

THE CHANGE LABORATORY AS A TOOL FOR TRANSFORMING WORK

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INTRODUCTION

The Change Laboratory® is a new method for developing work practices by the practitioners. It facilitates both intensive, deep transformations and continuous incremental improvement. The idea is to arrange on the shopfloor a room or space in which there is a rich set of instruments for analyzing disturbances and for constructing new models for the work practice. The Change Laboratory is used by a natural team or work unit, initially with the help of an interventionist. The Change Laboratory was developed in the Center for Activity Theory and Developmental Work Research of the University of Helsinki, and it is currently implemented in two major Finnish companies as pilot projects financed by the Finnish Ministry of Labour.

The method used in Change Laboratory is based on the notions of re-mediation and dual stimulation, derived from the cultural-historical theory of activity (Vygotsky, 1978; Leont'ev, 1978; Engeström, 1987; Cole & Engeström, 1993). Within the Finnish school of developmental work research, activity theory has been applied in work settings for some 15 years (see Engeström & Engeström, 1986; Engeström, 1991; 1993; 1995; 1996a). In the various projects, particularly in the project 'Learning and Expertise in Teams and Networks' (see Engeström, 1992; Engeström, Engeström & Kärkkäinen, in preparation) four new ideas emerged which led to the creation of the Change Laboratory:

- * There is a need for bringing work redesign closer to the daily shopfloor practice while still keeping it analytical - a new dialectic of close embeddedness and reflective distance.
- * There is a need for bringing together practice-driven redesign of processes and idea-driven construction of visions for the future - a new dialectic of specified improvements and comprehensive visions.
- * There is a need for bringing together multiple parallel rhythms of development in work - a new dialectic of long, medium and short cycles of innovation and change.

- * There is need for bringing together the tools of daily work and the tools of analysis and design - a new dialectic of instrumentalites.

In this article, we will first describe the basic structure and setup of the Change Laboratory. We will then briefly examine some earlier laboratory-based approaches to transforming practices, notably those of the 'laboratory approach' to 'training groups' initiated by Kurt Lewin and his colleagues in the 1940s and 1950s, and the 'learning laboratories' as implemented by Peter Senge and his collaborators in the 1990s. We will elucidate the key principles of the Change Laboratory by comparing and contrasting them with those of the earlier approaches. Finally, we will present a condensed case example from the implementation of the Change Laboratory in the Finnish Postal Services during the first half of 1996.

THE STRUCTURE AND SETUP OF THE CHANGE LABORATORY

The central tool of the Change Laboratory is a 3x3 set of surfaces for representing the work activity. Workers participating in the Change Laboratory process are facing the surfaces, aided by a scribe appointed from among them as well as by video equipment and available additional tools such as relevant databases and a reference library (Figure 1).

