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POST-INDUSTRIAL INTERVENTION

An Activity-Theoretical Expedition Tracing the Proximal Development of Forms of Conducting Interventions

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Cover
Persons in the pictures situated farther out are:
upper left: Frederick W. Taylor (1856–1915),
lower left: Charles E. Bedaux (1887–1944),
upper right: Kurt Z. Lewin (1890–1947) and

Persons in the pictures farther in are:
upper left: Peter F. Drucker (1909–2005),
lower left: Marvin Bower (1903–2003),
upper right: Mara Selvini Palazzoli (1916–1999) and
Dragim članovima moje porodice:
occus Miloradu, majci Milici,
bratu Zoranu i sestri Zorici

To my father Milorad, my mother Milica,
my brother Zoran and my sister Zorica
Abstract

The purpose of this study is to investigate which forms of conducting interventions could effectively address a qualitatively new type of problems (‘post-industrial problems’) which are located between activities and which cannot be resolved by adapting standard solutions. This is achieved by combining a historical-analytical investigation with an empirical-experimental investigation. The historical-analytical part commences by investigating the origin of forms of conducting interventions with a unit of analysis for the further procedure as an outcome. The unit of analysis serves as the basis for the analysis of some selected past and contemporary forms of conducting interventions. This leads to the comprehension of the historical dynamics of forms of conducting interventions, including a historical hypothesis of a zone of proximal development. The empirical-experimental part takes the study from the comprehension of the current state to a discussion of a qualitatively new form of conducting interventions that could address post-industrial problems effectively. Concrete characteristics of an example of a new form of conducting interventions are identified by following the developmental trajectory of theoretically interesting cases that experiment with new models of intervention. The Change Laboratory method is used to analyze and support the development in the central empirical case, a New Zealand-based research-consultancy hybrid.

The historical analyses suggest that intervention activity has its roots in societal problem-solving processes, that is, innovation and diffusion processes, associated with periods of radical change in work and organizations, such as those occurring during technological revolutions. In the majority of the 20th century a clear-cut societal division of labor between established types of conducting interventions can be observed: (1) ‘Scholar-entrepreneurs’ developed and tested innovative solutions for the efficient operation of factories, effective strategic management of multinational corporations and ICT infrastructure for supporting work processes in companies. (2) Large efficiency consultancies, management consultancies and IT consultancies took up these organizational innovations and focused on adapting and disseminating solutions that entailed a fundamental change in the logic of client activities. (3) After the unbalanced top-down implementation of fundamental organizational innovations (with regard to efficiency, strategy/structure or ICT)
problems such as Human Relations, weak cooperation or weak quality emerged or were aggravated. These problems were often addressed by intervention-oriented research centers, which relied on methodologies for creating innovative solutions. (4) In times of societal turmoil, government agencies were involved in organizing state interventions that diffused standardized solutions for partial organizational problems (e.g., in Human Relations or regarding quality issues) to a large number of work activities and by this provided the means to alleviate situations.

With the emergence of complex network organizations and post-industrial problems at the end of the 20th and the beginning of the 21st century, the need has increased for new forms of conducting interventions (‘post-industrial’ forms) which (1) combine a focus on creating innovative solutions with a focus on adapting and disseminating solutions, as well as (2) combine the focus on fundamental change in the logic of work organization with the focus on balanced transformation.

In the analysis of selected experiments on conducting interventions, variants of Developmental Work Research are identified as possible instruments of post-industrial forms. A dynamic network of activities that contribute to a joint problem-solving process is identified as a possible community arrangement of post-industrial forms. This study argues that the creation of solutions can develop a more disseminating character and the dissemination of solutions a more creative character, if intervention activity is not organized within the boundaries of one consultancy firm or research center, but is instead carried out by a network of actors and organizations.
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1 Introduction

1.1 The emergence of post-industrial problems in work and organization and the question of addressing them through interventions

Take Ford’s factory practices, add Sloan’s marketing and management techniques, and mix in organized labor’s new role in controlling job assignments and work tasks, and you have mass production in its final mature form. For decades this system marched from victory to victory. The U.S. car companies dominated the world automotive industry, and the U.S. market accounted for the largest percentage of the world’s auto sales. Companies in practically every other industry adopted similar methods, usually leaving a few craft firms in low-volume niches. (Womack et al. 1990: 43)

In this citation from their famous book exploring the past, present and future of the automobile industry, Womack, Jones and Roos characterize the production paradigm that has dominated the 20th century: mass production. Gary Hamel (2007: 151) crystallizes the main features of the mass-production paradigm into six management principles:

1. Standardization by minimizing variances from standards around inputs, outputs, and work methods in order to cultivate economies of scale, and also to achieve efficiency, reliability, and quality.
2. Specialization (of tasks and functions) by grouping similar activities together in modular organizational units in order to reduce complexity and to accelerate learning.
3. Goal alignment by establishing clear objectives through a cascade of subsidiary goals and supporting metrics in order to ensure that individual efforts are congruent with top-down goals.
4. Hierarchization by creating a pyramid of authority based on a limited span of control in order to maintain control over a broad scope of operations.
5. Planning and control, first by forecasting demand, budgeting resources, and scheduling tasks, and secondly by tracking and correcting deviations from plan in order to establish regularity and predictability in operations as well as to establish conformance to plans.
6. Extrinsic financial rewards to individuals and teams for achieving specified outcomes in order to motivate effort and to ensure compliance with policies and standards.

