The Change Laboratory
A Tool for Collaborative Development of Work and Education
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A new challenge of learning in work organizations—both in business and public administration—is to master entire life cycles of product, production and business concepts. Meeting this challenge calls—at all levels of the organization—for learning that expand the learners’ horizon and practical mastery from individual tasks up to the level of the whole system of the collective activity and its transformation. The Change Laboratory is a method for formative intervention in work communities that supports this kind of organizational learning. It is a path breaker in the area of work place learning due to its strong theoretical and research basis and the way that it integrates the change of organizational practices and individuals’ learning. It provides a way to develop practitioners’ transformative agency and capacity for creating and implementing new conceptual and practical tools for mastering their joint activity.

This first comprehensive presentation of the already widely used method is written for researchers, consultants, agricultural extension and HRD professionals, as well as practitioners involved in developing activities in their professional field. It explains this novel method as well as its theoretical basis on the Cultural Historical Activity Theory providing also practical examples and tools for carrying out a Change Laboratory intervention. A review is also provided of studies concerning various aspects of expansive learning processes in Change Laboratory interventions.

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## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Figures and Tables</td>
<td>xi</td>
</tr>
<tr>
<td>List of Boxes</td>
<td>xiii</td>
</tr>
<tr>
<td>Foreword: Formative interventions for expansive learning</td>
<td>xv</td>
</tr>
<tr>
<td>Authors’ preface</td>
<td>xix</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>xxi</td>
</tr>
<tr>
<td>Introduction</td>
<td>xxiii</td>
</tr>
<tr>
<td>1. MEETING THE NEW CHALLENGES OF LEARNING AT WORK</td>
<td>1</td>
</tr>
<tr>
<td>Historical Change in Challenges and Forms of Work-related Learning</td>
<td>1</td>
</tr>
<tr>
<td>The Need for a New Method of Intervention in Work Activities</td>
<td>3</td>
</tr>
<tr>
<td>The Concept of Intervention</td>
<td>3</td>
</tr>
<tr>
<td>The Difference between a Change Intervention and a Formative Change</td>
<td>7</td>
</tr>
<tr>
<td>Laboratory Intervention</td>
<td>11</td>
</tr>
<tr>
<td>Outcomes of Formative Change Laboratory Interventions</td>
<td></td>
</tr>
<tr>
<td>2. THE CHANGE LABORATORY–AN INSTRUMENT FOR AGENCY BUILDING AND EXPANSIVE LEARNING</td>
<td>15</td>
</tr>
<tr>
<td>Description of the Change Laboratory Method</td>
<td>15</td>
</tr>
<tr>
<td>The Setting and the Tools of the Change Laboratory</td>
<td>15</td>
</tr>
<tr>
<td>The Change Laboratory Process</td>
<td>17</td>
</tr>
<tr>
<td>Socio-cognitive Processes Called for in the Change Laboratory</td>
<td>20</td>
</tr>
<tr>
<td>The Historical Background of the Change Laboratory Method</td>
<td>22</td>
</tr>
<tr>
<td>The Developmental Work Research Methodology</td>
<td>22</td>
</tr>
<tr>
<td>The Change Laboratory as a Method for Carrying out Developmental Work Research</td>
<td>22</td>
</tr>
<tr>
<td>3. THE THEORETICAL BASIS OF THE CHANGE LABORATORY METHOD</td>
<td>29</td>
</tr>
<tr>
<td>Activity System as the Object of Intervention</td>
<td>29</td>
</tr>
<tr>
<td>Dialectical View of Development</td>
<td>29</td>
</tr>
<tr>
<td>Human Activity as a Cultural System</td>
<td>32</td>
</tr>
<tr>
<td>An Activity System in the Societal Division of Labor</td>
<td>35</td>
</tr>
<tr>
<td>The Hierarchical Structure of Human Activity</td>
<td>36</td>
</tr>
<tr>
<td>Cultural Mediators of Action as Generalizations</td>
<td>38</td>
</tr>
<tr>
<td>The Interplay between the Situational and the Cultural in Human Action</td>
<td>38</td>
</tr>
<tr>
<td>Levels and Types of Mediating Cultural Artifacts</td>
<td>40</td>
</tr>
<tr>
<td>Concepts as Mediators of Thinking and Acting</td>
<td>41</td>
</tr>
</tbody>
</table>
CONTENTS

Human Development as Re-mediation ............................................................... 45
Concrete, Creative Thinking .......................................................................... 45
Re-mediation as a Process of Turning an Artifact into an Instrument–
The Process of Double Stimulation ................................................................. 47
Re-mediation in Collective Activities: Expansive Learning and Concept
Formation ........................................................................................................... 49
The Dynamics of Expansive Development of an Activity System ............ 51
Historical Types of Work ................................................................................... 55

4. PREPARING A CHANGE LABORATORY INTERVENTION ...................... 61
The Three Levels of Planning a Change Laboratory Intervention ................ 61
Negotiating the Mandate for the Change Laboratory Intervention and
Anchoring It to the Organizational Context ....................................................... 62
Preparing the Change Laboratory process ....................................................... 69
Invoking the Participants in the Change Laboratory Process ......................... 69
Collecting Data for the Change Laboratory Process ...................................... 69
Outlining the sequence of Change Laboratory sessions ............................... 74

5. PREPARING AND CARRYING OUT CHANGE LABORATORY
SESSIONS ............................................................................................................. 79
The Three Aspects of Session Planning ............................................................ 79
Participants’ Tasks in Change Laboratory Sessions ........................................ 80
The Structure of Tasks in Change Laboratory Sessions .................................... 80
Planning Tasks to Stimulate the Participants to Take Expansive Learning
Actions of Questioning ..................................................................................... 81
Planning Tasks to Stimulate the Participants to Analyze Their Activity
System ............................................................................................................... 84
Planning Tasks to Stimulate the Participants to Model the New Object
and Form of the Activity .................................................................................. 93
Planning Tasks to Stimulate the Participants to Examine and Test the
New Model ....................................................................................................... 98
Planning Tasks to Stimulate the Participants to Implement the New
Model Experimentally ...................................................................................... 99
Planning Tasks to Stimulate the Participants to Reflect on the Learning
Process ........................................................................................................... 101
Planning Tasks to Stimulate the Participants to Consolidate and
Generalize the New Practice ................................................................. 103
Leading the Discursive Learning and Development Process in the Change
Laboratory Sessions ....................................................................................... 105
The Researcher-Interventionist’s Varying Roles in Conducting the
Work in the Change Laboratory Sessions .................................................... 105
Fostering the Dynamics of the Expansive Learning Process ....................... 108
The Dialectic of Collective Thinking in the Change Laboratory ................. 113
Introduction of the Case Examples ................................................................. 115
## CONTENTS

6. A CHANGE LABORATORY IN A SCHOOL IN BOTSWANA ................. 117  
 ICT Revolution—A Challenge of School Development ............................. 117  
 Digital Information and Communication Technology–A Media  
 Revolution ................................................................................................................. 117  
 The Application of ICTs in Schools ........................................................................... 121  
 The Change Laboratory in Molefi Senior Secondary School ......................... 124  
 Preparing the Change Laboratory Process ......................................................... 124  
 Carrying Out the Analysis and Design Phase of the Change Laboratory  
 Process ....................................................................................................................... 129  
 First Session .............................................................................................................. 129  
 Second Session ......................................................................................................... 133  
 Third Session ............................................................................................................ 140  
 Fourth Session ......................................................................................................... 144  
 Fifth Session ............................................................................................................ 147  
 Sixth Session ............................................................................................................ 151  
 Seventh Session ....................................................................................................... 154  
 Participants’ Comments on the Analysis and Design Process ...................... 157  
 Experimenting with the New Solutions ................................................................. 158  
 Evaluation of the Change Laboratory Process .................................................. 159  

7. A CHANGE LABORATORY IN THE CENTRAL SURGICAL UNIT OF  
 OULU UNIVERSITY HOSPITAL ................................................................. 165  
 The Activity of the Central Surgical Unit .............................................................. 165  
 The Change Laboratory Intervention ................................................................. 166  
 Data Collection before the Intervention .............................................................. 166  
 The Plan of the Intervention ............................................................................... 167  
 First Session ........................................................................................................... 169  
 A Video Meeting between the Researchers and the Management ............... 172  
 Second Session ....................................................................................................... 172  
 Third Session .......................................................................................................... 173  
 Planning Group ..................................................................................................... 175  
 Fourth Session ....................................................................................................... 176  
 Personnel Meeting ................................................................................................. 177  
 Fifth Session ............................................................................................................ 177  
 Follow-up of the Experimental Implementation of the New Model ...... 178  
 Long-term Consequences of the New Model ..................................................... 179  
 Methodologically Interesting Features in the Central Surgical Unit’s  
 Change Laboratory Process .................................................................................. 180  
 The Difference between the Concepts of ‘Organizational Task’ and  
 ‘Object of Activity’ ................................................................................................. 180  
 Changes in the Double-Stimulation Structure in the Change Laboratory  
 Process ....................................................................................................................... 181  
 Overcoming the Management-Practitioner Divide in Transforming the  
 Activity ....................................................................................................................... 183  
 Specific Features of the Implementation of the Intervention ....................... 184
CONTENTS

Sustained, Multifaceted Collaboration between Researchers, the Management, and the Practitioners of the Central Surgical Unit ............... 184
Writing a Document of the New Management and Organization Model ..... 184
Sustained Follow up and Researcher-Practitioner Collaboration ............. 185

8. A BOUNDARY CROSSING CHANGE LABORATORY IN AN AUTOMATION SYSTEMS FIRM ................................................................. 198
The Organization and the Activity .......................................................... 187
Pulp Production and the Two Levels of Its Automation ......................... 187
The Different Logics of the Provision of Basic Automation Systems and Optimization Automation ......................................................... 188
The Purpose and Plan of the Intervention .................................................. 190
Specific Features of a Boundary-Crossing Change Laboratory ................ 190
Preparatory data collection ................................................................. 191
Participants and Session Plan of the Boundary Crossing Change Laboratory ........................................................................ 193
Carrying Out the Intervention ................................................................. 194
Analysis of the Causes of Problems in the Activities .............................. 194
The Results of the Historical Analysis ..................................................... 198
Development of the New Model ............................................................. 202
The Implementation of the New Model and the Results of the Change Laboratory ....................................................... 206