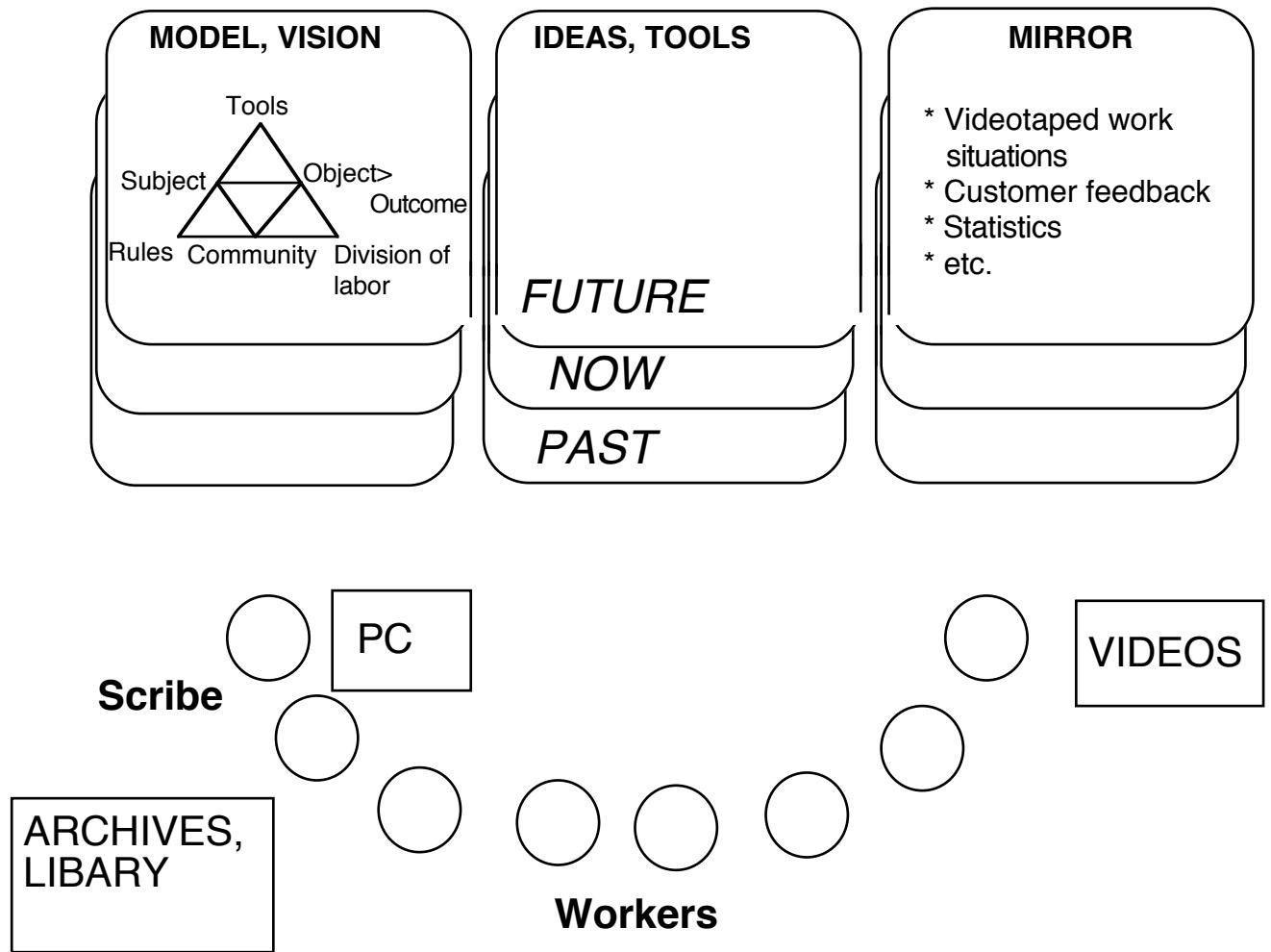


Figure 1: Prototypical layout of the Change Laboratory

The horizontal dimension of the surfaces represents different levels of abstraction and theoretical generalization. At one end, the *mirror* surface is used to represent and examine experiences from work practice, particularly problem situations and disturbances, but also novel innovative solutions. Videotaped work episodes as well as stories, interviews, customer feedback and regular performance statistics are used in the mirror.

At the other end, the *model/vision* surface is reserved for theoretical tools and conceptual analysis. The complex triangular model shown in Figure 1 (for theoretical elaboration, see Engeström, 1987) is used to analyze the systemic quality and interconnections of work activity. Systemic roots of specific but recurring problems and disturbances are traced and conceptualized as inner contradictions of the activity system. In addition, a general model of the steps of an expansive learning cycle is used on this surface, to enable the workers to analyze the current and projected next stage of the evolution of their activity (Figure 2; see Engeström, 1987).