Since the last decades of the 20th century, however, we can chart a period of radical change in human work activities and society as a whole. It appears to be a time of revolutionary new possibilities based on information and communication technology (ICT) (Freeman and Louçã 2001: 301–302). New possibilities in the ‘Computerization wave’ cannot, though, be fully utilized within the mass production paradigm (Freeman and Louçã 2001; Perez 2002; Benkler 2006):
The world of computers, flexible production and the Internet has a different logic and different requirements from those that facilitated the spread of the automobile, synthetic materials, mass production and the highway network. Suddenly, in relation to the new technologies, the old habits and regulations become obstacles, the old services and infrastructures are found wanting, the old organizations and institutions are inadequate. A new context must be created. (Perez 2002: 42)

While society as a whole seems to be entering a new ‘post-mass production’ or ‘post-industrial’ era, considerable uncertainty remains with regard to the effects and forms of utilization of the new possibilities. It is unclear whether a new ICT-based production paradigm will emerge or what it will look like. Indeed, it could be that a variety of production paradigms will emerge. As Perez describes, uncertainties concerning the utilization of new technologies do not articulate themselves solely through technological problems, but also through social and organizational quandaries (Perez 2002: 41–43; see also Venkatraman 1991: 122–128).

Heckscher et al. relate the shift from industrial to post-industrial era to the emergence of a qualitatively new type of social and organizational problem (2003: 11–13; 180–183). Analyzing the cases of AT&T, FS (the Italian Railroad) and other large traditional corporations, they observed that old ‘stakeholder relations’ (e.g., between management of corporations, unions, and government agencies) shift to a completely new regime of stakeholder relations, which they call ‘post-industrial relations’:

What is happening now is the dissolution of the existing stakeholder regime under the pressures of new actors and economic forces. The familiar pattern of periodic negotiations is losing favour everywhere as economies move toward a focus on knowledge and complex services, requiring a high level of “co-production” among many actors rather than vertically-integrated mass production. So the […] problem shifts from how to shore up and stabilize an existing regime, to how to catalyze the transition to a new set of relations. (Heckscher et al. 2003: 12)

While Heckscher et al. analyze large, traditional corporations in the US, France and Italy, they claim that the shift from the industrial era to a post-industrial era is a pervasive international phenomenon related to similar economic forces (2003: 180–182).

To make it easier to highlight the main characteristics of a qualitatively new type of problem, a further example is taken from the ‘edge of the world’ – New Zealand:1 After a longer period of deregulation in New Zealand’s public sector during the 1980s and 1990s, relations between government agencies and small and middle sized enterprises (SMEs) became increasingly complex, difficult to control and even more difficult to optimize to allow benefits to be achieved for all involved parties. The negative consequences of deregulation and emerging new

---

1 The example forms part of an empirical case study by the author, which will be addressed in detail later in this thesis.
possibilities in the Computerization wave led to a growing debate about how best to identify new forms of collaboration between SMEs and government agencies, with the overall purpose of ‘enabling SME’s to thrive in a regulated world’. There was no existing model to deploy as a guide for such collaboration; nevertheless a new model had to be developed (see Hill et al 2007; chapter 10).

In the following, Heckscher et al’s examples, together with the example from New Zealand, are complemented by theoretical reflections on current developments in work activities. The discussion concludes with a preliminary characterization of the qualitatively new type of social and organizational problem:

(1) As far as the case from New Zealand is concerned, problems could not be solved by individual actors or activities. The problem was located between actors and activities, which made it necessary to address the whole structure and function of collaborating individuals and systems. The same situation can be found with regard to problems in complex production processes. Contemporary production is increasingly carried out between organizations in various less formally structured networks. Scholars such as Lee and Roth argue that work activities become even less bounded ‘patchwork’ entities, in which shifting relations, contexts and alliances are a prominent feature (Lee and Roth 2003: 122). Correspondingly, today’s social and organizational problems are more often located between settings of multiple actors and activities, making it necessary to deal with complex networks of collaboration involving higher numbers of individuals and systems.

(2) In the cases studied by Heckscher et al., social and organizational problems were found to contain radically new elements – e.g., new kinds of relations with emerging new actors. Due to multi-actor and multi-activity settings, and also due to new possibilities in the Computerization wave, today’s social and organizational problems increasingly involve such new elements. At the same time, Heckscher et al. found that more familiar repeating patterns still persisted – that is, older stakeholder relations and other mass production patterns had not ceased to exist. Due to globalization as well as to the related size and international extension of multinational companies, there is a need to manage a large number of different units with similar tasks and technologies (e.g., standardized information systems) all over the globe (Ciborra and Failla 2000: 119–120). Mass-production principles such as standardization have not disappeared but are applied in changed contexts and have developed different forms. Correspondingly, today’s work activities and today’s social and organizational problems continue to show many repeating patterns.

The somewhat paradoxical conclusion is that emerging social and organizational problems more often exhibit, simultaneously, radically new elements and former patterns.

In the context of discussion about these previously identified problems, Heckscher et al (2003:11, 180) refer to ‘post-industrial relations’ and a ‘post-industrial
shift’. The qualitatively new type of social and organizational problem, typically situated between actors and activities, and characterized by the somewhat contradictory combination of radically new and repeating aspects, will be termed ‘post-industrial problems’ in this study.\(^2\)

Heckscher et al. do not end with a description of these problems. Their core question is directed at the issue of whether they as interventionists can make a contribution that addresses the qualitatively new type of problems (2003: 12). In the example from New Zealand, the emerging problem was also addressed by an intervention that involved external actors. The orientation on interventions is taken up and generalized. The governing question in the present study is correspondingly formulated as follows:

*What forms of conducting interventions\(^3\) are needed to address post-industrial problems effectively?*

At first glance, the means of arriving at an answer to this question might seem quite simple: To analyze developments within the area of theory and practice of the currently dominant type of activities that specialize in conducting interventions aimed at dealing with social and organizational problems – Management consultancy and IT consultancy.

### 1.2 Interventions conducted by consultancies and post-industrial problems

The last decades of the twentieth century witnessed rapid growth in the Management and IT consulting industry. Until the economic slowdown started in 2000, the worldwide market for consulting products increased between 10 and 15 per cent each year, exceeding by a considerable margin the global gross domestic prod-

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\(^2\) Certain differences exist between Heckscher et al’s comprehension of a qualitatively new type of problem and the comprehension of this study. Heckscher et al. focus dominantly on ‘human relations’ between actors, while in this study the focus is also on ‘non-human relations’ (e.g., relations between new forms of technology and human actors), as well as on relations between entities larger than actors, such as whole activities or organizations. These differences will be addressed in Chapter 11.