9. COMPARISON OF THE THREE CASE EXAMPLES .................................. 209
Differences in the Practical Realization of the Three Change Laboratory Interventions................................................................. 209
An Activity Theoretical Perspective on the Differences in the Three Change Laboratory Interventions ......................................................... 212
The Relation of the Observations Made in the Three Interventions to Related Theoretical Discussions ................................................. 215

10. THE FUTURE OF THE CHANGE LABORATORY METHOD ...................... 217
The Change Laboratory as a New Phase in the Development of Developmental Work Research Methodology ........................................ 217
The Cycle of the Creation of the Developmental Work Research Methodology ................................................................. 217
The Cycle of Change Laboratory-Based Developmental Work Research Activity ................................................................. 219
Studies of Aspects of Expansive Learning in Change Laboratories .......... 223
Concept Formation ............................................................................... 223
Dimensions and Forms of Expansion in Expansive Learning in Change Laboratories ................................................................. 224
Manifestations of Inner Contradictions in Change Laboratory Participants’ Activity System in Their Discussions in the Change Laboratory ................................................................. 225
Change in the Participants’ Way of Thinking ........................................ 227
CONTENTS

Cycles of Expansive Learning Actions in the Change Laboratory........... 228
The Development of Practitioners’ Transformative Agency in the Change Laboratory................................................................. 230
The Zone of Proximal Development of the Change Laboratory-based Developmental Work Research Activity.................................................. 233
Appendix 1: Session Planning Sheet.......................................................... 239
Appendix 2: Disturbance Diary.................................................................. 247
Appendix 3: Cultures of Dealing with Disturbances and Problems in Organizations ................................................................. 249
Appendix 4: Methods for Collecting Historical Mirror Data ................. 251
Appendix 5: Change Matrix .................................................................. 253
References......................................................................................... 255
Index...................................................................................................... 267
LIST OF FIGURES AND TABLES

Figure 1. Formative interventions in the field of research in social sciences xvi
Figure 1.1. Four types of interventions and intervention methods 4
Figure 1.2. The difference in the problem solving processes of change intervention and Change Laboratory intervention 10
Figure 2.1. A prototypic layout and instruments of the Change Laboratory space 16
Figure 2.2. The phases of a Change Laboratory process 17
Figure 2.3. The use of the surfaces of representation in a possible course of the analysis and design in the Change Laboratory 18
Figure 2.4. Socio-cognitive processes called for in the Change Laboratory 20
Figure 3.1. The first step in the transition from the animal form of activity toward the human form of activity 33
Figure 3.2. The organization of human activity system 34
Figure 3.3. An activity system as a node in a network of functionally interdependent activity systems 36
Figure 3.4. Two activity systems involved in co-construction of a potentially shared object 36
Figure 3.5. The hierarchical organization of human activity 37
Figure 3.6. The model of the cycle of expansive learning 51
Figure 3.7. The cycle of expansive transformation of an activity system 53
Figure 3.8. Historical types of work 56
Figure 4.1. Three approaches to the development of an activity 65
Figure 4.2. Expansive learning actions in the Change Laboratory process 75
Figure 4.3. Experimental implementation of the new model: taking a new kind of productive action in the activity system 77
Figure 5.1. A possible flow and dynamics of the action of questioning 82
Figure 5.2. A possible sequence of operations in the historical analysis 86
Figure 5.3. Different modes of collaboration 90
Figure 5.4. A possible structure of the expansive learning action of actual empirical analysis 92
Figure 5.5. Historical types of work and organizations depicted in relation to dimensions of increasing collectivity and flexibility 95
Figure 5.6. A possible sequence of steps to build the new model 96
Figure 5.7. A possible sequence of steps in carrying out expansive learning actions of reflecting on the process 102
Figure 6.1. Teachers’ joys, frustrations, and inspiring and worrying new experiences 131
Figure 6.2. Modeling teachers’ current activity system 135
Figure 6.3. Students’ worries 137
Figure 6.4. The cover and content of two students’ notebooks 140
Figure 6.5. The Mirror/Past in the form of matrix of changes in the elements of the activity system 143
Figure 6.6. A preliminary definition of an object of development as a cluster of loosely interrelated ideas 150
Figure 6.7. The ideas for new solutions located preliminarily in the teachers’ activity system model 154
Figure 7.1. A Change Laboratory session in the Central Surgical Unit, Oulu University Hospital 171
LIST OF FIGURES AND TABLES

Figure 7.2. The activity systems and their inner contradictions in the Central Surgical Unit ................................................................. 174
Figure 7.3. An idealized model of the process-based matrix structure of the Result Unit for Surgery and Intensive Care ................................. 174
Figure 7.4. The proposed model of the new organization of the unit .................... 175
Figure 8.1. The plan of the Boundary Crossing Change Laboratory in Metso Automation ................................................................. 194
Figure 8.2. A review meeting between the representatives from the provider firm and the client pulp mill on the functioning of the optimization software at the mill ............................................................... 199
Figure 8.3. The proposed new elements of the activity in relation to the extension of the scale and expansion of the scope of the activity ....... 207
Figure 10.1. The direction of transformation in work activities in the first DWR projects ................................................................. 219
Figure 10.2. The directions of transformations of work activities after the 1990s .......... 220
Figure 10.3. Types of Change Laboratories ................................................................. 235
Figure 10.4. The Zone of proximal development of developmental work research ........... 237

Figure in Appendix 3: Four types of organizational cultures of dealing with problems .... 249

Table 1.1. The difference between change interventions and formative Change Laboratory interventions .................................................. 12
Table 3.1 Two types of concepts and related intellectual operations .................. 43
Table 4.1. An example of a possible session structure of the analysis and design phase of a Change Laboratory intervention .............................. 76
Table 6.1. The plan of Change Laboratory sessions in the Molefi School ................ 129
Table 7.1. The plan of the Change Laboratory sessions in the Central Surgical Unit .... 168
Table 9.1. Comparison of the practical realization of the three interventions .............. 210
Table 9.2. Comparison of expansive learning processes in the three cases .............. 213
LIST OF BOXES

Box 2.1. The interplay between emotional confrontation and intellectual analysis in a Change Laboratory session ................................................................. 21
Box 2.2. The first DWR study in the early 1980s ................................................................. 24
Box 3.1. Understanding living systems ................................................................................ 31
Box 3.2. A discrepancy between the goal and the operations of carrying it out ............... 38
Box 3.3. Contradiction as a challenge to creative problem solving ................................... 46
Box 3.4. The experiment of the ‘meaningless situation’ ....................................................... 48
Box 3.5. Identifying and overcoming an inner contradiction in a team’s activity system .... 54
Box 3.6. A historical example of expansive learning ......................................................... 57
Box 4.1. Knowledge creation in the preparatory negotiations .............................................. 63
Box 4.2. Analysis and design in five Change Laboratory sessions ..................................... 67
Box 4.3. Using mirror data for constructing the object of the intervention together with the management ................................................................. 68
Box 4.4. Planning group ........................................................................................................ 69
Box 4.5. The data collection can already function as an intervention ................................. 71
Box 4.6. The same client but different conceptualizations of the object of the activity ....... 72
Box 4.7. An example of a work process as a mirror of the current practice ....................... 73
Box 4.8. A dramatic problem situation as the mirror of the activity ................................. 74
Box 4.9. An alternative Change Laboratory process ......................................................... 78
Box 5.1. Eliciting experiencing among Change Laboratory participants .............................. 83
Box 5.2. Different cultures of dealing with problems ........................................................... 83
Box 5.3. A living time line as a way to collect data about the history .................................. 85
Box 5.4. Collective recollection as a way to collect data about the history ......................... 87
Box 5.5. Taking a historical perspective on current disturbances ...................................... 89
Box 5.6. Conditions of cooperation ..................................................................................... 91
Box 5.7. A model of historical types of the activity as an analytic tool ................................. 92
Box 5.8. Benchmarking as a way to support moral-ideological expansion ........................... 94
Box 5.9. Modeling the future vision of the activity ............................................................. 94
Box 5.10. The use of critical benchmarking in the search for a new model ......................... 97
Box 5.11. Examining the new organizational model .............................................................. 99
Box 5.12. The Implementation Change Laboratory .......................................................... 100
Box 5.13. The relationship between reflection, consolidation and generalization of the new practice ...................................................................................... 103
Box 5.14. The interplay between societal meaning and individual sense in analyzing and changing the system of the joint activity ............................................. 106
Box 5.15. A deviation from the researcher-interventionists’ script ....................................... 107
Box 5.16. Competition between the old and the new principle ............................................ 111
Box 5.17. Logical operations in creative thinking ............................................................... 114
Box 6.1. Using the Change Laboratory to help teachers to reconceptualize the object and form of their educational activity ............................................. 123
Box 10.1. The international dispersions of the Change Laboratory method .......................... 221
Box 10.2. Pests do not respect boundaries–A Boundary Crossing Change Laboratory among tomato and cucumber producers .............................................. 225
FOREWORD: FORMATIVE INTERVENTIONS FOR EXPANSIVE LEARNING

The world seems more out of control than ever. Often the very striving for complete control, or absolutistic thinking to use the terminology of John Dewey, plays a central part behind personal failures. Dewey described this characteristic in The Public and Its Problems:

When we say that thinking and beliefs should be experimental, not absolutistic, we have then in mind a certain logic of method, not, primarily, the carrying on of experimentation like that of laboratories. Such a logic involves the following factors: First, that those concepts, general principles, theories and dialectical developments which are indispensable to any systematic knowledge be shaped and tested as tools of inquiry. Secondly, that politics and proposals for social action be treated as working hypotheses, not as programs to be rigidly adhered to and executed. They will be experimental in the sense that they will be entertained subject to constant and well-equipped observation of the consequences they entail when acted upon, and subject to ready and flexible revision in the light of observed consequences. (Dewey, 1927, pp. 202-203)

The implication is that instead of controlling the world, we should accept that all our designs have unintended consequences and drift in unexpected ways. Thus, instead of pushing grand designs through at any cost, we might cultivate tentative solutions by means of experimentation, first locally and, when working solutions are found, by generalizing and spreading them through dialogue and further experimentation. Interestingly enough, the success of the Finnish school system in the international PISA assessments seems to be largely based on this type of a gradual shift—not necessarily very deliberate and conscious—from central absolutistic control toward local experimentation and dialogue (Miettinen, 2013; Simola, 2005).

