critical tensions revealed by the mirror were: (1) operation theatres are closed while patients are queued for operations, (2) anesthesia is dispersed to other parts of the hospitals while its work is needed in the Unit, (3) the recovery room providing post-operative care is a bottle-neck in the Unit, and (4) elective and emergency operations are mixed in the activity of the Unit. In the following we discuss the first topic above.

Figure 4 The social process of innovation as expansive learning actions in the

The members of the working group started to reflect on the data immediately after the presentation of the first tension “closed operation theatres.” The operations manager who had overall responsibility for the functioning of the Unit described the situation to be paradoxical because they sometimes had to close down operation theatres due to, for instance, sick leaves, although there were patients queued for operations. Other members of the working group also unveiled the tensions in the activity of the Surgical Unit. In the following Excerpt 1, the head nurse of anesthesia describes the tensions of the Surgical Unit.

Excerpt 1

Head Nurse, Anesthesia: Well. So the patient material is surely the worst of all in the Unit. And the operations are the biggest and the operations are the heaviest... It is worse and it will remain worse because now the private sector combs out the easiest patients and operates on them... Another big problem for us is post-operative care... in

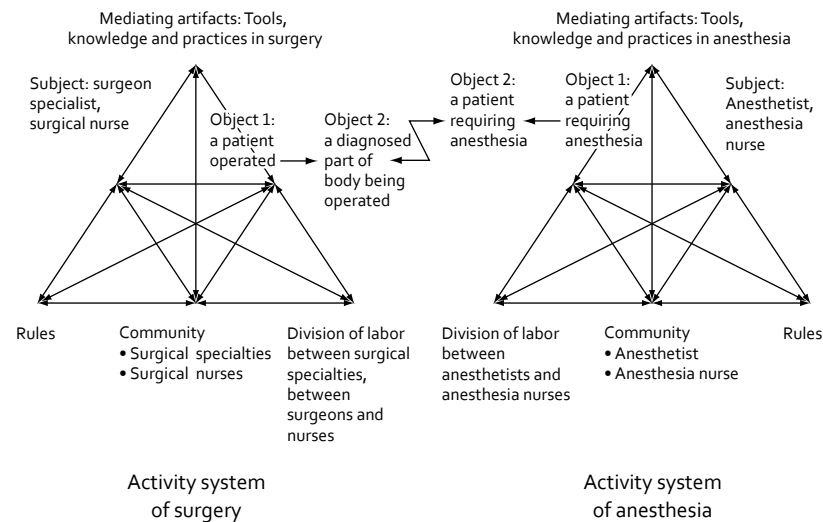
other words the recovery room which gets not only all our patients, but also patients from the central clinic and the emergency service, internal medicine patients, intensive care patients... And the number of staff is large and really, as I said, the area of responsibility is big... Management is demanding and communication is very difficult, getting the group together is really hard, motivating is hard. And what else should I think? Knowledge management is hard. The degree of professionalism is first-rate, so that is good. And the common spirit is good, this has come out. (September 28, 2006)

The discussion triggered by the paradox of closed operation theatres included multiple voices from different professional groups, revealing the tensions and challenges in the activity of the Unit. The staff of anesthesia felt that they hardly ever experienced rewards and instead only experienced the difficult aspects of their work. The work processes of anesthesia were fragmented into tasks and staff members did not see the overall results of their work. At-work training, keeping up with new knowledge, and training of newcomers were also experienced as problems by the staff of anesthesia and surgical nurses. However, problems were not experienced by all professional groups. The surgeons representing orthopedics considered “real work” with patients rewarding, although they felt it was difficult. Some of the surgical specialties had also created a training system that supported the entry of newcomers and the sharing new knowledge among surgeons in general. The difficulties of the staff of anesthesia and surgical nurses lied in the fact that they were required to expand their competences instead of focusing on one specialty only.

It became obvious during the discussion that anesthesia and surgery constituted two activity systems of their own based on the history and practices of the two professions. The contradictory units of the activities of surgery and anesthesia are analyzed in Figure 5.