\(^3\) In this study the term ‘forms of conducting interventions’ is a central expression used to describe the activities that conduct interventions. The term intends to capture the *methods and tools of conducting intervention* but also the *logic of the community arrangement* that supports the activity of conducting interventions (the organizational form). A ‘form of conducting interventions’ is *not necessarily a single system* but could also be a network (or a kind of ‘formation’) that supports the conduction of interventions. This expression is chosen to make it possible to capture diverse examples of the activity of conducting interventions in reference to its historical and current development. To find out which historical and contemporary examples of ‘forms of conducting interventions’ existed, or exist, is one task of this study.
uct. In 2003, the total revenue of the top ten consulting firms stood at over $51 billion (Kipping 2002; Armbrüster and Kipping 2003). Growth in this business coincided with the creation of mega-firms employing tens of thousands of consultants. As examples of dominant, 'pre-eminent' or 'archetypical' players in the consulting industry, we can identify McKinsey as representing the area of strategy consulting (or Management consultancy in the narrow sense), and Accenture for the area of IT consulting (Kipping 2002; Fincham and Clark 2003).

McKinsey and Accenture enjoy a high level of visibility and influence, in both public and private organizations and spheres (Djelic, Ainamo and McKenna 2002; Saint-Martin 2000).

Growth in management advice is often regarded as a direct and unproblematic consequence of changing corporate demands and the need to enhance competitive performance. Several studies have identified consultants as important 'carriers' in the diffusion of scientific knowledge and innovations (e.g., Rogers 1962; Bessant and Rush 1995). In discussions concerning the development towards a post-industrial era, consultants are accorded a prominent place, and sometimes are even seen as prototypes of the new 'knowledge workers' (Engwall and Kipping 2002: 1f.; Starbuck 1992; Drucker 1993; Sarvary 1999).

Within the frame of the question related to forms of conducting interventions that have the potential to address post-industrial problems, one could follow discussions associated with the historical development of consultancy with a view to establishing what the newest forms of consultancy are. Matthias Kipping (2002) identifies three major generations of consultancies: the early engineering dominated Scientific Management consultancy generation (of which Taylor was a part), the strategy (or management) consultancy generation, and the IT consultancy generation. While Kipping (2002) advanced his provocative hypothesis about the fading of strategy consultancies and the dominance of IT consultancies, Armbrüster and Kipping (2003) also discuss developments leading to mutual interpretation between strategy and IT consultancies. Going further along this path of reasoning, hybrids of strategy and IT consultancy might emerge as significant new forms of conducting interventions.

However, before reaching any conclusions relating to the discussion about whether such possible new forms of conducting interventions have the potential to address post-industrial problems effectively, it is important to achieve a more complete picture of consultancy. The 'success story' represents one side of the coin. But there seems to be another side.

Even dominant and successful consultancy companies are not completely satisfied with their own practice. Bartlett, for example, describes three McKinsey assignments, where despite the projects appearing to have been brought to successful conclusions, the company’s consultants were nevertheless not wholly satisfied, and expressed concerns about McKinsey’s practice in so far as it related to internal knowledge-developing systems, and the quality of solutions conveyed to clients (Bartlett 1996: 8–12):
Overall, I think we did pretty good work, but I was a bit disappointed we didn’t come up with a radical breakthrough. [...] We leveraged the firm’s knowledge base effectively, but I worry that we rely so much on our internal expertise. We have to beware of the trap that many large successful companies have fallen into by becoming too introverted, too satisfied with their own view of the world.’ (Bartlett 1996: 9)

A former Accenture consultant claims that the system of conducting projects in the consultancy was highly standardized by process-shaping instruments. Accenture’s project methodology ‘occupied the entire discursive space; it simply would not have occurred to new staff that there might be any other way to operate on client projects’ (Thompson 2004: 23).

The comments of some academics studying management consultancies are still more confrontational even than these self-criticisms. Large consultancies are accused of lacking quality and effectiveness; Chris Argyris, for instance, discusses case examples where consultants delivered flawed advice to clients (Argyris 2000: 127–170). Kieser describes how leading consultancies use inadequate and scientifically invalid methods, resulting in gross oversimplifications of complex problems (Kieser 2002: 212–213). In accordance with Kieser, consultancies such as McKinsey and Accenture are often criticized of imposing standard solutions to non-standard problems (Heckscher et al. 2003: 108–109).

Fincham and Clark describe one particularly famous example of an apparent lack of quality and effectiveness involving global consultancy companies: the case of Enron. Even though McKinsey was not involved in the controversial accounting and reporting model, or in the actual fraud, McKinsey was central to the evolution of corporate thinking at Enron:

Jeffrey K. Skilling, Enron’s former CEO, was once a McKinsey partner [...] the consulting firm was the architect of many corporate strategies (e.g., securitized credit, the contracts strategy, and the so-called asset-light strategy) that had helped to transform Enron into a giant energy trader. McKinsey’s role, therefore, must call into question the whole issue of the quality of expensive corporate advice. While a consultancy may duck the blame for this or that failed strategy, the more general point is what such episodes say about the prescience of consultants, or their claims to put the client’s interests first. In the Enron case, the world’s pre-eminent strategy firm had intimate contact with a client that was heading for the abyss, but apparently saw none of it coming, nor issued any cautionary advice. (Fincham and Clark 2003: 12)

Fincham and Clark further summarize that consultants have been portrayed as:

expensive (i.e., charging exorbitant fees) and ineffective (i.e., their advice rarely works); as destroying organizations; as repackaging old ideas and developing empty buzzwords; as running amok if not tightly controlled; as undermining the quality of management; as lacking independent insight; as acting in their own interest, rather than the client’s, and so forth. Thus, part of the interest in consultancy stems from the ‘masters of the universe’ view of them, and from beliefs about the
insidious and unaccountable power they might command within global capitalism. (Fincham and Clark 2003: 8)

While numbers about the percentage of success and failure of change projects conducted by large consultancies should be regarded with caution (partly due to the difficulty in finding adequate criteria), different authors estimate that around half of the projects, or more, are unsuccessful (Hammer und Champy 1993; Picot et al. 1999).