Dewey’s vision is very different from the dominant notions of a positivist “gold standard” for research in education and social sciences. Absolutistic control modes of thinking have left relatively little room for the development of experimentalist-interventionist research traditions and methodologies. One important exception was the work of Urie Bronfenbrenner in the 1970s. In his paper “Toward an experimental ecology of human development,” Bronfenbrenner envisioned what he called “transforming experiments.”

But all such naturalistic studies [of the impact of societal changes on the socialization of children] have the disadvantage of being limited to variations of macrosystems that presently exist or have occurred in the past. Future possibilities remain uncharted, except by hazardous extrapolation.
FOREWORD

(…) This foreshortened theoretical perspective was first brought to my attention by Professor A. N. Leontiev of the University of Moscow. (…) In summing up his views, Professor Leontiev offered the following judgment: ‘It seems to me that American researchers are constantly seeking to explain how the child came to be what he is; we in the USSR are trying to discover how he can become what he not yet is.’

(…) Soviet psychologists often speak of what they call the ‘transforming experiment.’ By this term they mean an experiment that radically restructures the environment, producing a new configuration that activates previously unrealized behavioral potentials of the subject. (Bronfenbrenner, 1977, pp. 527-528)

Bronfenbrenner concluded that “research on the ecology of human development should include experiments involving the innovative restructuring of prevailing ecological systems in ways that depart from existing institutional ideologies and structures by redefining goals, roles, and activities and providing interconnections between systems previously isolated from each other” (Bronfenbrenner, 1977, p. 528). It seems to me that time is ripe for a rediscovery of this insight in our era of transformations that cannot be controlled but need to be influenced and shaped.

This book presents a carefully elaborated and practically tested way to push forward, cultivate into a methodology, and put into practice Bronfenbrenner’s visionary recommendation. The Change Laboratory represents a new step in the evolution of the tradition of transformative experiments, or formative interventions. Figure 1 suggests a rough map for locating formative interventions in the field of research in social sciences.

![Diagram](image)

Figure 1. Formative interventions in the field of research in social sciences
Formative interventionist methodology, as embodied in the Change Laboratory, is needed and viable for three reasons. First, all research intervenes. When we observe, analyze and interpret social life, we also influence it, whether we want to or not. In other words, we cannot stay completely outside our research objects; we can only pretend to do so. It seems advisable that we get serious about it and analyze our own actions and research practices as they interact with those of our subjects.

Secondly, interventions are taking place in any case. Any human activity system or organization is bombarded with deliberate and incidental interventions from within and without. Researchers do not have a monopoly on interventions; in fact, our interventions are often among the weakest ones. Therefore, we should stop fearing that we may “contaminate” the reality; there is no virgin or uncontaminated reality out there.

Thirdly, by intervening deliberately and methodically we generate knowledge about what is possible. Corresponding to Dewey’s distinction between absolutist and experimental thinking, I have suggested a distinction between stabilizing categorization knowledge and dynamic possibility knowledge (Engeström, 2007). Possibility knowledge opens up insights into what may be possible in a human activity and what alternative directions of development and change are available. Possibilities are not given; they are created and articulated by those whose lives are at stake. Possibility knowledge is generated by setting the activity and its subjects into motion, into some form of focused “time travel” that explores the past, the present and the future in relation to one another. Such modes of engaged world making are rarely captured without deliberate intervention.

The Change Laboratory method is based on the theory of expansive learning (Engeström, 1987). In this framework, the end results of learning are not predetermined by the interventionists or researchers. The outcomes are designed by the participants as they work out expansive solutions to developmental contradictions in their activity systems. Expansive learning cuts across the often separate disciplinary domains of individual learning and organizational learning. Learning outcomes are not reducible to changes in the cognition and behavior of the participants of expansive learning efforts. The outcomes are above all consequential material changes in the objects, instruments, rules and divisions of labor within and between the collective activities engaged in expansive learning, coupled with new forms of collective and individual transformative agency (Virkkunen, 2006).

The Change Laboratory is a living toolkit that cannot be mechanically reproduced. Each implementation is a creative endeavor that requires grasping the local circumstances and specific potentials of the activity systems involved. Each implementation generates insights and findings that can enrich and develop further the method itself, as well as the theory behind it. This book is an invitation for researchers and practitioners to join in, study the ideas, and interact with those who have already conducted Change Laboratory interventions. People working in the birthplace of the Change Laboratory, the CRADLE at the University of Helsinki (http://www.helsinki.fi/cradle/), will respond and facilitate such interactions.
FOREWORD

REFERENCES


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AUTHORS’ PREFACE

Change Laboratory is a novel method and set of instruments for developmental intervention to support collaborative learning in and transformation of work activities. It is based on collaboration between researchers and practitioners in the analysis and realization of developmental possibilities in an existing activity or network of activities. Since the first Change Laboratory interventions in the mid-1990s in Finland, the method has raised broad interest at home and abroad. Although many articles about Change Laboratory interventions and analyses of aspects of expansive learning in them have been published, no textbook on the method has been available. This book has been written to fill that gap.

The purpose of the book is to provide a basic description of the method for researchers and developers who want to apply it in the development of a work activity. This purpose is not as straightforward as it might seem for two reasons: First, the Change Laboratory is not a standardized method that could be applied as if following an algorithm. On the contrary, the method has to be creatively applied in each individual case. Such a creative application can only succeed by searching for guidance from the theory behind the method. Second, the training of the method has shown that the meaning and relevance of many of its concepts and principles become clear only when planning and carrying out an actual Change Laboratory process. For these reasons, we have included in the book an extensive review of the background theory of the method and provided a variety of examples of solutions applied in the actual Change Laboratory processes.

We also describe three Change Laboratory processes carried out in different activities: a school, a hospital’s surgical unit, and a company that provides automation systems for industry. These examples are not chosen to function as showcases or ideal models of Change Laboratory processes, but to allow us to concretely discuss the problems of applying the principles and conceptual tools of the Change Laboratory. The idea of writing this book arose during a project in Botswana that focused on the use of information and communication technologies in school education. As part of this project, we carried out a Change Laboratory intervention in the Molefi Senior Secondary School near Gaborone, the capital of Botswana. We chose to take this intervention as the first of our three concrete examples of Change Laboratory processes. This case shows that, although the problems that are worked on in the intervention are specific to each case, the use of the method in itself is not limited to a specific cultural context.

There are, however, constraints on the use of the method. It can be applied in contexts where the practitioners can feel safe to freely express their opinions and are allowed to experiment with new ways of acting. The method also calls for the participants to show a willingness to exert themselves, get involved and take a risk. Both the participants and the researcher-interventionists are brought in the Change Laboratory intervention outside their confidence zone and taken into unknown domains that call for and enable creative solutions from them. Besides crossing the
AUTHORS’ PREFACE

boundary between the world of research and the world of practical activity, the method often calls for crossing disciplinary and professional boundaries in the area in which it is applied.

Research is one of those activities in which the use and development of tools are intimately intertwined. The Change Laboratory is a toolkit for research-based development and development-based research. It is not a ready-made package but an object of public discourse and continuous development. All those who apply the method think and work differently. There is no canonized right way of applying the method, but only varying solutions with varying situational and theoretical substantiations that are open to discussion. This book presents the authors’ views at the time of writing the book, although we have been lucky to have received critique and support from a broad spectrum of people.

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Denise Shelley Newnham
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INTRODUCTION

The challenges of learning in work organizations—in both business and public administration—have changed. The life cycles of entire product-, production- and business concepts are rapidly becoming shorter. There is an increasing need to meet societal needs in new ways that break away from traditional concepts and organizational forms. The new challenge is to master the creation of such new solutions as well as the related qualitative transformations of activities. These challenges cannot be met by means of technical optimization, isolated improvements, or individuals’ learning to carry out their current tasks better. They require learning and development that concerns the whole idea and structure of the activity.

There is currently an increasing interest in the problems of ‘workplace learning’ and ‘learning at work’ within both academia and the workplace. This interest reflects a genuine need for mastering the new challenges of learning and innovation in workplaces both theoretically and practically. At the same time, it also brings forth the flagrant lack of well-grounded intervention methodologies that would meet the need. The Change Laboratory is a novel method and a set of instruments for formative intervention in work activities that is designed for meeting this need and supporting qualitative transformation and expansive learning within work activities. The method, originally developed by Prof. Yrjö Engeström, is a path breaker in this area as it not only focuses on carrying out changes in organizational practices, but also on the development of the practitioners’ sustained capability for developing these expansively with the help of new conceptual and practical tools. It stands out clearly in its uniquely strong theoretical and research basis on the Cultural Historical Activity Theory, the Theory of Expansive Learning, the Developmental Work Research methodology, and the empirical research carried out based on these.

This book has been written to provide a basic description of the method for researchers and developers who want to apply it. It explains the background theory, and gives examples of both specific solutions within interventions and of whole Change Laboratory interventions. It also provides a review of analyses of expansive learning processes in Change Laboratories. In the first chapter of the book we will discuss the changes in the economy and the workplace that have brought about the need for a new kind of learning and for novel instruments for developmental intervention, with which such learning can be supported. We will also discuss how the Change Laboratory differs from other generally known forms of developmental intervention in work activities.

The second chapter gives the reader a condensed overview of the Change Laboratory method without going into its theoretical background, which is explained in the third chapter. The third chapter expands the presentation of the method integrating it into the broader methodology of Developmental Work
INTRODUCTION

Research and its background theories, the Cultural Historical Activity Theory and theory of expansive learning.

Chapter 4 describes the process of planning and preparing a Change Laboratory intervention starting from the negotiations with the representatives of the client organization and ending with a project outline of the intervention.

Chapter 5 describes in detail the planning and preparation of the intervention sessions and the process of carrying them out. At the end of that chapter, we introduce the three case examples that are then presented in the following three chapters.

Chapter 6 provides a case example of a Change Laboratory carried out in a senior secondary school in Botswana. The Change Laboratory was carried out as part of a broader project that focused on the use of computers in schools. Therefore, we briefly review, in the beginning of the chapter, research concerning the introduction of information and communication technologies in schools.

Chapter 7 presents a case example of a Change Laboratory that focused on the organization and management of the surgical activities in the Central Surgical Unit of Oulu University Hospital in Northern Finland. The case allows us to discuss the relation of the Change Laboratory to the theoretical discussion of change management.