The activity system of surgery involves two separate communities of surgeon specialists and surgical nurses who act as subjects according to their division of labor. On a general level, the object of their work is a patient in need of operations (object 1). However, each operation requires a special object, i.e. a diagnosed part of body to be operated (object 2). The system of anesthesia also involves two separate communities of anesthetists and anesthetic nurses who act according to their division of labor. On a general level, the object of their activity is a patient in need of anesthesia (object 1). The anesthesia differs in each operation to some extent but basically object 1 and operation-specific object 2 are the same in every operation. Furthermore, the process of anesthesia includes the post-operative care provided in recovery rooms.

The coordination between the two activities did not always run well in practice. In the first Change Laboratory session, an episode called “red flag”

Figure 5 The contradictory units of the activities of surgery and anesthesia

emerged between members of the surgery and anesthesia systems when tensions related to closed operation theatres were discussed. The contradiction between the different objects of activity in surgery and anesthesia became explicitly clear in the episode described in Excerpt 2.

Excerpt 2

- 159 *Researcher 1*: Yes, how do the surgeons take it that the theatres are closed?
 160 *Surgeon 1*: It is a red flag.
 161 *Surgeon 2*: It is really bad...
 162 *Surgeon 1*: It is all the bad there can be on the earth.
 163 *Surgeon 2*: It doesn't make sense to educate people to work and then we don't let them work, and there are more sick patients than anyone can count and then they don't get treated, so it is a completely idiotic system. It is generally the reason to found hospitals that we would be able to treat the patients.
 164 *Operations Manager*: And this is not easy for me either, I find it a crazy situation that we have to do it like this.
 165 *Researcher 1*: # You are in such a crazy situation that you have to do it in order to stay in some kind of an operational preparedness, isn't it so.
 166 *Operations Manager*: Yes, and I feel that, in a sense, in my mind, I am responsible for the fact that otherwise even the people who are left wouldn't survive. That –

you have got to do it, but it is totally against ethics. (Change Laboratory September 28, 2006, turns 160–167)

The uncovering of the different perspectives allowed a better understanding between representatives of the surgical and anesthesia activities to emerge in the session. Possible solutions were also raised for the observed tensions as early as in the first Laboratory session. First, it was suggested that the problems regarding patient waiting lists could be solved by increasing staff resources. But it was difficult to find new staff members that were qualified for specialized surgery or anesthesia. Second, it was suggested that new staff members needed support and guidance in their work. This was, however, not easy to organize in a short time, especially among nursing staff. Third, it was suggested that the identity of the Surgical Unit had to be redefined so that the Unit could attract new staff members. Fourth, a new leadership and management model was suggested for the Unit. According to the fourth suggestion, the Unit could be divided into smaller units as it was getting too large to manage. Different specialties could have their own departments with specialized nurses attached to them. It was presumed that smaller units would be easier to manage, better build an identity of their own, recruit new staff members more easily, and better manage the adoption of new knowledge in the unit. The last suggestion was strongly supported by the representatives of surgeons and anesthesia.

The discussion proceeded by assessing the fourth suggestion from different points of view. Especially, the work of the recovery room and the dispersion of anesthesia were assessed. One of the key issues related to competence and knowledge management in the Unit, as becomes evident from the following episode in Excerpt 3.

Excerpt 3

- 225 *Head Nurse, Anesthesia*: Yes. Such that – tell me if I'm wrong – but if you compare anesthesia work, like an anesthesia nurse's and nurses' work [in general], the anesthesia nurse's work is (...) that the patient is kept alive, and that is the most crucial thing. This keeping alive, and especially in these critical cases.
 226 *Researcher 1*: [speaking over] Yes. At least as a patient I would think this.
 227 *Head Nurse, Anesthesia*: So. And this creates even greater pressures in work. That it is the patient's life. If I make a mistake the patient will die. If I don't know how, if I fill that perfusion machine wrong, the patient can die there. Or if I don't know how to use it, the patient will die. Or am I right?
 228 *Surgeon 1*: Yes (...) the Surgery Unit is a big ward, and a large part of it, apparently all procedures, especially on the instrument side, they go around the whole

system all the time. And this leads to the fact that we have these specializations, where e.g. on the instrument side you are given on the table five containers of nuts and bolts, and it always takes about 2–3 months to learn all those nuts and bolts. And the training restarts every half a year or year, and the first 2–3 months slow down the operations and efficiency. And then when we get to the point where it starts to run smoothly, we start the same round again. It is continuing learning which affects the normal operations – it is inefficient. It always slows down the action and it is not rational for the fact that when the person has been there for six months or a year then s/he goes elsewhere and comes back again after five years, s/he has had time to forget everything several times over. In addition it is completely useless. And not everybody needs to know all of these things. (Change Laboratory September 28, 2006, turns 225–228)