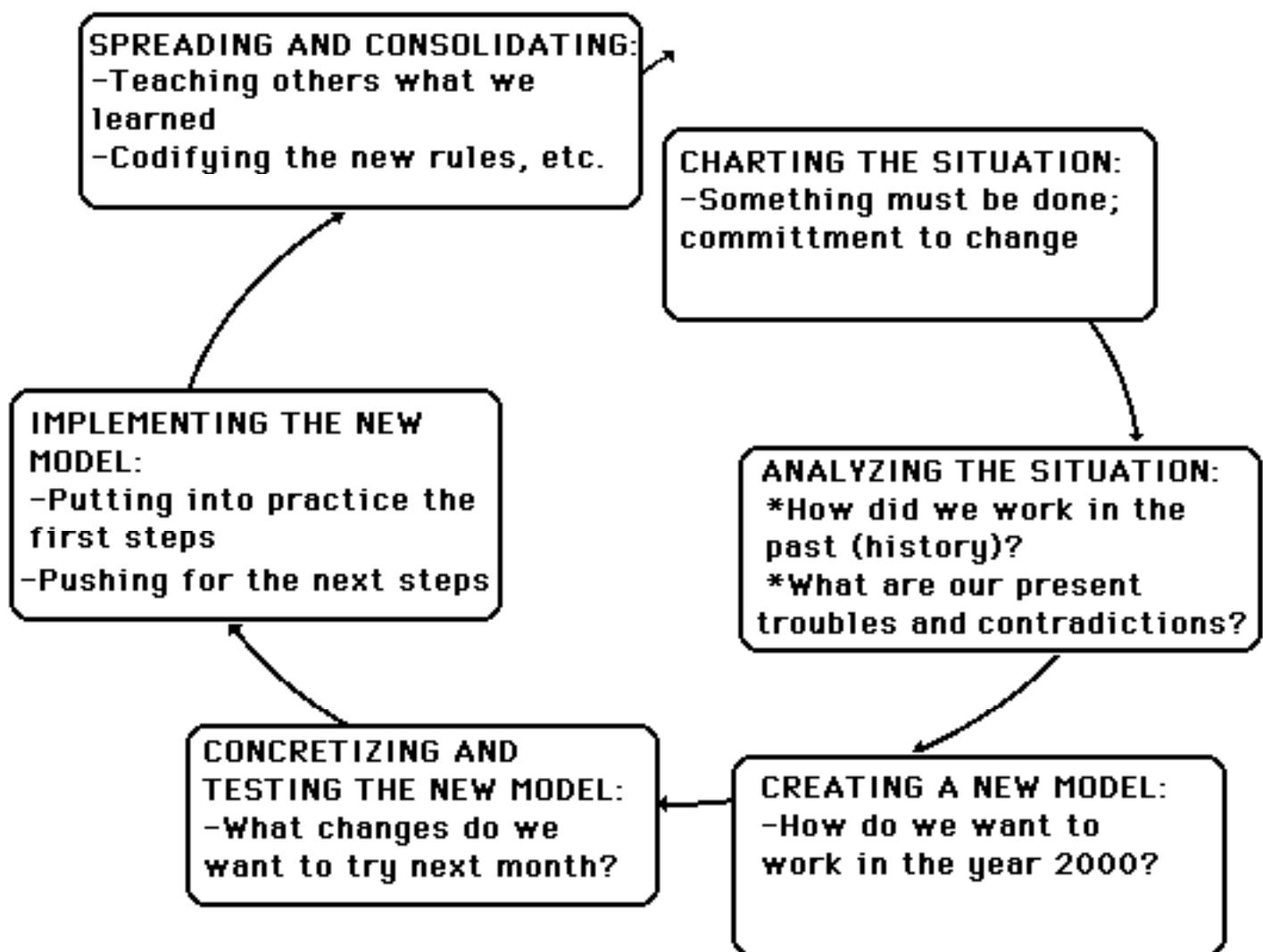


Figure 2: Steps of expansive learning

The third surface in the middle is reserved for ideas and tools. In analysis of problem situations and in the design of a new model for the work activity, intermediate cognitive tools (Norman, 1993) such as schedules and flowcharts of processes, layout pictures and diagrams of organizational structures, categorizations of interview responses, formulas for calculating costs, or techniques for idea generation and problem solving, including simulations and role playing, are often needed. As the participants move between the experiential mirror and the theoretical model/vision, they also produce intermediate ideas and partial solutions, to be tested and experimented with. These, too, are represented on the middle surface.

The vertical dimension of the surfaces represents movement in time, between the past, the present, and the future. Work in the Change Laboratory typically starts with the mirror of present problems. It then moves to trace the roots of current trouble by mirroring experiences from the past and by modeling the past activity system. The work then proceeds to model the

current activity and its inner contradictions, which enables the participants to focus their transformation efforts on essential sources of trouble. The next step is the envisioning of the future model of the activity, including its concretization by means of identifying 'next-step' partial solutions and tools. Subsequently, the stepwise implementation of the new vision is planned and monitored in the Change Laboratory. Such a cycle of expansive learning induced in the Change Laboratory typically takes three to six months. One cycle leads to the next one, and within the cycles there are smaller cycles of problem solving and learning (see Engeström, 1996; Kärkkäinen, 1996).

EARLIER LABORATORY APPROACHES

The most widely known laboratory approach to work-related learning is the Laboratory Method or T-Group method initiated by Kurt Lewin and his colleagues in the late 1940s and refined in the 1950s (see Lewin, 1948; Bradford, Gibb & Benne, 1964; Golembiewski, 1972). For Lewin, the method was originally a possibility to implement action research to resolve social conflicts, at least tacitly informed by his dynamic field theory. Contrary to many of his followers, Lewin insisted on the rigor of data collection and analysis in action research. The first training laboratories were simply seminars where people representing different positions in a field of practice ridden with conflicts were brought together to discuss and work out their differences. The discussion groups were attended by observers who made notes of the unfolding interaction. The idea of letting the discussants participate in meetings where researchers analyzed the discussion led to a new level of reflexivity in the procedure.

Interpersonal reflexivity and group dynamics was a tempting direction to go for Lewin's followers. To make a long story short, field theory and the connection to societal conflicts were set aside and largely forgotten. A variety of techniques and tools were developed, and a host of studies in group dynamics were conducted. Soon T-Groups were defined as laboratories where only here-and-now interactions were discussed and explained with reference to universal laws of group behavior. Discussion of the participants' background and work contents was disallowed. By the 1960s, facilitating each participant's personal self-understanding became the dominant goal of the T-Group movement. By the end of the 1970s, the Laboratory Approach was rapidly fading away (Zander, 1979).