In the eighth chapter, a case example of a Boundary Crossing Change Laboratory is described, that was carried out in a new activity within Metso Automation, an international firm that provides automation systems for process industries. The new activity consisted of providing systems for automated optimization of pulp production processes. In this chapter, we also discuss the specific nature of Change Laboratories focusing on boundary crossing between activities as well as the role of the Change Laboratory in developing co-configuration work.

In chapter 9, the three case examples are compared and the particular perspectives they give to the Change Laboratory method are summarized.

Chapter 10 discusses the current phase and the future perspectives of the Change Laboratory-based research and development activity. In this chapter, we also briefly review scientific analyses of the expansive learning processes in Change Laboratory interventions.

Although the ten chapters of the book explain the theory behind the method and give examples of its use, the concepts and ideas presented in the book begin to live only when planning and carrying out an actual Change Laboratory intervention and using them as hypotheses for possible solutions.
CHAPTER 1

MEETING THE NEW CHALLENGES OF LEARNING AT WORK

This chapter begins with a discussion on the new challenges in ways of mastering work activities and learning at work. The increasing need to master fundamental transformations of activities will be highlighted. The concept of intervention method will be explained and a summary of different kinds of interventions provided highlighting the difference between change interventions, which aim at reaching a predetermined objective, and formative interventions, which focus on creating a new concept and principle of carrying out an activity. At the end of the chapter, the Change Laboratory will be introduced as a theory-based method of formative intervention in work activities.

HISTORICAL CHANGE IN CHALLENGES AND FORMS OF WORK-RELATED LEARNING

Our contemporary society is often characterized as a ‘knowledge society’ and its economy as a ‘knowledge economy’ (Jensen, Lahn, & Nerland, 2012). However, as Freeman and Louça (2001, p. 132) note, all human societies have been knowledge societies. What has been changing are the ways of learning and accumulating knowledge and passing it on, interacting with changing ways of organizing production and regulating economic activities and social behavior. The changes have not been a smooth accumulation and increase in knowledge, but have rather taken place as surges of innovation-triggered qualitative transformations. The reason for the current discussion of the knowledge society is that we find ourselves in the middle of a technological revolution based on digital information and communication technologies, in short, the digital revolution.

In the era of a market economy, the great technological revolutions have repeatedly followed a similar basic pattern (Perez, 2002). After the breakthrough of a new technology, there has typically been a phase of frenetic investment in the development of the new technology and the installation of the infrastructure for its utilization. Progress in the development and use of new technologies in these phases has been based on a “technology push” created by ample financial investment into its development. These phases have typically ended in deep financial crises due to overinvestment. Following the crisis, a new phase has begun that is characterized by a broad deployment of the new technologies in all activities in the society driven by a ‘need pull’ and an increasingly central role of the users in the development of new solutions. In the first phase, the new technology is largely applied within the existing institutional structures and principles of management.
Therefore, in the digital revolution the new technologies were first applied in the structures and principles of mass production and consumption, which evolved and stabilized during the long post-war growth period. The latter phase of this technological surge, in which we now live, is characterized by radical qualitative transformation of the structures and principles of production and consumption as well as ways of learning and creating knowledge.

Learning and knowledge creation is about generalization, that is to say, identifying essential differences and variation. In craft work, the artisan learns to identify differences in materials and ways of using tools that affect the quality of the product. In industrial mass production, the variation that has to be identified and mastered consists of deviations from an optimal production process that are manifested as disturbances, breaks, and waste. The methods conceived to master such variation are based on studying and rationalizing ways of carrying out tasks and continuously improving the production process (Adler & Clarke, 1991; Victor, Boynton, & Stephens-Jahng, 2000; Lillrank, Shani, & Lindberg, 2001, Pihlaja, 2005). In recent years, the challenge has increasingly been to identify essential variation and change in individual customers’ needs and to master the meeting of these in the conditions of rapid technological development (Pine, 1993; Victor & Boynton, 1998).

Currently, a kind of variation and change in work activities has become more prominent than before. The following example illuminates its nature. A company that produced fertilizers for agriculture recognized that the business was no longer profitable because of strong competition. The corporate management chose to sell the business. A buying firm would perhaps be able to make the production profitable by increasing its volume. However, the managers of the fertilizer production business of the corporation created another plan. They knew that there was in the country, in which they operated, a database about the chemical composition of soil in all the fields and even parts of the fields of the country’s farms. They designed a new kind of service, in which the farmers could order a mixture of fertilizers that would complement the lack of nutrients and necessary minerals in the chemical composition of the soil of their farm’s fields. They also created a regulator for fertilizer dispensers that applied location information received from a satellite to control the application of fertilizers to different fields and parts of a field. This precision fertilizing system reduced costs and diminished the environmentally harmful runoff of nutrients. The change from selling standard fertilizer to the provision of a customized fertilizing service called for a radical change in the principle of carrying out the business and most of the processes involved in it challenged the professionals to learn and develop completely new skills and forms of collaboration (Virkki, 2012).

The change and variation in the example was not about how the process of producing the fertilizer or the specific tasks involved in the production were carried out. Rather global competition had rendered the whole idea of producing and selling a standard fertilizer obsolete making it necessary to change the whole concept and principle of the business. A new concept was created of how the firm could help farmers to fertilize their fields more economically and in an
environmentally more sustainable way. There was a change in the way of thinking about fertilizing, but perhaps more importantly, a fundamental transformation in the structure of the network of activities involved in the business and the work of the individuals involved in them. This kind of transformation takes a long time and involves a great number of complementary innovations and changes. The new challenge of learning is to master this kind of complex processes of concept-level change. Such a transformation calls for generalization and learning that expand the involved individuals’ horizon and practical mastery up to the level of the whole activity and its historical transformation (Engeström & Sannino, 2010, p. 3).

Such concept-level changes have traditionally been seen solely as the concern and responsibility of the top management of the organization. This view, which is a legacy of the era of mass production, appears currently too limiting. As Engeström states:

The increasingly societal nature of work processes, their internal complexity and interconnectedness as well as their massive volumes in capital and capacity, are making it evident that, at least in periods of acute disturbance or intensive change, no one actually quite masters the work activity as a whole, though the control and planning of the whole is formally in the hands of the management. This creates something that may be called ‘grey zones’, areas of vacuum or ‘no man’s land’, where initiative and determined action from practically any level of the corporate hierarchy may have unexpected effects. (Engeström, 1987, pp. 113-114)

Strategically important insights and innovations increasingly emerge at all levels of the hierarchical work organization and in collaboration between organizations. The challenge is to find effective forms and methods to support concept-level change at all levels of the organization as well as in networks of interrelated organizations. To master the challenges of concept-level changes, new dialogical relationships need to be built between the actors that inhabit these vertically and horizontally separated worlds and their different perspectives (Ahonen & Virkkunen, 2003; Engeström, 2003; Prahalad & Ramaswamy, 2004; Hamel & Breen, 2007).

THE NEED FOR A NEW METHOD OF INTERVENTION IN WORK ACTIVITIES

The Concept of Intervention

Intervention has been defined as “purposeful action by a human agent to create change” (Midgley, 2000, p. 113). Speaking about intervention in continuously changing human activities, a more appropriate definition might be “purposeful action by a human agent to support the redirection of ongoing change.” The word intervention comes from the Latin words inter, between, and venio, to come, that is, ‘to come between.’ The interventionist comes between an actor’s actions so that the activity finds a new direction. In human life, individuals and groups constantly intervene in each other’s activities trying to change their course in one way or other, sometimes succeeding, sometimes not. However, the term intervention is,
usually reserved for the application of specially planned forms and methods of intervening.

A method is a pre-planned procedure, process or set of steps to follow that is generally applicable in certain tasks. An intervention method can be a result of experimentation and empirical experience, but it can also be based on a theory that provides the reasons and rationale for the nature and sequence of the steps. In such a case, the intervention method is part of a methodology that answers questions such as how to delineate and understand the object of the intervention, how and why the method produces the outcomes it is claimed to produce, and on what grounds and in which ways the results of an intervention can be generalized to other situations and other activities.

In the following, in order to provide a rough overview of the variety of interventions in work activities, two dimensions along which intervention methods differ are highlighted. The first dimension describes the order of the change searched for in the intervention (Bartunek & Moch, 1987). Along this dimension interventions differ from those that focus on producing incremental improvements in the way of realizing the current basic concept of the activity to those that seek to transform the whole activity changing its concept and principle of operation. The change in the fertilizer business described above is an example of the latter kind of change, while rationalizing the production process would exemplify the former. The second dimension describes the intervention process. It can vary from a strictly structured set of steps of implementing a pre-existing solution to a creative reframing of problems and forming novel solutions (see Figure 1). These differences are related to different conceptions of organizational change. In some theories, organizations are viewed as basically stable and change is seen as an exceptional process brought out by an external agent. Other theories rather perceive change as continuous and endemic to organizations (Weick & Quinn, 1999). Crossing these two dimensions provides the model of different types of interventions presented in Figure 1.1.

![Four types of interventions and intervention methods](image.png)

*Figure 1.1. Four types of interventions and intervention methods*
In Figure 1, quadrants A and C represent two different kinds of interventions that focus on a specific aspect of the overall activity such as, for example, interventions in productivity, accident prevention, and worker motivation. Quadrant A represents improvement interventions aimed at the implementation of an existing solution, while quadrant C represents problem-solving interventions, in which a new solution is searched for and created. Often the aim in both of these kinds of interventions is to change a group’s practice or individuals’ ways of acting. Most of these methods for intervening in work have been created in the era of mass production and entail tacit background assumptions based on those conditions such as a slow pace of change and relative independence of functions. In the current era, these conditions are seldom present.

Many theories and methods of problem-solving intervention have evolved from Kurt Lewin’s (1943, 1946, 1947a, 1947b) pioneering work in the 1940s. He strongly argued for combining research and development in a process of action research. For him it was both a way to change individuals’ and groups’ habits and to create scientific knowledge of ways and possibilities of solving societal problems. In action research, the researcher collects data about the problem and the current habits of involved individuals and groups and leads the group to experiment with, test and evaluate alternative ways of acting. In the 1970s, a tradition of organizational change intervention called Organizational Development (OD) evolved on the basis of Levin’s ideas (Bennis, 1969, French & Bell, 1973; Schein, 1969, 1990). However, this approach did not live up to Lewin’s vision of combining scientific research and development of practices (for an exception cf., Bartunek & Schein, 2011).