How do the ‘success’ and ‘failure’ of big management consulting companies fit together? While individual cases will be analyzed later in more detail, a preliminary hypothesis could be that that the forms of activity of McKinsey and Accenture are oriented towards applying similar solutions to a great number of cases, which is made possible by the general applicability of a best practice standard solution. With this way of dealing with problems in work activities there is little emphasis placed on researching the change process or the innovativeness and unique fit of solutions.

This way of dealing with problems may enable both companies to achieve high profitability, but it potentially also entails the (attempted) implementation of inadequate solutions, leading to unsuccessful projects.

What conclusions can be drawn with regard to discussing forms of conducting interventions that have the potential to address post-industrial problems?

One core characteristic of post-industrial problems is that they contain radically new aspects, related to developments associated with the new possibilities of information and communication technology (see section 1.1). Radically new aspects of problems, however, lie outside the focus of previously discussed consultancy forms. Correspondingly, the dominant focus of consultancies might appear as a limitation when addressing the qualitatively new type of post-industrial problems.

Science and research represents a further area of theory and practice that possibly contains forms of conducting interventions with the potential for dealing with post-industrial problems.

1.3 Interventions conducted by scientific research centers and post-industrial problems

Science has a long history of producing knowledge that was then used for dealing with problems in society. However, the role of science and scientists in the conduct of interventions aimed at addressing general social and organizational problems in work activities is less clear than in the case of consultancies.

Academic science in the 20th century was dominated by a model of ‘pure’ science that was formulated as a guideline for US research policy after the Second World War. Under this guideline, the importance of keeping basic science ‘pure’ was emphasized, with the warning that ‘applied research invariably drives out pure’, if applied and basic science are mixed (Bush 1945/1990: 73; cited after Stokes 1997: 3).

However, as Donald Stokes (1997: 71–75) demonstrates, scientific activities have never been completely ‘pure’ in the sense indicated above; there have always been examples of high level applied and basic research being unified.
Kurt Lewin’s way of conducting research constitutes an example of unifying basic and applied research as well as offering an example of how to conduct interventions dealing with general social and organizational problems in the context of work activities. Lewin operated as a ‘practical theorist’ (Marrow 1969), establishing in the 1940s a research center that offered to conduct scientific research-oriented interventions with work activities that had encountered ‘Human Relations’ problems. Lewin also became one of the founders of the ‘Organization Development’ movement, representing a significant tradition of conducting interventions in the second half of the 20th century.

While Lewin’s research center stood as rather an exception in its age, today’s scientific activities seem to have become more open as far as addressing problems in the ‘context of application’ is concerned (Gibbons et al 1994). The increasing importance of the context of application represents a primary characteristic of the profound change that the academic world is currently experiencing. This change leads towards an entire new ‘mode’ of scientific knowledge production termed ‘Mode 2’ (Gibbons 2000: 40; see Ziman 2000: 172). By entering the ‘context of application’, scientific activities increasingly cooperate or compete with other professional knowledge producing communities (Ziman 2000: 172–173).

Scientific activities seem to have become increasingly open to the possibility of addressing problems in the context of application in the last few decades. The question is now whether scientific research-oriented activities have or will emerge that – similar to Lewin’s practice – specialized in conducting interventions that deal with general social and organizational problems in work activities.

The answer is that several such forms of conducting interventions have indeed emerged. Among the most eminent are those exemplified by the research groups centered around Christopher Argyris (at the Harvard Business School), using ‘Action Science’ to facilitate organizational learning (Argyris and Schön 1978; 1995) and the group focused on Edgar Schein at the MIT using ‘Process Consultation’ to influence organizational culture (Schein 1969; 1980). Both groups have been prominent in the 1970s, 1980s and 1990s.

A more recent example of research-oriented forms of conducting interventions is the Center for Activity Theory and Developmental Work Research at the University of Helsinki founded in 1994 by Yrjö Engeström. Developmental Work Research (DWR) is a methodology aimed at creating new forms of work activity by simulating ‘expansive learning’ (see Engeström 2005).

In addressing the question about forms of conducting interventions that could have the potential to deal with post-industrial problems, one could analyze similarities and differences in different scientific research-oriented forms of conducting interventions (see Argyris and Schön 1978: 225–291; Engeström et al 1996; Virkkunen et al 1997), as well as discussing possibilities of integration.

However, the role of scientific research-oriented forms that specialize in conducting interventions that deal with general problems in work activities is very specific, and correspondingly constrained. While scientific research-oriented forms of conducting interventions associated with Lewin, Schein, Argyris, or Engeström were able to develop unique and innovative solutions for particular work activi-
ties, their impact is limited due to the size and orientation of their research centers. They are principally aligned towards single cases and locally oriented, and do not have the resources to deal with a high number of client companies or client activities with subsidiaries all over the world that demand the simultaneous consideration of similar problems (repeating patterns) in their subsidiaries (a second core characteristic of ‘post-industrial’ problems, see section 1.1).

Correspondingly, the dominant focus of scientific research-oriented forms of conducting might appear as a limitation when addressing the qualitatively new type of post-industrial problems. What, then, might the conclusion be?

1.4 Obstacles to studying forms of conducting interventions

In the last two sections the characteristics of consultancy forms and scientific research-oriented forms of conducting interventions were described. The forms discussed exhibited complementary foci which have their root in patterns of the industrial era. While consultancies are oriented towards applying similar solutions to a great number of cases, they include little research in the intervention process and therefore have a lower potential for innovativeness and unique fit of solutions. Scientific research-oriented forms of conducting interventions produce research-based, unique, and sometimes radically new solutions – but only for a limited number of client activities. It was argued that dominant foci of consultancies and scientific research-oriented forms might – at least in part – appear as limitations when addressing the qualitatively new type of post-industrial problems characterized by both radically new and repeating aspects.