In the 1990s, Peter Senge and his group at MIT have created a new discourse on laboratories at work (Senge, 1990; Bakken, Gould & Kim, 1994; Senge & Sterman, 1994). This time, the laboratory concept is based on ideas from systems theory. Decision makers often fail because their mental models do not match the complexity of the issues and systems they manage. In

Senge's Learning Laboratories, a "management flight simulator" is used to construct, represent and critically examine cycles of reciprocal causation, or feedback loops, in interactions in the organization as well as between the organization and its environment. To facilitate the process, Senge offers a set of "system archetypes", prototypical models of good and bad, successful and unsuccessful, loops.

Senge's Learning Laboratories deal with actual contents of management and business processes. However, it is not clear just how concretely a Learning Laboratory goes into the specific history and culture of a given organization. Being a management training tool, it seems to be aimed at relatively quick fixes in problematic business domains with the help of general heuristic devices such as the "system archetypes".

In Table 1, key assumptions of the Laboratory Method/T-Groups and Senge's Learning Laboratories are compared with those of the Change Laboratory. Such a presentation runs the risk of oversimplification. While critical toward previous laboratory-based approaches to learning and work redesign, the Change Laboratory can learn much from them.

Table 1
Key assumptions of the Laboratory Method/T-Groups, Learning Laboratories, and the Change Laboratory

	Laboratory Method/ <u>T-Groups</u>	Learning <u>Laboratories</u>	Change <u>Laboratory</u>
Contents	Interpersonal and group dynamics	Business and management problems	Past, present and future of work activity
Concepts	Laws of group behavior	Systems theory, system archetypes	Activity theory, models of activity system and cycle of expansive learning
Notion of	Positive loops lead to balanced interaction	Positive loops lead to mastery of complexity	Resolution of systemic contradictions leads to new modes of activity and new contradictions

Distance not discussed practice	Contents of practice simulated	Practice observed from and changed on site; Laboratory is located in the workplace
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The last item in Table 1, distance from practice, deserves special attention. In some recent discussions on learning organizations, the entire workplace itself is presented as a learning laboratory (Leonard-Barton, 1992). Such a notion may be a useful metaphor, but theoretically it overlooks the very idea of laboratory as a space protected from the noises of outside life in order to facilitate focused experimentation and analysis. In this sense, the "factory as a learning laboratory" idea represents the opposite to both T-Groups and Senge's 'management flight simulators' which are decidedly separated from the daily flow of shopfloor practice. The Change Laboratory is based on separation and embeddedness simultaneously. It is located in the workplace as close to the shopfloor as possible; yet it is a room protected by walls. The boundaries between Laboratory and practice are made permeable by encouraging movement across them. Workers enter the Laboratory whenever they feel a need and have a moment for reflection; they go out of the Laboratory to check the reality on the shopfloor; and representations of work are brought out of the laboratory onto the walls of the actual work space.

PRINCIPLES OF THE CHANGE LABORATORY

The basic design of such interventions follows Vygotsky's method of *dual stimulation* (see van der Veer & Valsiner 1991). The crucial idea here is that a task is never just the task the experimenter designed. It is always interpreted and reconstructed by the subject by means of his or her internalized 'psychological instruments' that cannot be strictly controlled from the outside.

Rather than giving the child just a task, ignoring her interpretation and reconstruction of the task, and observing how she manages, Vygotsky and his colleagues typically gave the child also potentially useful mediating artifacts - tools or signs. With them, the nature of the task could be radically changed. The potential capabilities and emerging new psychological formations of the child might be revealed. Thus, dual stimulation may also be characterized as *re-medial* design.

In the Change Laboratory, the original 'task' of Vygotskian designs is represented by the *mirror* which contains challenging examples of problems and disturbances. The original 'mediating artifact' is represented by a *model* of the entire activity system that is used to make sense of the built-in contradictions generating the troubles and disturbances depicted in the mirror. This model is also used as a vehicle of time travel, to construct a *vision* of the past and the future of the activity system. The potential capabilities and emerging formations are represented by the surface in the middle. It is a third space, reserved for new *ideas* and *tools* for reorganizing the activity.

In the Change Laboratory, movement happens in three dimensions. First, the gaze, the intellectual work and the practical representational work (writing, drawing, etc.) of the participants move *between the spaces* of the mirror and the model, stopping occasionally in the middle. Secondly, these processes move *between three layers of time*. And thirdly, the discourse moves *between the participants and their various voices*, typically including an entire work team or unit plus one or more researchers/interventionists.