In the second Change Laboratory session, the practitioners worked on tensions and contradictions as well as the idea of a new leadership and management model for the Unit. The contradictions were worked on simultaneously with reflecting the imagined influences of the new model. But the discussion did not uncover new aspects of existing contradictions. It more or less repeated the issues that were discussed in the first Laboratory session. The manager of the Profit Unit who was absent in the first session participated in the second session.

Interestingly, however, the knowledge management and information sharing practices were, as a new topic, discussed in detail during the second session. The discussion focused on the position of rational knowledge and experiential knowledge in the hospital culture. Hospital culture has a tradition of valuing rational knowledge over experiential one. Besides bringing up the challenge of rationality based on figures and mean values, the discussion about knowledge uncovered the difficulty of staff members to keep up with hospital information. Although they were able to access the information system, the use of the system was difficult and took time. One participant emphasized that a parallel issue in terms of knowledge emerged among decision makers who believed that the hospital was running properly on the basis of the numbers and mean values of hospital functioning. However, the tension between knowledge experienced by the practitioners and rationally justified knowledge remained and came up again during the process.

The second session ended with Researcher 1 instructing the participants to form groups and to present ideas in a written form for the next session. The working group also decided to invite additional members to the third Change Laboratory session. Namely, a surgeon specialized in planning emergency duty and a gastroenterologist were invited to the working group.

During the third Change Laboratory session, the outcomes of the group's work achieved between the second and the third Laboratory sessions were discussed. First, a surgeon who had suggested dividing the Surgical Unit in the first Laboratory session presented his plan for dividing the Unit into three areas: (1) gastroenterology and urology, (2) orthopedics, and (3) thorax and vascular surgery. He considered that the division of the Unit was not as simple as he thought in the first place. Therefore, his second suggestion was to divide the Unit into four areas. Besides the above-mentioned three areas he suggested that the recovery rooms could become the fourth area. Second, a surgeon specialized in orthopedics presented his plan for emergency duty. He suggested that the Unit would be divided into two areas: 'soft' and 'hard' surgery. The plan was, however, considered problematic in many ways from the practical perspective. For instance, the division of surgery into 'soft' and 'hard' surgery could not be provided during night-time emergency duty. Third, the charge nurse portrayed a calculation of dividing the nursing staff into three activity areas that she had prepared together with the two head nurses. She suggested that a special flexible team consisting of skilled nurses from both anesthesia and surgery could be established. This team would be available for emergency situations and, therefore, reduce the need to close operation theatres, for instance, in cases of sick leaves. Fourth, the head nurse of anesthesia and another anesthesia nurse provided a plan concerning the recovery rooms. According to their plan, the recovery room could either reduce its present activity or expand it. Finally, the operations manager presented a new leadership and management model. The model had four activity areas: (1) gastro-urology, (2) thorax-vascular, (3) orthopedics, plastic, hand and neurosurgery, and (4) recovery rooms.

The third Laboratory session produced an idea to hold an additional session in which the plans and models presented in the third session would be worked out in detail. The additional session was arranged for seven people who had been involved in writing the plan of the new leadership and management model. The session became an intensive process of clarifying the division of the Unit into four smaller units and discussing leadership issues. The group confirmed that it would be wise to divide the Unit into 3 specialty-based units and the recovery room.

In the fourth Laboratory session, researcher 1 presented the results of the additional meeting to the rest of the group. The resulting plan described the new leadership and management model and related practices in the Surgical Unit. The model was discussed in detail and finally accepted by the participants during the fourth Laboratory session. At this stage it became obvious that the new leadership and management model had become a shared object of the group.

A planning meeting about the new model for the entire staff of the Profit Unit took place after the fourth Laboratory meeting. It was realized that some specification of the plan, especially in the description of leadership issues, was needed. The specifications were done before the fifth Laboratory session in which the reworked version of the plan was presented.