The previous observations motivate a closer investigation of established and new forms of conducting interventions as well as a closer investigation of their potential and limitations when addressing post-industrial problems, and of their possibilities for development.

What is the body of knowledge that should be considered as relevant for such an investigation?

Obviously, contributions about the consultancy forms of conducting interventions (e.g., Engwall and Kipping 2002, Fincham and Clark 2002) should be included in the investigation. In their discussion about the nature of change, Beer and Nohria (2000) address contributions that relate to consultancy forms, but also include scientific research-oriented forms of conducting interventions.

However, to understand the potential for addressing post-industrial problems effectively, we need to study not only different types of activities but also concrete interventions concepts, methods and methodologies. Different scholars have introduced management concepts such as Business Process Re-engineering (Hammer 1990, Davenport and Short 1990), Knowledge Management (e.g., Nonaka and Takeuchi 1995), or Co-Creation (e.g., Prahalad and Ramaswamy 2004). These concepts function (or have functioned in the past) as important guidelines when conducting interventions. Another group of scholars has described longer-term traditions of intervention methodologies, such as Organization Development (e.g., Cummings and Worley 2001).
The previously mentioned contributions cover only a small extent of relevant scientific knowledge. Several other distinct scientific disciplines, scientific areas, and frames of reference can also be considered as relevant for understanding forms of conducting interventions. While these contributions are all potentially relevant, they conceptualize the object of interest in very different ways. It seems that when studying the phenomenon of conducting interventions, one first has to choose — without any scientific grounds — a specific discipline, specific frames of reference, or even a specific intervention concept or methodology as a focal point for each investigation.

However, there appears to be no scientifically grounded basis for such a choice. Characteristics of intervention methodologies certainly influence chances of success or failure when addressing post-industrial problems. The discussion of consultancy and scientific research-oriented forms revealed that matters of business logic, and other aspects of the activities that specialize in conducting interventions, should not be excluded from an investigation either.

While consultancies are certainly relevant objects of this study, the complementary picture of foci and limitations of consultancies and intervention-oriented research centers is an indication that an investigation about forms of conducting interventions should not be limited to a discussion of consultancy variants.

To choose a relatively narrow focus (e.g., intervention methodologies, or consultancy) in studying forms of conducting interventions would entail exposing oneself to the danger of ‘theoretical arbitrariness’ (Holzkamp 1983). On the other hand, the body of relevant knowledge seems so vast that some degree of selection is unavoidable.

This thesis argues that the dynamic associated with forms of conducting interventions is strongly related to the historical emergence and change of problems in work and organizations. This relationship serves as the basis for a ‘theoretical-historical’ selection and study of the main forms of conducting interventions, as well as a corresponding key for avoiding ‘theoretical arbitrariness’. This claim will be considered in the following section.

1.5 A historical perspective: The change in needs for intervention, and the need for change in interventions

The second half of the nineteenth century was a time of revolutionary technological innovation and new possibilities. The potential inherent in the use of electrical power was almost limitless. Manufacturers were free to build plants in any shape,

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4 Shared terms for the phenomenon of conducting interventions do not exist. ‘Consultancy’, ‘Management Consultancy’, ‘Consulting’, ‘Organization Development’, ‘Intervention’, and ‘Organizational change intervention’ are all used to describe frequently related phenomena. Difficulties in setting boundaries for the phenomenon and in establishing shared terms are not only observable in the Anglo-American scientific community, but also in other scientific communities such as the German-speaking context.
and to use all kinds of new production instruments (such as electric motor-driven machines), as well as new transport devices (such as cranes and conveyor belts) (Nelson 1980: 3–20).

These revolutionary technological possibilities in the ‘Electrification wave’ would ultimately open the path to a whole new form of production: mass production. This paradigm would be the central model of work for a new era: the industrial era (Freeman and Louçâ 2001: 140–142; 220–221).

However, before this shift occurred, there was a period of great uncertainty about the utilization of these new possibilities. The uncertainties were not manifest solely as technological problems. The main obstacles to realizing the new possibilities appeared instead to be social and organizational problems. It was Frederick Winslow Taylor, chief engineer of the Midvale Steel Company, who developed through experiments within Midvale methods aimed at dealing with these problems. The methods that Taylor used to reorganize production were unified and generalized in his methodology of Scientific Management (Nelson 1980: 3–20).

Taylor is often regarded not only as the originator of Scientific Management, but also as the father of consultancy as a specialized type of activity. As social and organizational problems related to the utilization of the new technological possibilities seemed to have exhibited themselves in a large number of factories, Taylor and other engineers such as Harrington Emerson began to offer their services as ‘consultants’ to those other factories.

After Taylor’s time, there was another period that saw widely encountered problems associated with work organization – that is, ‘Human Relations’ problems: the 1930’s, 1940s and 1950s. The social scientists Elton Mayo, Fritz J. Roethlisberger, and Kurt Lewin developed ways of dealing with these problems. Lewin’s research center emerged in this period as a scientific research-oriented form of conducting interventions (becoming one of the pillars of the ‘Organization Development’ movement).

In the course of the 20th century, there have been further periods characterized by technological revolutions that have opened up new possibilities, resulting in widely encountered social and organizational problems, as well as in the emergence of activities that specialized in conducting interventions to deal with these problems. After the Second World War (in the so called ‘Motorization wave’), activities that specialized in conducting interventions aimed at reorganizing the strategy and structure of corporations became increasingly important within society, and in fact grew towards a whole new industry: the Management consultancy industry (Engwall and Kipping 2002; Toivonen 2004).