Previous Vygotskian theorizing and research has mainly focused on a single individual or a dyad of two subjects using a single, well-defined mediating tool or artifact. Only language as mediator has demanded a more complex approach - but studies of semiotic mediation have commonly excluded material instruments and tools. In the Change Laboratory, the mediational setup is complex and multi-layered both semiotically and instrumentally. Yet the Change Laboratory is temporally and spatially constrained so as to allow the collection of comprehensive high-fidelity data by means of videotaping. Analysis of such data forces the researcher to adopt a new view of mediation: instead of single instruments, one has to analyze a whole interconnected *instrumentality*.

The concept of instrumentality has three implications: (1) The instruments form a system that includes multiple cognitive artifacts and semiotic means used for analysis and design, but also straightforward primary tools used in the daily work and brought into the Laboratory for examination, reshaping and experimentation. (2) In such a dense mediational setting, a set of interconnected new sociocognitive processes are called for - a new mentality generated. (3) The very complexity of the setup means that the instrumentality is constantly evolving; old tools are modified and new tools are created. Central sociocognitive processes called for in the Change Laboratory are schematically depicted in Figure 3.

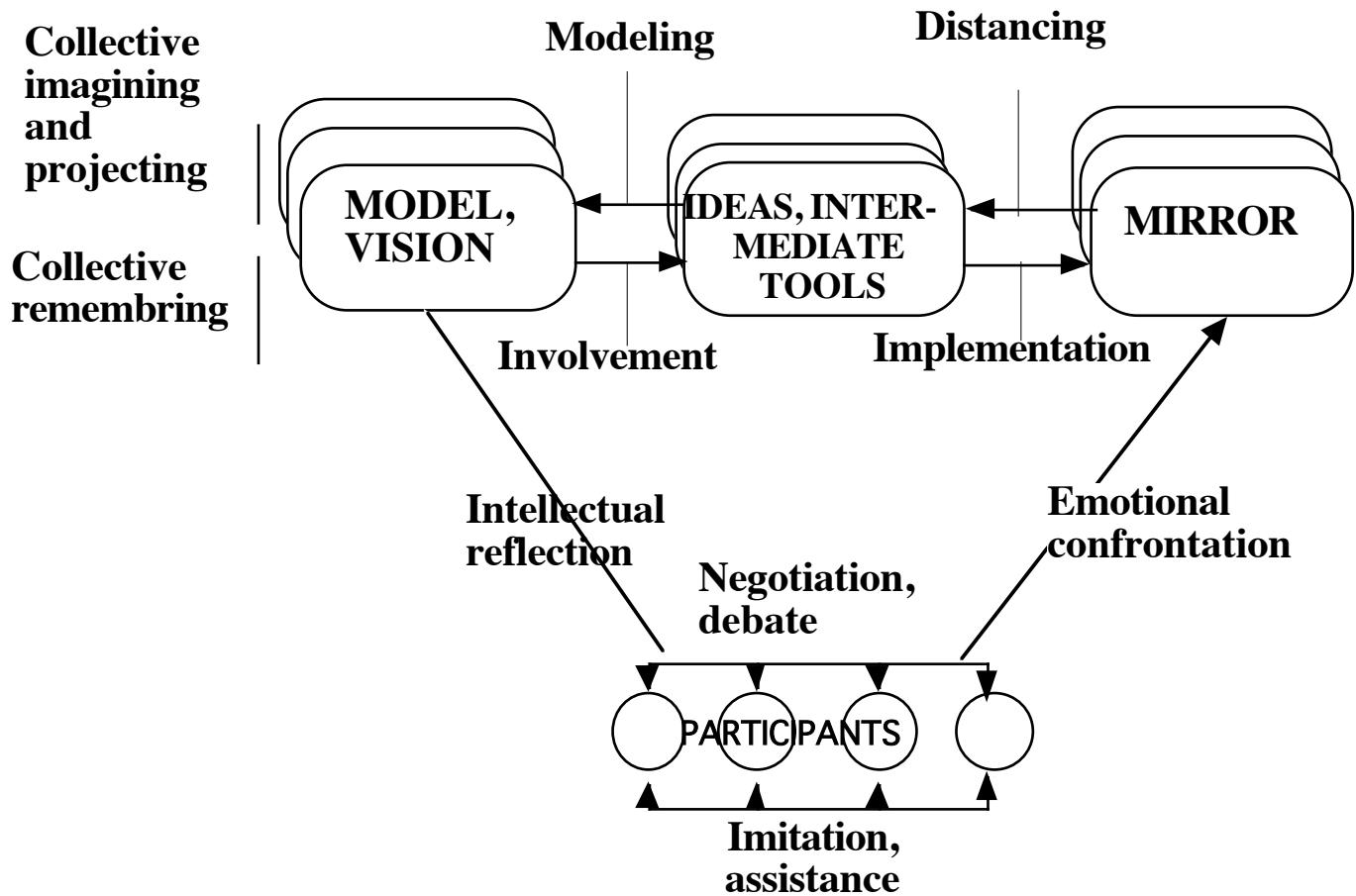


Figure 3: Sociocognitive processes called for in the Change Laboratory

IMPLEMENTATION IN FINNISH POST OFFICES

The Change Laboratory was first implemented in five pilot post offices of the Finnish Postal Services from February to August, 1996. The project, named *Delivery 2000*, was aimed at redesigning the delivery work of mail carriers.