Lewin characterized his approach as ‘social engineering’ and as ‘planned change’. In his studies, a third party who ordered the intervention typically defined the problem to be solved; for instance, a government wanting to change peoples’ food habits or a manager wanting to change employees’ behavior (Lewin, 1947b, 1943). In his interventions in group behavior, Lewin applied the idea that the current practice reflects a quasi-stationary equilibrium between the forces of change and those of inertia. Increasing the pressure to change would increase the overall tension in the field and strengthen the forces of inertia making the behavior change more difficult. On the other hand, an intervention that would weaken the forces of inertia would simultaneously diminish the overall level of tension in the situation and make the change more feasible. According to Lewin, a successful change intervention includes three aspects: unfreezing (if necessary) the present habit of the group, moving it to a new level, and freezing the group’s habit on the new level (Lewin, 1947a, p. 34). Lewin saw change as a goal-oriented movement from a lesser state to a future, better state that is planned and managed by an external change agent (Marshak, 1993, p. 400).

Chris Argyris has developed a version of Levin’s idea if action research that takes a different approach to the forces of inertia: he calls it Action Science. The idea of weakening the forces of inertia is applied in Action Science interventions in a specific way. The intervention seeks to overcome the practitioners’ unconscious strategies of self-protection by surfacing them. These strategies are activated when
people feel embarrassed or threatened. They trigger forms of defensive behavior such as attempts to unilaterally control the social interaction or smooth over and cover up mistakes and problems. According to Argyris (1985), such defensive behavior hinders organizational learning and change.

Recently, a new version of social engineering has been proposed in the field of educational research called design experiments or design research (Brown, 1992; Collins, Joseph, & Bielachyc, 2004). The idea is that an external specialist designs a new educational method or learning environment, introduces it to practitioners who then apply and test it in practice in collaboration with the researcher who studies its effects and application.

The approaches of planned change assume that the researcher-interventionist defines the grounds of identifying problems and the problem addressed in the intervention. This practice downplays the expertise and agency of the practitioners whose activity the intervention is set out to change. F. W. Whyte (1991) has developed an alternative action research approach, Participatory Action Research, in which the researcher and the involved persons jointly define the problem and plan the research to find a solution in a dialogue.

Instead of solving specific problems or carrying out an incremental improvement, a growing number of change interventions aim to implement an existing concept or model in an organization (see quadrant B in Figure 1.1.). Such concept-driven change interventions (Gustavsen et al., 1996; Kotter, 1996; Bodrožič, 2008) typically involve all functions and levels of the organization. They are often connected to the implementation of a new computer system that is designed to support the realization of a specific concept in the activity.

Many of the intervention methods that are based on the implementation of a pre-existing solution share Lewin’s idea of intervention as social engineering; however, the engineering analogy is misleading as it disregards the need for communication, negotiation and collaboration. People do not react mechanically to external change impulses, but interpret them from the perspective of their interests, motives and plans. Norman Long (2001) has aptly criticized linear plan-execution-outcome models of intervention highlighting that an intervention is always a complex and multifaceted social process in which different flows of events and varying interests intermingle as a new order is negotiated and constructed. This is also the central message of the many studies of concept-driven reform processes that show how the initial idea of a reform is lost, transformed and sometimes turned on its head in the change process (Beer, Eisenstat, & Spector, 1990; Hubbard, Mehan, & Stein, 2006). The system, that is the object of the intervention, has its own developmental dynamics that affect the intervention process. As soon as the intervention begins, a new dynamic system emerges that comprises both the object of the intervention and the researcher-interventionists who cannot remain as detached external actors in the process. An intervention is always a partially unpredictable process of interaction and collaboration that produces emergent outcomes, which the involved actors cannot fully predict or determine beforehand.

Many of the existing intervention methods are designed to meet a pre set change objective whether limited or encompassing as in concept-driven change
MEETING THE NEW CHALLENGES TO LEARN AT WORK

In these interventions, the change objective is set based on a current understanding and in terms of existing concepts and ideas. The need for a formative intervention oriented to transformational change and the creation of a new concept of the activity (see quadrant D in Figure 1.1) arises, when intertwined change processes render the prevailing concept and principle of meeting a societal need as well as carrying out the activity inadequate. In such a situation, the threat of a crisis cannot be overcome by making incremental improvements or solving individual problems. Instead, the whole activity has to be reconceptualized. Some intervention approaches, for example Emery and Purser’s (1996) Search Conference and Heckscher, Maccoby, Ramirez, and Tixier’s (2003) Full Engagement Intervention approach attempt to accomplish this by organizing and orchestrating a complex process of negotiations among all the stakeholders. The Change Laboratory method (Engeström, Virkkunen, Helle, Pihlaja, & Poikela, 1996; Engeström, 2007a) aims to help in meeting this challenge through a collective process of inquiry, learning, and change oriented to the systemic causes of the experienced problems and to the possibilities of reconceptualizing and reconfiguring the activity.

The Difference between a Change Intervention and a Formative Change Laboratory Intervention

Consider the following two examples of formative Change Laboratory intervention.

The case of a special school for neurologically ill and disabled children. As a result of the increasing integration of the education of neurologically ill and disabled children in normal schools, the students that came to a special school had more severe neurological illnesses and were more severely disabled than before. The activity of the school was based on the coordinated contributions of teachers, nurses, and therapists, who carried out their work according to their respective professional traditions. The students went from classes to therapy sessions to get specific treatments and back to their lessons or the student home. Because of the increasing severity of the diseases and disabilities of the students, more specialized therapists had been hired. For the same reason, it took an increasingly long time to move the students from classes to therapy sessions, which often took place in another building, and to dress and undress them especially in wintertime when warm clothing was needed. Both teachers and therapists complained that they could not meet their objectives because of a lack of time. There were also problems in the continuity and coordination of the rehabilitation of the students because each profession set the objectives of individual students’ rehabilitation separately. In a formative Change Laboratory intervention, the professionals analyzed the roots of the problems and recognized that they could not be solved within the model of coordinated professional work. In the intervention process, they developed a new concept and principle of integrating education and therapy based on the idea of making the daily life of the students rehabilitative. The various professionals
analyzed, in teams, the daily routines of the individual students and designed ways
of integrating rehabilitative elements in them so that the need for specific therapy
sessions could be reduced (Virkkunen & Tenhunen, 2010).

The case of the Central Surgical Unit of Oulu University Hospital. The unit had
difficulties in responding to increasing demands for effectiveness due to employee
turnover and sick leaves. As an attempt to remedy the situation, the hospital
management had invited an external process-efficiency consultant to conduct a
study in the unit. The consultants selected one surgical process in one of the nine
surgical specialties of the unit, that of knee and hip surgery, in which waiting times
had especially lengthened due to a growing number of patients. The aim of the
study was to reveal where time in the process was wasted. The main suggestion
was a reorganization of the process that was supposed to save time as much as 28
minutes per operation. However, according to the unit’s operations manager this
suggestion was not implemented for two reasons. First, the process-efficiency
study did not deal with the overall complexity of work in the unit, but led to well-
defined normative guidelines for a very specific and narrow process isolated from
the rest of the activity. Second, the practitioners were not committed to the solution
because they were not involved in the study (Engeström, Kajamaa, Kerosuo, &
Laurila, 2010, p. 14). In a subsequent formative Change Laboratory intervention
(see Chapter 7) carried out by Engeström, Kerosuo and Kajamaa, the practitioners
first identified the many interlinked problems in the activity and the changes that
had led them close to a crisis situation in which the practitioners’ felt that they had
lost control of their work. The practitioners then constructed a new principle of
organizing and managing the surgical work in the unit based on multi-professional
communities that they formed based on medically meaningful areas of surgery. As
a result, the formal coordination of individuals’ work evolved into a shared,
holistic responsibility for the patient’s chain of care in the area. The new
organizational and management model that had been created led to a remarkable
decrease in sick leave and a noticeable increase in the efficiency and quality of the
unit’s surgical activities (Engeström et al., 2010).

In both these examples, the starting point was that of an organization in which
specialized professionals focused on their respective work tasks. In both cases, the
need for an intervention did not rise from a specific, isolated problem but from a
gradual increase in disturbances and ruptures in the activity that had threatened to
become a crisis. While focusing on their specific tasks, the professionals had lost
sight of what they were jointly producing. In both cases, the turning point in the
formative Change Laboratory intervention was a reconceptualization of the object
and motive of the joint activity. In the case of the special school, it was the new
understanding of the best way to support the students by carrying out rehabilitation
by reforming the daily actions of the rehabilitees. In the case of the Central
Surgical Unit, it was the sustained multi-professional collaboration on a medically
meaningful area of surgery.

It is often thought, that each individual should focus on his or her specific job
and that it is the responsibility of the management to structure and control the
activity as a whole. Although this is partly true, strict adherence to this principle leads to two incompatible, differently inadequate views of the activity. On the one hand, there is an overall view of the whole activity from management’s external, detached perspective that lacks the subjective devotion and ownership of those who carry out the activity. On the other, there are the involved and devoted but limited views of the practitioners who carry out their tasks in the various positions in the joint activity. What is often lacking is a dialogue between the management and the practitioners that would be based on the practitioners’ orientation and devotion to the development of the activity as a whole. In a formative Change Laboratory intervention, the separation between an overall view from outside and partial views from inside as well as subjective devotion and objective analysis are surpassed by helping the practitioners to jointly analyze and develop the whole system of the activity.

In contrast to action research, design experiment and other change intervention methods (Reason & Bradbury, 2001; Somekh, 2006; Noffke & Somekh, 2009, Brown, 1993, Collins, Joseph, & Bielachyc, 2004) that focus on solving an immediately visible problem or seek to realize a predefined objective, a formative Change Laboratory intervention entails successive cycles of identifying and formulating problems, questioning previous problem formulations and conceptions in the search for the core source of problems in the current structure and principle of carrying out the activity. A solution is sought for through an expansive reconceptualization of the object of the activity, like the change from carrying out specialized therapies in therapy sessions to making the students daily activity rehabilitative in the school example above. Such a reconceptualization also involves a change in the principle of carrying out the activity as well as the development of new tools, rules, and forms of division of labor. Even the external relationships of exchange and collaboration have to be reformed.

A formative Change Laboratory intervention combines specific, incremental improvements with a holistic new perspective on the long-term development of the activity. The distinction between the immediately visible surface and the underlying systemic structure of the activity, as well as the interplay between these levels, are central in the Change Laboratory intervention. The difference between the problem solving process in a change intervention and in a Change Laboratory intervention is concisely depicted in Figure 1.2.