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5 On the basis of economist Nikolai Kondratiev’s work, the innovation scholars Chris Freeman and Francisco Louçâ (2001), as well as Carlota Perez (2002), developed a theory of successive industrial revolutions and resulting techno-economical periods or ‘waves’ dominated by certain techno-economic paradigms. The most recent three waves are the Electrification wave (approx. 1870s-1940s), the Motorization wave (approx. 1910s-1990s), and the Computerization wave (approx. 1970s-ongoing).
As described in the beginning of this chapter, since the last decades of the 20th century a period of radical change in human work activities and society as a whole began, one that is comparable to the radical change in the ‘Electrification wave’ (from Taylor’s time). It has been argued that developments in the Computerization wave entailed the emergence of a historically new type of social and organizational problem – post-industrial problems.

This outline of a historical perspective on the relation between the dynamic of forms of conducting interventions and the emergence and change of problems in work and organization illustrates the advantages of a historical comprehension of forms of conducting interventions. Following this historical view, forms of conducting interventions that can deal effectively with post-industrial problems (this study’s main object of interest) are ‘only’ part of the most recent development of a longer-term historical development of forms of conducting interventions.

The following task is to identify or develop a methodology for studying the past, present and possible future development of forms of conducting interventions. Such a methodology should include a critical review and analysis of theories and models that may contribute to the comprehension of forms of conducting interventions, and that can serve as a basis for a ‘theoretical-historical’ selection of the main forms. Ultimately, the procedure should make it possible to capture, or even to support, the development of forms of conducting interventions that have the potential to address post-industrial problems. Because of the sheer amount of significant forms of conducting interventions, it is, however, clear that no comprehensive analysis of the historical dynamic of forms of conducting interventions will be possible, but only an analysis on the basis of selected cases. The intent of this study is to offer a provocative view on the dynamic of forms of conducting interventions, which will hopefully stimulate associations, objections and further reactions.

Only after the methodological procedure has been derived will the formulation of more specific research questions in this study make sense. Therefore, specific research questions and an overview of the chapters comprising this study will be formulated at the end of the following chapter.

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6 In this study the terms ‘comprehending’ or ‘comprehension’ are used in the sense of ‘theory-based deeper understanding’ (akin to the sense of the German term ‘Begreifen’).
2 Towards a methodological procedure for capturing the past, present and potential future development of forms of conducting interventions

This study began by questioning what forms of conducting interventions might effectively address emerging post-industrial problems (located between different actors and activities as well as exhibiting radically new and repeating patterns). The research task in this chapter is to derive a methodological procedure that makes the discussion of such forms possible (or supports their development) by arriving at an integrated comprehension of the past, present and future development of forms of conducting interventions in their diversity.

Scholars of the tradition of Cultural-Historical Activity Theory such as Lev Vygotsky (1962), Aleksei Leontjev (1978) and Yrjö Engeström (1987) have conducted investigations in which the historical development of phenomena was studied in order to develop a qualitatively new comprehension of the phenomenon – and possibly to contribute to the emergence of a historically new form of the phenomenon. To develop a suitable methodological procedure, contributions from proponents of Cultural-Historical Activity Theory (CHAT) will be drawn on. In section 2.1 basic conceptual instruments of CHAT, constituting the foundation of a methodological procedure will be discussed. In section 2.2, basic conceptual instruments will be used and partially elaborated in order to arrive at conclusions relating to a specific methodological procedure for addressing the research object (forms of conducting interventions in their dynamic and diversity).

2.1 Searching for conceptual instruments to be used in a methodological procedure

A comprehension of past, present and future development with regard to forms of conducting interventions in their diversity demands an integrative unit of analysis (subsection 2.1.1) as well as concepts to capture change and development (subsection 2.1.2). It also calls for an overall methodological procedure (subsection 2.1.3). Conclusions as to the best way to deploy CHAT concepts in this study will be made in subsection 2.1.4.

2.1.1 Finding an integrative unit of analysis

The idea of a systemic unit of analysis is based on the critique of an elementalist view of research (e.g., Vygotsky 1962, 1978). This view tends to study elements of complex phenomena separately – which threatens to lead to the destruction of the specific qualities of the phenomenon under investigation. An example of such an elementalist view would be the study of intervention methodologies in isola-
tion from the way in which they are used in intervention businesses. To retain the specific quality of the research object, the smallest possible systemic unit that still carries the specific quality of the whole dynamic phenomenon has to be identified. During the development of CHAT, three units of analysis have been predominantly used (Engeström 2001).

These three principal units of analysis were developed on the basis of the idea of cultural mediation of human conduct. They are as follows:

1. artifact mediated and goal oriented action (Vygotsky 1978: 40);
2. activity system (Leontjev 1978; Engeström 1987); and
3. network of activity systems (Engeström 2001).

As a unit of analysis an activity system links individuals and the society they live and work in. To analyze activity systems, Engeström's conceptual 'triangle' model has often been used (figure 2.1). Activity systems comprise the individual practitioner, colleagues and co-workers in the workplace community, conceptual and practical tools, and the shared object as a united dynamic whole. The model reveals the decisive feature of multiple mediations in activity. The subject and object, or actor and environment, are mediated by artifacts that function as instruments, including symbols and representations of various kinds (Engeström 1994: 237).

Figure 2.1: Activity system model (Engeström 1987)

A central concept within activity theory is the concept of object (in the sense of Gegenstand familiar from classical German philosophy). The object is a constituting part of an activity; 'scientific investigation of activity necessarily requires discovering its object' (Leontjev 1978: 52). The object is understood as a collectively constructed entity, through which the meeting of a particular human need is pursued (Leontjev 1978: 54; Engeström 1990: 107; Foot 2002: 134).
The construction of any object entails a dialogical interaction between aspects of the participants' personal experience and his or her community of significant others with whom the object is pursued, and cultural historical properties of the object. In other words, an individual's construction of an object is both facilitated and constrained by historically accumulated constructions of the object. (Foot 2002: 135)

Lektorsky describe this characteristic of the concept object as follows:

In the objects cognized, man singles out those properties that prove to be essential for developing social practice, and that becomes possible precisely with the aid of mediating objects carrying in themselves reified sociohistorical experiences of practical and cognitive activity. (Lektorsky 1984: 137)

Lektorsky highlights the importance of the connection of the concept of object with concept of mediation, which was developed by Vygotsky (1978). Engeström puts it the following way:

Objects do not exist for themselves, directly and without mediation. We relate to objects by means of other objects. [...] This means that objects appear in two fundamentally different roles: as objects and as mediating artifacts or tools. (Engeström and Escalante 1996: 361–362)

In a sense, the object of an activity is always twofold or double-faced (like the Roman god Janus, god of gates, doors, doorways, beginnings, and endings). Objects include the ‘need face’ of a ‘consuming’ activity (termed ‘object activity’ by Engeström 1987) and the face of a ‘producing’ activity that deals with needs on the basis of existing cultural knowledge embodied in mediating artifacts/instruments (termed ‘central activity’ by Engeström 1987).