In the fifth Laboratory session, the written document was figured and completed in detail. The outcome of the five Laboratory sessions consisted of a detailed plan of the new leadership and management model for the Unit. In the model, the Unit was divided into four activity areas, as suggested by the operations manager in the third Change Laboratory session. The plan also detailed the new division of labor between the activity areas, emergency duties, and the duties of the emergency team. After the fifth session, the new model began to be implemented and tested in March 2007. During the implementation, the members of the operational management and staff members actively contributed to developing the process on the level of practices. For instance, the employees began to take more responsibility than before for the coordination of daily issues in the new activity areas established in the Unit. Simultaneously, the emerging new activity enabled the unit to function in a better way.

The implementation period was followed up during two sessions in June 2007 and February 2008. During the implementation it was considered that the model needed to be adjusted to practice in a better way. As a consequence, some changes were made in the original model. For instance, the daily activity was coordinated by two staff nurses, instead of four as planned in the first place. It was observed during the implementation that the model of four staff nurses divided the overall activity into parts that were too small and fragmented.

The new model is currently in use. Outcomes of the intervention have been followed by actors within the Unit and by the researchers. A comparative survey of Finnish hospitals was conducted in 2008 (Intensium® Benchmarking). The Surgical Unit and 22 similar kinds of surgical units from hospitals in different parts of Finland took part in the survey. The Unit scrutinized in this study did extremely well in the comparison. It was third in reaching the target time to begin work in the morning (in comparison with the hours of operation). The Unit was the best nationwide in the utilization rates of operating rooms on weekdays and during hours of operation (71.16% in 2008) compared to the other 22 surgical units nationwide. The Unit also had the lowest rate of idleness for operating rooms in the evening nationwide (11%).

Summary points, conclusions and discussion: Change Laboratory as a social process of innovation

In this paper, we have illustrated how organizations can promote innovation and learning through the Change Laboratory method. We have presented a case example from Finnish health care, a surgical unit that formed a multi-professional working group to improve its working context and services. The Change Laboratory method enabled the development of a leadership and management model in close connection to daily work. The managerial level of strategy making and the practical level of development were connected in a joint effort of learning within a working group of representatives of management and staff members.

The social process of innovation defined by Slappendal (1996) was opened up through the process of expansive learning actions that involves phases from idea generation to implementation and diffusion of innovation. In the beginning of the process it was uncovered that contradictions and their transformations needed to be analyzed and solved through an activity that would enable novelty and innovation to occur. In the case example, the members of the working group were confronted with contradictions between the units of surgery and anesthesia. Each operation required good coordination and division of labor between surgical activity and anesthetic activity. But the two activities did not consider a patient receiving an operation as a shared object, although the patient was there as a whole being. "Mirror" data from day-to-day activity simultaneously enabled the members of the multi-professional group to take distance from and become involved in solving the contradictions in their daily work. As a consequence, they were able to contribute to the social process of innovation by modeling, imaging and projecting the effects of the new leadership and management model on daily practices.

The model of expansive learning actions (see Figure 2) outlines, in ideal terms, the script for the social process of innovation. However, the script can be broken up and reformulated by the practitioners (see Figure 4). The ideal model of expansive learning actions may seem unidirectional and deterministic. But the findings of the case example show that the process of expansive learning is not deterministic. In the case example, the first, second and third expansive learning actions were intertwined and bidirectional whereas the remaining four learning actions proceeded unidirectional.

The promotion of innovations does not happen by itself. The analysis of the case example underlines the fact that strong intervention tools and a theoretical framework are required in employee-driven innovations. The creation of new practices, i.e., the creation of social innovations, is a slow process and

requires the engagement of management and staff members. Practices such as those in health care organization are deeply embedded in their contexts. Therefore, methods of innovation that promote breaking away from prevalent practices are needed for solving current challenges within organizations. It is recommended that decision makers in public policy support the adoption of such methods. Organizations can improve their innovation capacity through expansive learning in Change Laboratory interventions. In order to understand the process of innovation, contradictions in the scrutinized activity and their transformations need to be understood.

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