The cultural tradition of mail carriers has been a combination of bureaucracy and individualism. The traditional hierarchical organization of the Postal Services has largely precluded innovations from below. Work processes have been meticulously rationalized and measured from above by procedures confirmed through collective bargaining. Individualism, in turn, stems from the fact that individual mail carriers have been free to go as soon as they have finished their individually assigned routes for the day. There has been little incentive for collaborative teamwork.

However, the Finnish Postal Services are currently facing increasing competition from private companies entering the field. There is an urgent need to raise productivity, and a looming threat of severe loss of jobs.

All the mail carriers of the five pilot post offices met mostly once a week for four months in their Change Laboratories (called Room 2000 by the practitioners). Each session was structured around concrete tasks requiring the use of the Change Laboratory surfaces. Figure 4 depicts a session in one of them, the post office Turku 52.



Figure 4: A Change Laboratory session in the post office Turku 52 (the researcher/interventionist Juha Pihlaja sitting third from the left)

The room in Figure 4 is the regular coffee room of the workers, a few feet from the shopfloor where the mail is sorted. In the post offices, the material equipment was minimal: three flip chart stands, felt pens, and a VCR with a TV monitor attached. All the meetings in the five pilot offices were videotaped, as were samples of key work processes (sorting of mail, actual delivery) in each pilot at the beginning and at the end of the process. A number of interviews were made with the workers in each site during the process.

There were three main phases in the process. In the first phase, the workers analyzed the history and the present contradictions of their work activity. Figure 5 presents a summary of the results of this phase in the triangular model form used by the workers.