After the formation of an activity, a corresponding human need can be met by transforming the object with the aid of mediating artifacts/instruments into an outcome (Leontjev 1978; Engeström 1987).

Examples of mediating artifacts that relate to the phenomenon of intervention would be intervention methodologies, methods and concepts. The human need and object might, for instance, be related to social and organizational problems in the context of work activities.

The unit of analysis of ‘activity system’ emphasizes that activities display characteristics of sustained systemic wholes. Correspondingly, elements within an activity system are not random but have to be complementary and compatible. In the historical development of an activity system, qualitatively different combinations of elements emerge that are based on different objects and instruments, as well as on different ways of being mediated by a community (including certain rules and division of labor).

Jaakko Virkkunen (2006) elaborates the idea of a systemic whole. He argues that activities have to balance the demand of ‘production’ (the transformation of the object into an outcome), and also the demand of profitability or sustain-
ability in a market economy. Activities are characterized by a context-dependent, systemic whole, within which principles exhibit a certain complementarity that allows actions within an activity to be conducted repeatedly in a market economy. Virkkunen refers here to businesses as well as to non-business organizations such as research institutes, which also have to find a way to ‘produce’ something – e.g., knowledge – in a form that makes their activity permanently possible on the basis of given resources.

Following Leontjev (1978), processes conducted in human activities can be divided into a hierarchical structure. Activity is the most general unit conducted by a community and oriented to an object. Activities consist of goal-oriented actions, conducted by individuals or groups. Actions consist of routinized operations that are conducted by humans or machines and depend largely on environmental conditions such as the possibility of using machines (table 2.1).

Table 2.1: Hierarchical structure of processes and instruments pertaining to an activity (Leontjev 1978; see Engeström 1987); slightly modified

<table>
<thead>
<tr>
<th>Level of activity</th>
<th>Orientation on</th>
<th>Conducted by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
<td>Object/motive</td>
<td>Community</td>
</tr>
<tr>
<td>Action</td>
<td>Goal</td>
<td>Individual or group</td>
</tr>
<tr>
<td>Operation</td>
<td>Conditions</td>
<td>Individual or machine</td>
</tr>
</tbody>
</table>

From the end of the 1990s onwards the model of a network of activity systems below was used as the minimal unit of analysis. Different activity systems with potentially shared objects can be analyzed using the network model (see figure 2.2).

![Figure 2.2: Two interacting activity systems with a potentially shared object (Engeström 2001: 136); slightly modified.](image-url)
The evolution of the previously described units of analysis (from artifact-mediated and goal-oriented action to an activity system and further to a network of activity systems) mirrors to some degree the development in work activities towards more complexity. One of the characteristics of current developments in the world of work is that production is increasingly carried out between organizations in multiple less firmly structured forms of networks (see Chapter 1). Lee and Roth (2003) argue that work activities become even less bounded ‘patchwork’ entities, in which shifting relations, contexts and alliances are a prominent feature.

Yrjö Engeström (2006) contributed recently to the discussion about changing characteristics in the world of work. He suggests that work activities (community arrangements), objects and instruments show less bounded and more dynamic patterns. Engeström (2006; 2007) argues that CHAT concepts can contribute to addressing the changing characteristics in the world of work; he adds, however, that these changing characteristics can also motivate further developments concerning the concepts of CHAT.

Post-industrial problems are deeply connected to current changes in work and organization. In order to study the historical development of forms of conducting interventions – including those with the potential to address post-industrial problems – it is necessary to single out more clearly the principal characteristics of forms of conducting interventions, and also to include an idea of them in the unit of analysis itself.

2.1.2 Ways of capturing historical change and development

The study and comprehension of phenomena as historically changing, developing and developable is a central aim of the historical-genetic method (Davydov 1977), and one of the core principles of CHAT. When following this method one first analyzes the basic, most rudimentary form of a system with a view to identifying its basic relationships and the dynamics of its development into more complex and varied forms. Thereafter, one studies the qualitative transformations that have taken place in the system and its inner logic. Historical-genetic analysis provides a basis for hypotheses for empirical research on the mechanism of development of the contemporary system and its current developmental potential.

To study a phenomenon in its evolution, it is necessary to include the idea of inner contradictions in the system as the driving force of development. The idea is based on a dialectical view of the inner logic of a system as a unity of oppositions. A change in one element in the system creates incompatibility as well as internal contradictions. New, more complex forms of the system evolve as (partial) resolutions to the inner contradictions developed within the previous forms. Lev Vygotsky (1978) has demonstrated how more complex forms of thinking evolve as solutions to contradictions in culturally mediated forms of action. Leontjev (1978) has shown how individuals’ motives and activities develop in the ontogeny as a solution to contradictions in the system of a child’s activity.

Yrjö Engeström (1987) uses the idea of inner contradictions to study evolving phenomena in the following way:
According to his interpretation activity systems evolve over time. Their future possibilities can be better understood by the reconstruction of past phases in the evolution of an activity system, and by the systematization of those phases with the help of a model that captures how the basic relationships of a phenomenon change over time (e.g., the activity system model). Such a periodization of the historical-genetic development can lead to a tentative identification of the internal contradictions of the activity system during past phases up to the contemporary situation.