Improvement and problem solving interventions begin with identifying a problem and proceed then to experimenting with, correcting and elaborating a solution idea (arrow 1→4 in Figure 1.2). In the Change Laboratory, the process moves from individual actions and immediately visible problems to the analysis of the systemic causes of the problems and proceeds to an expansive reconceptualization of the idea of the activity and reconfiguration of its structure. It then returns to the level of individual actions by developing and implementing corresponding new instruments, relationships of collaboration, rules, and principles of division of labor (arrows 1→2→3→4). The problem solving proceeded this way in the two examples of Change Laboratory intervention described above. The
CHAPTER 1

<table>
<thead>
<tr>
<th>Focus</th>
<th>Problems</th>
<th>Solutions</th>
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<tr>
<td>Invisible systemic structure of the collective activity</td>
<td>Disclosing the systemic causes of the visible problems in the activity.</td>
<td>Finding a way to overcome the problems by expansively reconceptualising the idea of the activity.</td>
</tr>
<tr>
<td>Immediately visible events and problems in individuals’ actions within the joint activity</td>
<td>Identifying the obvious (visible) problems</td>
<td>Taking new kinds of actions: implementing new instruments, rules, ways of dividing labor and collaborating.</td>
</tr>
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Figure 1.2. The difference in the problem solving processes of change intervention and Change Laboratory intervention

researcher-interventionists produced, in collaboration with the practitioners, empirical data about the current problems in the activity and provided conceptual tools for disclosing their origin and systemic causes and for creating a model of the future form of the activity, which the practitioners then tested, implemented and elaborated.

The Change Laboratory method is not aimed at producing just an intellectual solution or a change of practice, but also at building up the practitioners’ collaborative transformative agency and motivation based on a new understanding of the idea of the activity and a new perspective of its future development. To do that, the Change Laboratory intervention has to be based on the practitioners’ intensive collaboration on inquiring about the developmental challenges of and possibilities in the activity. The successive intervention sessions are carried out on a tight-enough schedule to ensure that the discussion continues and ideas accumulate from session to session. This is also supported by visualizing and documenting the collective thinking that takes place in the discussions in the Change Laboratory sessions.

The difference between change interventions and formative Change Laboratory interventions is related to the relationship between individual learning and the development of joint activity. When participating in an existing system of activity, an individual adopts some of the accumulated knowledge and skills of the work community. As incremental improvements are made in the activity system, the gradual development of the activity and individuals’ learning proceed hand in hand (Wenger, 1998). The relationship between learning and development seems different in our previous example of concept-level change in the fertilizer business. Some of the specialists and managers of the business began to analyze the origin and nature of the problems, not only in their own business, but also more broadly in the way farmers fertilized their fields. In this analysis, they observed and questioned the traditional method of applying fertilizers. They saw the possibility for a precise, need-based way of fertilizing that would be more economical and
environmentally sustainable. The new concept they created guided the practitioners’ sustained, collective learning and construction of a new form of the activity expanding the activity and their expertise beyond the boundaries of the previous form of the activity. In this case, individual and collective learning first took place in the collaborative inquiry into the origin and systemic causes of problems and possibilities of overcoming them. This learning, which preceded the practical transformation of the activity, opened up a new perspective on the development of the activity. When the practitioners were transforming the activity on the basis of the created new idea of the activity, their individual and collective learning increasingly took place through experimentation with new tools and forms of action based on the new idea and through solving problems encountered when changing the work practices. Engeström (1987, pp. 155-156) has characterized such expansive learning and developmental collaboration as ‘activity producing activity,’ as a new form of activity is created through it.

**Outcomes of Formative Change Laboratory Interventions**

Change interventions are customarily evaluated by measuring, before and after the intervention, those features of the situation that were highlighted in the predefined objectives of the intervention. The task of assessing the outcomes of a formative Change Laboratory intervention is more complex. First, the purpose of the intervention is not only to create a change in the activity but also, and more importantly, to deepen the understanding of the nature and causes of the problems in it. A successful Change Laboratory intervention thus leads to a reconceptualization of the problems and a new understanding of the activity thereby also bringing to the fore other aspects of its effectiveness and efficiency than those deemed important prior to the intervention. This process was clearly visible in the example of the intervention in the surgical unit described above. The problems in the unit were first seen to concern the efficiency of the surgical processes but turned out, in the Change Laboratory, to be much more complex and also related to practitioners’ experiences of meaning in and control of their work. Secondly, only a small part of the potential outcomes can be seen immediately after the intervention. At its best, a Change Laboratory intervention produces new concepts and solutions the utilization of which takes time and requires further work. When implementing the new ideas created in the Change Laboratory, the practitioners encounter obstacles due to contradictions between the dominant logic of the activity and the logic of the new concept of the activity. The new idea develops further through the creative resolution of these contradictions that are different in different contexts. The administrative consolidation of the new solution also often becomes possible only after a period of cultivation, enrichment and generalization of the original solutions created in a Change Laboratory. The generally applicable core of the new idea becomes crystallized in such processes of creative implementation.

The results of a Change Laboratory intervention are initially local, although with the potential for becoming general. Therefore, their spread and diffusion often
CHAPTER 1

takes place as further development and enrichment rather than as direct transfer and copying of the created solutions. The created new concepts and the methods used to produce them can be used as resources in other units for analyzing local problems and creating a locally appropriate solution. Table 1.1 below summarizes the difference between change interventions and formative Change Laboratory intervention (modified from Engeström, 2011, p. 606).

Table 1.1. The difference between change interventions and formative Change Laboratory interventions

<table>
<thead>
<tr>
<th>Aspect of the intervention</th>
<th>Change intervention</th>
<th>Formative Change-Laboratory intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object</td>
<td>A local practice or habitual way of acting of a group.</td>
<td>A historically developing system of collaborative activity.</td>
</tr>
<tr>
<td>Starting point</td>
<td>The researcher defines the problem, content and goals of the intervention.</td>
<td>Contradictory demands, which the participants encounter in their vital life activity.</td>
</tr>
<tr>
<td>Process</td>
<td>The subjects are expected to experiment with a given solution. Difficulties are seen as weaknesses in the solution that call for refining it.</td>
<td>The content and course of the intervention are subject to multi-voiced negotiation. The subjects gain agency in the process and eventually take charge of it.</td>
</tr>
<tr>
<td>Outcome</td>
<td>The full or partial reaching of the pre-established goal. A solution that can be as such transferred to other settings.</td>
<td>New concepts that may be used as instruments of analysis and problem solving in other settings. Participants’ transformative agency.</td>
</tr>
<tr>
<td>Researcher-interventionist’s role</td>
<td>Owns, designs and controls the process.</td>
<td>Provokes and sustains a collaboratively led expansive transformation process.</td>
</tr>
</tbody>
</table>

A Change Laboratory intervention can be seen as an interface between two worlds, the researcher-interventionists’ world of research and development, and the practitioners’ world of productive work. Both the researcher-interventionists and the practitioners have their histories that have formed their interests, knowledge and skills before the intervention. This is equally true for their respective broader communities and the discourses in them that provide resources for the individual members of the communities. The Change Laboratory intervention can be seen as a dialogue and a process of co-production between the representatives of these two worlds.

The dialogue and collaboration between practitioners and researchers already begins during the preparatory discussions and the joint formation of the idea of the coming Change Laboratory intervention. In the intervention, a new understanding is produced about the nature and origin of the problems in the activity as well as about a way forward. Problems that are insoluble for individual practitioners and paralyze their initiative are solved collaboratively at the level of the joint activity.
Thus, the Change Laboratory builds transformative agency among the participants; however, the significance of the outcomes of the Change Laboratory intervention is largely determined through their subsequent nurturing, support and further development in the organization (Kajamaa, Kerosuo, & Engeström, 2010, p. 135; Engeström, Kerosuo, & Kajamaa, 2007b).

For the researcher-interventionists the immediate outcomes of the Change Laboratory process are new insights, ideas and challenging problems of theory and method. The intervention also generates rich sets of research data about the activity and its transformation in the form of recorded Change Laboratory sessions, interviews, ethnographic observations and statistical indices about the activity. The analysis of the collected data partly takes place already during the intervention, but the researchers typically continue and deepen the analysis after the intervention in order to find answers to theoretical problems and to develop new insights and concepts. In some cases, the dialogue between researchers and practitioners continues after the Change Laboratory intervention and develops into a longstanding partnership of collaborative learning and development.
CHAPTER 2

THE CHANGE LABORATORY—AN INSTRUMENT FOR AGENCY BUILDING AND EXPANSIVE LEARNING

This chapter presents an overview of the Change Laboratory method. The instruments and process of a Change Laboratory intervention will be explained as well as the dynamic socio-cognitive processes that take place in it. The chapter also describes the origin of the method and its variants.

DESCRIPTION OF THE CHANGE LABORATORY METHOD

The Setting and the Tools of the Change Laboratory

The Change Laboratory is a formative intervention method for developing work activities by the practitioners in collaboration with researcher-interventionists. It is also a tool kit for envisioning, designing, and experimenting with new forms of work and a social setting in which this can be done. A Change Laboratory intervention is typically conducted in a pilot unit of an activity that is in need of a major transformation. The practitioners and managers of the unit work intensively together with a small group of researcher-interventionists in five to twelve successive Change Laboratory sessions to analyze and specify the challenges of developing the activity and creating a new model for it. A number of follow-up sessions are typically carried out after the initial experimentation and implementation of the new model some months later.

The collaborative analysis and design work in the Change Laboratory is supported by a 3x3 set of surfaces for representing the work activity that help the group to share and jointly process their observations and ideas (see Figure 2.1). The surfaces are divided horizontally into three columns, which allow the participants’ work activity to be represented on different levels of abstraction and systemic integration. In the vertical dimension, the surfaces are divided into rows representing the past, present, and future of the activity.

The mirror surfaces of the right-hand column are used to provide the practitioners with a mirror reflection of their activity by presenting specimens of the current practice and first hand data concerning the activity to be jointly examined. The Mirror/Present 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 as well as cases that enable the analysis of ruptures in the coordination and collaboration between actors. The mirror of the past comprises data and
observations concerning historical changes in the activity. The mirror of the future is used to represent and discuss follow-up data concerning participants’ experiments with the new concepts and tools, which they have created and with which they begin to build the future form of the activity. It can also be used to present data of anticipated changes in the object and structure of the activity.