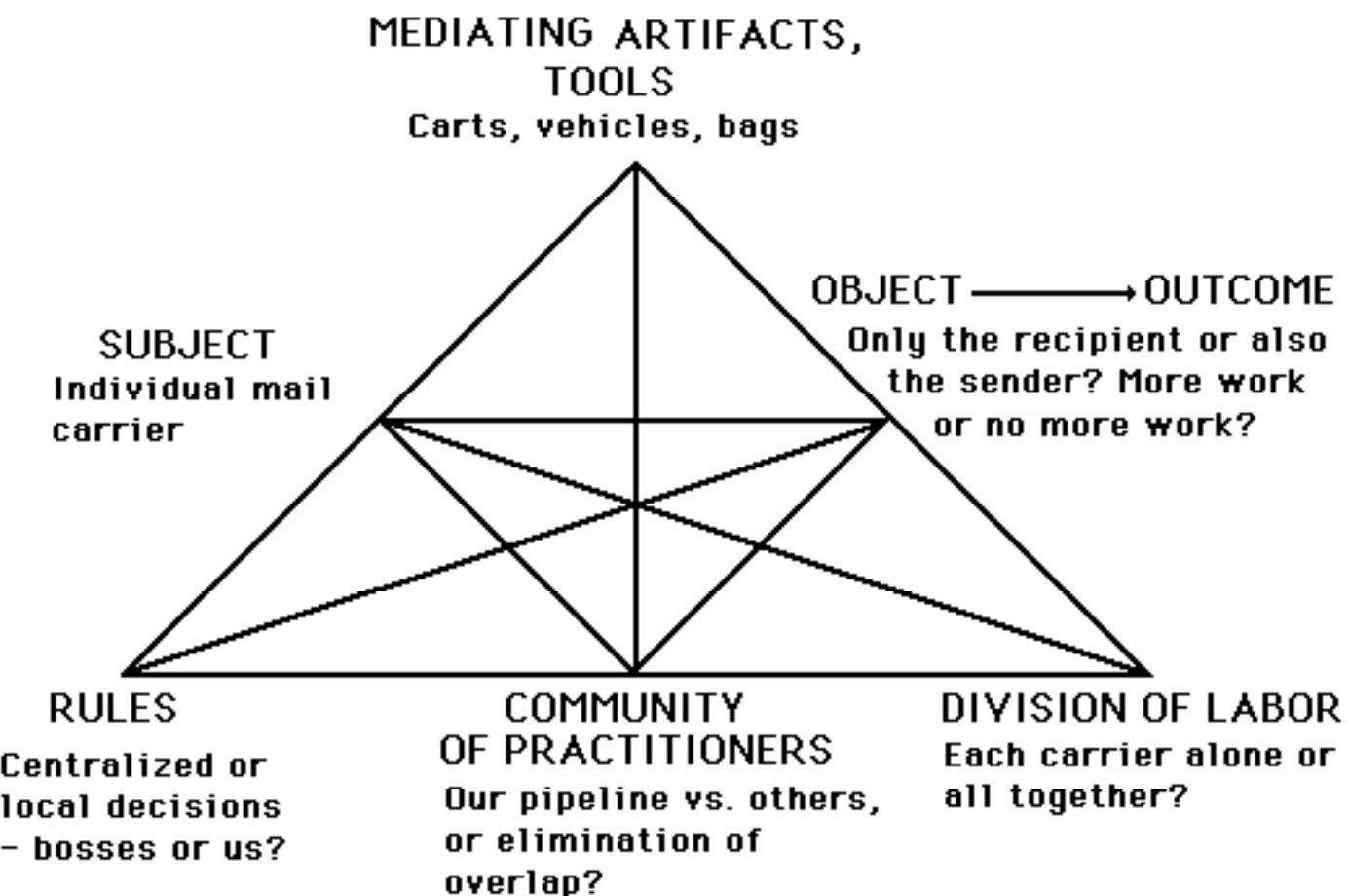


Figure 5: Summary of the current contradictions of delivery work identified by the workers

Question marks in the components of the triangle indicate contradictions. It was characteristic to the pilot post offices that they characterized their contradictions only in tentative and dilemmatic terms, typically in the form of questions concerning each component on its own rather than as aggravated tensions between components of the activity. After the first phase, the pilots met in a one-day conference where they reported and discussed their intermediate findings. Excerpts from their presentations illuminate the nature of the contradictions.

"We've had lots of good ideas, and we've been thinking that we could do work which is something else than just delivering. We could for example handle some social services, we have quite a lot of old people in our area. But who would train us for that and in what time? And how does it impact the finances, the results; would it bring any revenue?"

"We also had this heated discussion, whether we should expand our object or not."

"So it's the old way of thinking, a bureaucrat's way: I'm sitting here and I won't do anything else. I'll go home after I'm done and I don't give a damn about what the others are doing."

"Right now it seems that it's becoming a problem, which is in a way also a good thing, namely the increase of advertisement mail."

"This internal flexibility, it would mean that the work measurement would be adjustable within our own office. So that when the amounts of mail fluctuate, the real shitty day wouldn't fall on one guy alone, while the others just giggle about it..."

"There are these so called pipelines [referring to special delivery services and other separate branches of the Postal Services], we do a terrible amount of overlapping work. So for example the special deliveries comes from five kilometers to fetch from us a packet which goes to the house next to us, and takes it there. So that really doesn't make any sense."

The tentative and uncertain tone in the characterization of the contradictions reflects the fact that the Postal Services have had a total monopoly in their field for a long time. There are lots of historically built-in buffers that slow down and soften the impact of the contradictions experienced in daily work practice.

In the second phase of the process, the pilots designed visions for delivery work as it should be organized in the year 2000. The results of this phase are summarized in Figure 6.

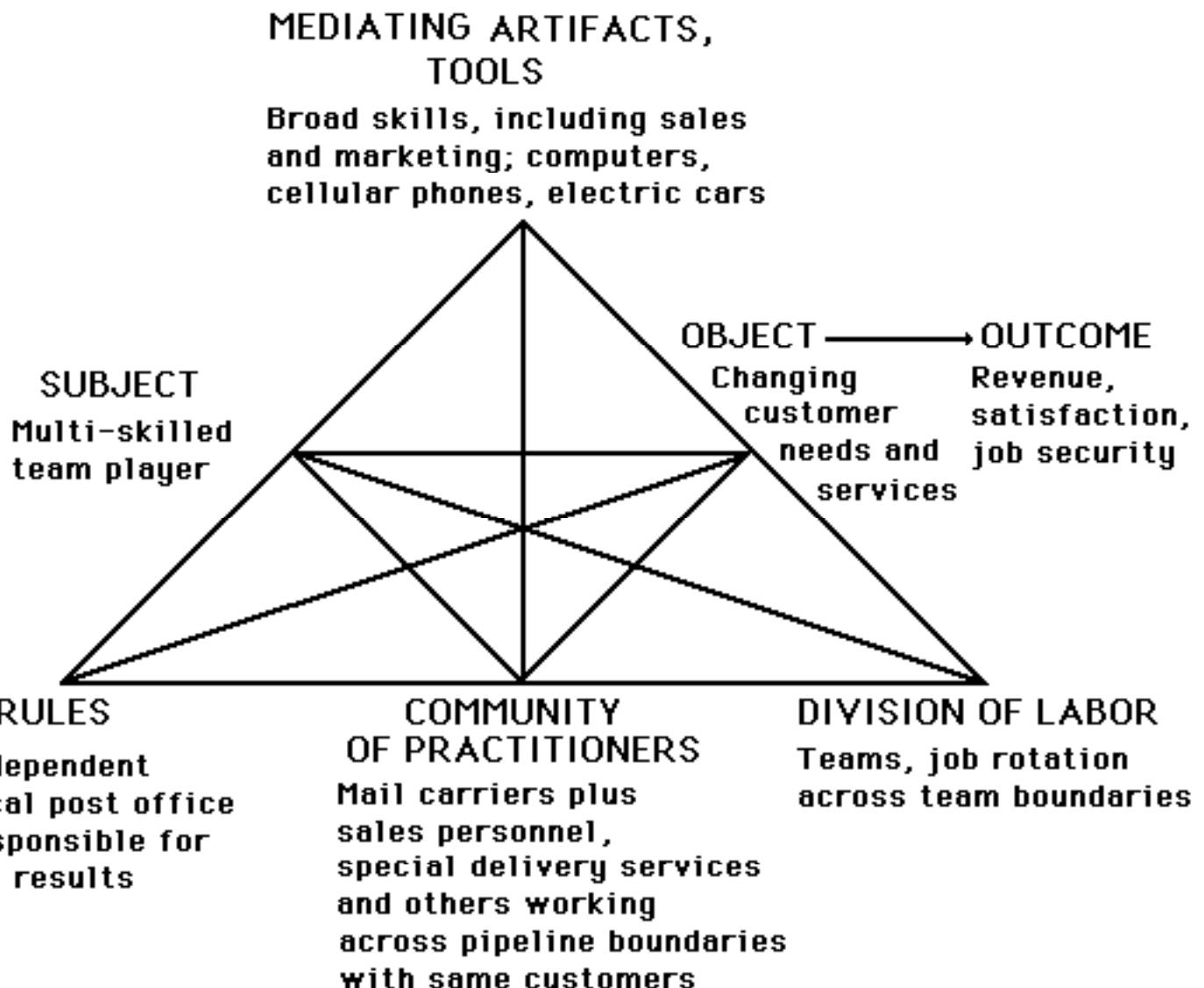


Figure 6: Summary of the model for delivery work in year 2000 designed by the workers

Figure 6 is obviously an idealistic vision. However, the core idea of independent post offices responsible for their own results became a sound guiding principle for a transformation now spreading gradually through the whole organization. While crafting the vision, each pilot also designed a set of first-step solutions and tools to be implemented as local experiments within a month.

These local experiments had different emphases in the different pilots. Three of the five designed experiments aimed both at introducing teams and also at creating new products and services. Two of the five concentrated on new products and services only.

In the third phase of the process, the experimental solutions were implemented and their impact on revenues, performance, customer satisfaction, and workers' well-being was monitored. Two

examples of the new products and services, both pioneered by the Turku 52 pilot office, may be mentioned.

Example 1: The Turku 52 pilot group decided to start selling stamps to the customers at their door, thus saving them the trip to the post office. This has not been the practice in Finnish Postal Services. To put the idea into practice, a pilot group needed to design a brochure advertising the new service to the customers, and an order form for stamps. The pilot group also needed to design and order belt bags for carrying money. They needed to make sure the mail bags were appropriate for carrying stamps. For this concrete solution, the post office had to become a virtual design office for a while. A new set of instruments were created - a step was taken toward a qualitatively new type of instrumentality which involves direct business discussions between the mail carrier and the customers.

Example 2: In the pilot office of Turku 52, the mail carriers designed an entirely new "safety service" for old people living alone in their apartments. The mail carrier not only drops the mail, he or she also rings the doorbell and checks that everything is all right with the elderly customer. There is rapidly growing need for this type of service due to demographic change in the country. The social services department of the City of Turku quickly endorsed the idea, seeing large potential savings in it. The new service is now experimentally implemented in the area for which the pilot office is responsible. The customers are happy with it, and after the experimental period the Turku City and the post offices will negotiate a deal to make the service available in the whole city. The experiment has attracted nationwide attention in mass media.

Full-scale detailed analysis of the Change Laboratory process in *Delivery 2000* is in progress. In the meantime, the Finnish Postal Services have decided to begin a continuation project, *Delivery 2001*, which will put the Change Laboratory process in 20 new pilot post offices around the country.

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