![Diagram showing past, present, and future phases of activity](image)

*Figure 2.1. A prototypic layout and instruments of the Change Laboratory space (Adapted from Engeström et al., 1996, p. 11)*

The Model/Vision surfaces in the left hand column are reserved for modeling the past, present and future structure of the activity and inner contradictions in it. The triangular model of activity system is used to analyze and model the systemic structure of the activity and interconnections within it. Systemic roots of specific but recurring problems and disturbances are traced and conceptualized as inner contradictions in the structure of the activity. In addition, a general model of the phases of expansive transformation of an activity can be used on this surface to enable the participants to analyze the current and projected next stage of the
evolution of their activity. These models will be explained in detail in the next chapter.

When analyzing problem situations and designing a new model for the work activity, the practitioners need such intermediate cognitive tools 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. The Ideas/Tools surfaces are reserved for representing these as well as the insights the participants gain as they move between the experiential mirror and the theoretical model/vision surfaces.

The Change Laboratory Process

The Change Laboratory process can be divided into six main phases as described in Figure 2.2. Each phase consists of finding answers to specific questions in the analysis, design and implementation process. However, the collaboration between the researcher-interventionists and the practitioners begins before the first session in the discussions and interviews with the participants and the representatives of the client organization as well as in the collection of ethnographic data about the activity that is necessary for the preparation of the process.

![Figure 2.2. The phases of a Change Laboratory process (Adapted from Engeström et al., 1996, p. 11)](image-url)
Figure 2.3: The use of surfaces of representation in a possible course of the analysis and design in the Change Laboratory (see explanation below).

<table>
<thead>
<tr>
<th>MODEL/VISION</th>
<th>IDEAS/TOOLS</th>
<th>MIRROR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FUTURE</strong></td>
<td>7 Visioning the future structure of the activity system in which the current contradictions would be overcome.</td>
<td>8 Modelling the new tools and ways working necessary for realizing the vision. Designing first experiments with the new tools and new ways of working.</td>
</tr>
<tr>
<td><strong>PRESENT</strong></td>
<td>6 Modelling the most important changes taken place in the elements of the activity system as well as historically evolved inner contradictions the changes have created within the activity system.</td>
<td>2 Shared concerns, identified problem areas in the joint activity. Ideas for further analysis. Solution ideas to identified problems.</td>
</tr>
<tr>
<td><strong>PAST</strong></td>
<td>5 Modelling the central features of the past structure of the activity. Analyzing the nature of the current phase of the transformation of the activity.</td>
<td>4 Identification of periods and turning points in the development of the activity.</td>
</tr>
</tbody>
</table>
After the preparations, the Change Laboratory process begins with a discussion of the mirror data that demonstrates challenging and problematic aspects of the current activity. The participants observe the mirror data and relate the presented data to their own experiences and views (1. Mirror/Present). After participants’ observations and comments have been collected, the discussion can move to identifying the most important problem areas needing further investigation and possible solutions (2. Ideas/Tools/Present). In order to understand how the problems have emerged, the participants collect data and observations concerning changes that have taken place in the systemic structure of their activity and record them (3. Mirror/Past). The collected data and observations concerning changes are then analyzed to identify times and phases in which the rate of change was especially fast and to investigate the causes of and connections between the observed changes. Through this analysis, the actors can identify periods in the development of the activity system and the last time when the activity system was relatively coherent and stable (4. Ideas/Tools/Past). The past form of the activity can then be modeled by characterizing the specific nature of the elements of the activity system at that time (5. Model/Vision/Past).

A model of the current activity system can then be constructed by identifying the elements of the activity in which major qualitative changes have taken place and those in which there has been relative little change. The relationships between changed and unchanged elements of the activity system suggest a possible contradiction between those elements in the systemic structure of the activity. The analysis of inner contradictions in the systemic structure of the activity can be further clarified by discussing the nature of the current phase in the development of the activity with the help of the model of expansive transformation of an activity. Based on these analyses, the participants can create a hypothesis concerning the inner contradictions in the systemic structure of their activity that could explain the problems and disturbances they encounter in their daily work (6. Model/Present) and test it by comparing the hypothesis to the empirical observations in the mirror.

Overcoming the identified contradiction(s) defines the design task to be accomplished in the collaboration between the researcher-interventionists and the practitioners. Materials and ideas for the new solutions are already partly created in the discussions concerning the mirror data. Besides this, the participants can search for models from theories concerning the activity and examples of other, in some respects more advanced, local instances of the same or a comparable activity. The design process then proceeds in two directions. The participants have to develop a vision of the future form of their activity (7. Model/ Vision/Future), and decide on a few new, key forms of actions and new tools with which they will begin to experimentally realize the vision (8. Ideas/Tools/Future).

The change does not take place in a simple linear process. Besides successes, the first experiments with new tools and forms of acting typically reveal aspects of the current practice that the actors had not noticed when planning the solution and create new contradictions that have to be addressed. Therefore, qualitative follow-up data has to be collected from the first experiments to determine what aspects of the idea of the new form of the activity turned out to be feasible, and what changes
and further development are needed to progress in the development of the activity. Based on the follow-up data (9. Mirror/Future), both the vision and the practical tools are developed further.

Although it is important that a work community should work intensively together in the Change Laboratory, the idea is not that they should do it as an isolated group. Rather, they should be in contact with other members of the organization and discuss their insights of the systemic causes of problems and their ideas for the new form of the activity and for new tools and organizational arrangements as well as experimentation with new tools during the respective phases of the process.

**Socio-Cognitive Processes Called for in the Change Laboratory**

The Change Laboratory setting and tools are designed to support the many complementary forms of emotional and intellectual processing necessary for transforming work practices.

![Figure 2.4. Socio-cognitive processes called for in the Change Laboratory (Engeström et al., 1996, p. 14; reproduced with permission from KVS Foundation)](image)

The socio-cognitive processes in the Change Laboratory include emotional confrontation of problems, distanced intellectual analysis, and collective recollection and reconstruction of the path to the current situation. Imagining and
Box 2.1. The interplay between emotional confrontation and intellectual analysis in a Change Laboratory session

Many of the socio-cognitive processes depicted in Figure 2.4 can be seen in the following condensed excerpt of a discussion in a Change Laboratory in a department of a daily paper. The participants are the deputy head of the department (A), copyeditors, as well as journalists and former typesetters who laid out the pages. The roles of supervisor, writing journalist, and copyediting journalist rotated among the journalists, who worked in shifts.

The researcher had hung on the wall the pages of the day’s paper, which the participants had produced on the previous evening, to begin a discussion about the differences in the news stories. However, a major disturbance had taken place in the workplace on the previous evening. At the beginning of the session, the researcher asked, how the participants felt about the process. The following is a condensation of part of the discussion that followed:

1 A: We should have more people.
2 B: On Monday, the supervisor had a hard time.
3 A: A problem of division of labor, but the supervisor should venture to ask for help.
4 C: Copy editors have begun to write their own stories.
6 D: But then, the 12 o’clock shift is a combined writing and copyediting shift. It was created as a compromise to have somebody to check the stories earlier.
7 F: There is always the rush [in the evening].
8 D: Helping to prepare the main story.
9 C: We don’t have too few copyeditors but they use too little time for copyediting.
10 A: I admit, but – we speak of this specific story [points to the wall to a page of the newspaper] – it was my mistake that the copy editor was sent [to a press conference]. I should have understood that he did not have time to do anything else – nobody did [understand].
11 G. But the layout was finished at 8 o’clock [in good time]
12 A: Yes, people do exceed themselves. It was my lack of experience, but it was also the foolishness of the supervisor not to ask for help.
13 D: The supervisor has no time to beg people to work overtime.
14 C. The process has not been developed from the point of view of layouting.

A’s comment in row 1 was her conclusion of the previous turns of talk, which participant B concretized in row 2. B’s comment brought the tensions of the previous night to the session. A blamed the supervisor about the disturbance (row 3) and herself (row 5). The blaming reveals A’s emotional involvement. However, it seems that it also provoked a distanced reflection on the shift system: In row 4, C points to a change that had taken place in the practice. In rows 6-9 participants D and F explain why the 12-o’clock shift, which was involved in the disturbance process, was created in the first place. In row 10, C redefines the problem, which A had defined (row 1). In row 11, A specifies the previous night’s disturbance process by pointing to the news story on the page of the paper, the production of which had caused the problem, and continues to blame himself in rows 12-14, 16, and 17. G and D (rows 15 and 18) question the feasibility of the individual-centered solution of asking for help that A proposed in rows 3 and 17. In row 19, participant C turns the talk again to the shift system saying that it was not developed from the point of view of the layouting.
CHAPTER 2

projecting into the future, as well as modeling a new solution, and committing to its implementation are also important aspects of this process. The roles of the Change Laboratory instruments in supporting these processes are depicted in Figure 2.4.

The socio-cognitive processes take place in the Change Laboratory in the participants’ and the researcher-interventionists’ multi-voiced dialogue in which all the participants learn from each other. The public discourse in the sessions reflects and supports individual participants’ inner processing of the conflicts between their various motives that the analysis of the activity and the discourse bring forth or aggravate. When coming to a laboratory session, the participants change their focus from carrying out their current tasks in the productive activity to the analysis and development of the structure and processes of their joint activity still, however, having in mind the concrete situations and emotional tensions experienced in carrying out the daily work actions.

The instruments of the Change Laboratory make it possible for the participants to move between concrete observations concerning individuals’ actions and the structure of the joint activity in which the actions are taken as well as to compare and identify differences in the past, present and future forms of the systemic structure of the activity. No real development and change can take place without emotionally confronting the unpleasant facts of the current activity, such as failures and disturbances and difficult, unsolved problems. The mirror in the Change Laboratory makes such confrontations possible. On the other hand, mirror data such as a video recording of a work situation in which problems and disturbances occur, or customers’ critical comments can be emotionally difficult for the participants to confront and accept if they do not also have tools for distancing themselves from the situation presented in the mirror and for analyzing it intellectually. On the other hand, a purely intellectual analysis without emotional involvement lacks the motivational power and dynamic necessary for the practitioners to work out a solution to a difficult problem and change the current practices.

THE HISTORICAL BACKGROUND OF THE CHANGE LABORATORY METHOD

The Developmental Work Research Methodology

In Finland in the late 1970s, there was a great need for in-service training of personnel in both private firms and public administration units. The need arose from the implementation of new legislation and new planning and control systems that were necessary to manage growing businesses and to administer the expansion of the welfare state services. In this situation, a new kind of collaboration evolved between a group of human resource development practitioners and an academic researcher, Yrjö Engeström; both were interested in applying the ideas of Cultural Historical Activity Theory to personnel training. The collaboration resulted in a new, broadly applied approach to in-service training (Engeström, 1982, 1994).
In the application of the new approach, it soon became evident that training individual people was not an effective way to develop collective work practices. The object of the researcher-practitioner collaboration expanded from training to the development of work activities and from the application of psychological and pedagogical theories to the application of sociological theories of work and organization. In addition, the number of researchers and practitioners taking part in the collaborative development expanded. In it, a new approach to the research and development of work activities was developed through a critique of existing, ahistorical and individual-centered approaches and the construction of an alternative on the basis of the Cultural Historical Activity Theory. The new approach was called Developmental Work Research (DWR) (Toikka, Engeström, & Norros, 1985; Engeström & Engeström, 1986).

Yrjö Engeström elaborated the theoretical basis and the principles of the DWR methodology and created the related theory of expansive learning in his dissertation, “Learning by Expanding” in 1987. Several large studies applying the methodology were carried out between 1986 and 1995, many of which were published as dissertations. In all these studies there was, in one way or another, collaboration between practitioners, a DWR researcher, and researchers or professional specialists in the area of activity in question. In 1995, Yrjö Engeström published a review and analysis of these studies and drafted further possibilities of the development of the methodology, in particular the need for exchange of experiences, results, and ideas in the growing and increasingly multidisciplinary and heterogeneous (academicians and practitioners representing different industries) DWR community. The exchange and the development of the methodology was amplified through the activity of the Center for Activity Theory and Developmental Work Research that Yrjö Engeström established with his colleagues in 1994 at the University of Helsinki. (In 2008 the center merged with another research center of the same university, the Centre for Research on Networked Learning and Knowledge Building and became the Center for Research on Activity, Development and Learning, CRADLE (http://www.helsinki.fi/cradle/index.htm).

Combining research and the development of work practices is difficult because of the different time span and rhythm of these two activities. The first DWR projects took several years. Because of the time researchers needed for the analyses, the time intervals between workshops with the practitioners could be so long that the practitioners had already forgotten much of the content of the discussions in the previous workshop with the researchers when they came to the next one.
CHAPTER 2

Box 2.2. The first DWR study in the early 1980s

The basic ideas of DWR were evident in the first DWR study of cleaners’ work in a commercial cleaning firm (Engeström & Engeström, 1984):

1. The system of collaborative activity as the unit of analysis and development;
2. Parallel analysis of the current practice on three levels: the system of the activity, individuals’ work actions, and the operations, through which the actions were realized;
3. A historical analysis of the qualitative change of the principles of the activity (from craft-type home cleaning to industrial cleaning);
4. An analysis of cleaners’ conceptions of the meaning and proper way of cleaning;
5. The use of video recordings of cleaners’ work practices and stimulated recall interviews, in which the cleaners viewed the videos taken of their work and explained why they acted as they did and what they thought was important in carrying out the work task.

The central observation in the study was that many of the problems and disturbances in the cleaners’ daily work were caused by a contradiction between their work orientation that was based on home cleaning and the logic of the industrial cleaning work they were carrying out. A new training program was designed that was based on the explication of this difference and elaborated the meaning and principles of industrial cleaning. The training had a remarkable effect on the quality of cleaning and cleaners’ occupational health and well-being.

The Change Laboratory as a Method for Carrying out Developmental Work Research

In the middle of the 1990s, based on experiences gained in DWR projects and the observations he had made in his research project, “Learning and Expertise in Teams and Networks,” Engeström crystallized an assessment of the needs of the development of work activities in five points. According to him, there was a need

- to bring work redesign closer to the daily shop floor practice while still keeping it analytical—a new dialectic of close embeddedness and reflective distancing;
- to bring together practice-driven redesign of processes and idea-driven construction of visions for the future—a new dialectic of specific improvements and comprehensive visions;
- to bring the multiple parallel rhythms of development in work to closer interaction—a new dialectic of long, medium, and short cycles of change;
- to bring together the tools of daily work and the tools of analysis and design—a new dialectic of instrumentalities, and
- to bring together the resources inherent in the existing work practices and the new ideas and concepts used to take up new challenges and to develop new products and services—a new dialectic between tradition and innovation (Virkkunen, Engeström, Helle, Pihlaja, & Poikela, 1997, p. 158).
The Change Laboratory was created to meet these challenges. The first Change Laboratory interventions were carried out in the mid 1990s by researchers of the Center for Activity Theory and Developmental Work Research at the University of Helsinki within single organizations or units of organizations (Engeström et al., 1996). Later the Change Laboratory has increasingly been used to solve problems of inter-organizational coordination and collaboration and a number of variants of the method have been developed.

In a Boundary Crossing Change Laboratory, members of two or more organizations study jointly the causes of ruptures and disturbances in the coordination of their actions concerning their shared clients and develop new concepts and tools to manage their collaboration. Engeström, Engeström, and Vähäaho (1999) carried out the first Boundary Crossing Change Laboratory in Helsinki between the staff (managers, doctors and nurses) of a health center that provides primary health care, and the staff (managers, doctors and nurses) of hospitals that provide specialized care. The goal was to solve problems of coordination and communication in the care of chronically ill patients with multiple diseases who were receiving care from the health center and from several units of specialized care. A new model of a flexible system of planning and following up the distributed care of a patient called a Care Agreement was created in this intervention. The model is based on the idea of object-oriented knotworking in which the patient’s “own doctor” in the primary health care, the involved specialists of specialized care, the patient, and members of patient’s family meet to define the needs of care and to create, through mutual negotiation, a shared care plan and agreement on the division of labor and responsibility in carrying out and following up on the patient’s health and care. The concept of knotworking was also central in the new form of collaboration between the library and research groups created in the recent Boundary Crossing Change Laboratory at the University of Helsinki Library (Engeström, Kaatrankoski, Kaiponen, Lahikainen, Laitinen, Myylls, Rautavuori, Sinikara, 2012; Engeström, Rautavuori, & Kerosuo, 2013).

An ambitious Boundary Crossing Change Laboratory was carried out in 2004-2006 by the research team of the firm Web Research in the apple industry in the Hawke’s Bay area in New Zealand between government agencies and a variety of small and medium-sized firms carrying out different functions in the industry. The purpose was to find a solution to the use of illegal seasonal labor force in the industry. A new, shared policy of quality-oriented apple production was created and implemented in the intervention (Hill, Capper, Wilson, Whatman, & Wong, 2007).

An Implementation Change Laboratory process was designed and carried out for supporting the implementation of the new tools and practices created in the health care Boundary Crossing Change Laboratory mentioned above. In this Change Laboratory the practitioners analyzed and solved problems in the use of the new system on the basis of case data (Kajamaa, 2011a; Kerosuo, 2001, 2003, 2004, 2006; Kerosuo & Engeström, 2003).

A number of other, more specialized Change Laboratories have also been developed. Engeström, Engeström and Suntio (2002a) carried out a Change
Laboratory in a middle school in 2000-2001. The development work was continued in a Knowledge Work Change Laboratory that focused on changing the instructional practices in the school by incorporating the use of information and communication technologies in pilot curriculum units (Engeström, Engeström, & Suntio, 2002b). The specific feature of the laboratory was the joint, data-based analysis of teaching in the pilot curriculum units using a model of types of school instruction.

Heli Ahonen (2008) has developed a special version of Change Laboratory to be used as an instrument of knowledge and competence management. The focus in this Competence Change Laboratory is on the analysis of a work team’s current learning challenges and the development of new learning practices adequate to meet the challenges (Ahonen, 2008; Virkkunen & Ahonen, 2004). The need for the development of learning practices arose from the observation that in a rapidly changing activity, the specialists cannot plan and configure the ways of carrying out the operative work in detail and the practitioners have to learn to master the changing situations themselves collaboratively. The Competence Change Laboratory is a condensed and more standardized version of Change Laboratory, which the human resources specialists of the firm can be trained to carry out.

Marianne Teräs used a version of Change Laboratory to develop intercultural collaboration in immigrants’ training. The special feature of this Culture Change Laboratory was the parallel education and reflective development of the intercultural educational process by making the tacit cultural expectations visible and discussable (Teräs, 2007; Teräs & Lasonen, 2012).

A specific version of the method has been created in the Finnish Institute of Occupational Health for helping work communities to prevent and deal with problems of occupational health and work-related well-being in the midst of a transformation of their work activity. This Change Workshop applies a specific theory of occupational health and well-being developed by Jorma Mäkitalo (2005) on the basis of the Cultural Historical Activity Theory.

Merja Helle and Maija Töyry (2009) have developed a variant of the Change Laboratory method, which they call a Media Concept Laboratory, for helping media organizations reorient their activity in the midst of the digital revolution. The laboratory utilizes an explication of the key elements of a ‘media concept’, e.g., a media firm’s business concept. Versions of the Change Laboratory have also been created for firm-specific developmental processes.

Change Laboratory interventions have been carried out in many different fields of activity such as education, health care, social welfare, media, industry, retail trade, banking and insurance, as well as in agriculture. Interventions have been carried out in many other countries and cultural contexts besides Finland, which attests that the method is applicable in different cultural contexts as long as the participants can freely express their opinions.

Change Laboratory is also a tool for crossing the boundary between research and practice and between developmental work research and the research concerning the activity in which the Change Laboratory method is applied. A good example of this is the collaboration between pest researchers, Developmental Work
Research researchers, and local tomato growers in a Change Laboratory intervention carried out in a tomato-growing village in the Närpiö municipality in Finland to find a way to overcome the growers’ aggravating pest problem (Vääninen, 2012; Vääninen, Pereira-Querol, Forsström, & Engeström, 2011).

As developmental research, Change Laboratory interventions are expected to contribute to both the accumulation of scientific knowledge and the development of the local activities in which they are carried out. This is made possible through the dialogue and collaboration between researchers and practitioners. They learn from each other in the joint, data-based analysis of the activity and the formation of new concepts and tools to master its future.

As a research instrument, the Change Laboratory can produce unique data about specific historical challenges and possibilities of development of a local activity and even a type of activity, as well as new concepts and solutions for meeting these challenges. Furthermore, it provides rich data about the processes of concept formation as well as individual and collective learning and development.