Engeström (1987) describes the construction and resolution of successively evolving tensions and contradictions in a complex system as a process of expansive learning. According to his theory of expansive learning, the transformation of activity systems is not a simple procedure, but rather possesses the character of a complex, stepwise cycle.

The first phase within such an expansive learning cycle of an activity system is a problematic in the current way of working – an activity system in a ‘need state’ – where hesitation and uncertainty exhibited among actors are typical. ‘Primary’ contradictions can be identified within the elements of the activity system model. In the development of the activity, its various components create secondary contradictions and incompatibilities between elements. Such contradictions can manifest as ‘double binds’ within individuals’ actions, with one component ‘pulling’ in one direction and a second component in another. Secondary contradictions can be overcome by creating a new model of the activity system – including a new object of the activity. The implementation of a new model creates tertiary contradictions between the old and the new form of work. Innovative resolution of these contradictions leads gradually to the stabilization of the new form of the activity, which is finally consolidated through rearranging the relationships of the focal central activity system to the other activities in its network. At the initial and final stage of the cycle, two different forms of the activity can be found (Engeström 1987: 187–191; see figure 2.4 in the next subsection).

A concept that is particularly important in capturing the transition from past and present to future forms of action and activity is the concept of the zone of proximal development. Vygotsky (1978: 86) introduced this concept to characterize the potential for development in a child’s maturing process. Engeström extended the concept to characterize the potential for development towards new historical forms of societal activity (1987: 174). He redefined Vygotsky’s concept at a collective level as the ‘distance between the present everyday actions of the individuals and the historically new form of the societal activity that can be collectively generated as a solution to the double bind potentially embedded in everyday actions’ (Engeström 1987: 174). The zone of proximal development in the context of work can be comprehended as a hypothetical transitional area towards an emerging,

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7 Engeström deploys the cycle model not only to analyze the steps of real-life expansive learning processes (1987: 1989), but also to guide his methodology. In the current subsection the cycle is used according to the former, analytical model; in the following subsection, it will be used within a methodological context.
potentially more advanced form of the activity (Engeström 1987: 327). Expansive learning processes can be viewed as journeys across the collective zone of proximal development of an activity system (Engeström 1994: 242).

Similar to the conclusion reached in the last subsection, it can be assumed that while core ideas such as the principle of historicity, and core concepts such as dynamic contradictions, zone of proximal development, and expansive learning, remain central – even when more extended and dynamic formations of activities are analyzed – the specific content of these concepts might change towards more spatially and temporally extended and dynamic patterns.

A corresponding example of elaborations of concepts would be the suggestion that expansive learning processes should not be understood as consisting of successive phases only, but as potentially consisting of smaller learning cycles within a larger expansive learning cycle (see Engeström 1999: 385). Furthermore, it should be emphasized that expansive processes do not linearly and automatically lead to expansive solutions, but can include breaks and regressive actions. (Engeström, Kerosuo and Kajamaa 2007: 15).

2.1.3 The dialectical cycle and the cycle of expansive learning as guidelines to cultural-historical methodological procedures

In CHAT studies, integrative units of analysis and concepts of capturing historical change and development have been used within the context of different methodological procedures. This chapter argues that methodological procedures in the tradition of CHAT (e.g., Vygotsky 1962, 1978; Leontjev 1978; Engeström 1987), or related traditions such as critical psychology (e.g., Holzkamp 1983, 1995), can be interpreted as having a common ancestor: the ‘dialectical method’ or ‘method of ascending from the abstract to the concrete’.

The method as outlined by Karl Marx (1973: 100–108) started from the ‘chaotic whole’ of the phenomenon under investigation, then ‘descending’ to the initial abstraction of the basic categories, before finally ‘ascending’ again to the concrete whole – but this time, based on the initial abstraction, – being able to comprehend the concrete whole as having evolved from initial simple forms towards present complex forms (a ‘rich totality’).

The idea of ascending from abstract to concrete is not comprehensible if one thinks of ‘abstract’ and ‘concrete’ in the sense in which the words are commonly used in everyday language. Evald Ilyenkov and his student Vassilij Davydov have increased our understanding of this method by analyzing and elaborating Marx’s outline. The methodology as outlined by Ilyenkov (1982) can be interpreted as a cycle consisting of 4 steps:8

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8 Another possibility would be to interpret it as consisting of three steps, in which the subsequently described second and third steps are understood as one step, in this manner remaining closer to Marx’s original outline.
In the first step of a dialectical cycle, the phenomenon under investigation is constituted by gathering together current knowledge about it and by the application of critical analysis and revision of existing knowledge (‘reduced abstract expressions’). Ilyenkov describes this step as follows:

The data of contemplation and notion were always interpreted by Marx as the entire mass of the socially accumulated empirical experiences, the entire colossal mass of empirical data available to the theoretician from books, reports, statistical tables, newspapers, and accounts. It stands to reason, however, that all these empirical data are stored in social memory in an abridged form, reduced to abstract expression. They are expressed in speech, in terminology, in figures, tables, and other abstract forms. The specific task of the theoretician who uses all this information about reality does not, of course, consist in lending this abstract expression still more abstract form. On the contrary, his work always begins with a critical analysis and revision of the abstractions of the empirical stage of cognition, with the critical overcoming of these abstractions, attaining progress through a critique of the one-sidedness and subjective character of these abstractions and revealing the illusions contained in them, from the standpoint of reality as a whole, in its concreteness. In this sense (and only in this sense) the transition from the empirical stage of cognition to the rational one also appears as a transition from the abstract to the concrete. (Ilyenkov 1982: 148)

The second step of the dialectical cycle is to find a proposition of the developmental ‘germ cell’ – the initial abstraction – of the phenomenon by discovering the very conditions of the origin of the phenomenon, as well as expressing the ‘initial abstraction’ very different from gaining abstractions of similarities of features of phenomena expressed by an ‘abstract’ word:

Science as thinking in concepts begins only where consciousness does not simply express in other words the conceptions of things spontaneously thrust upon it but rather attempts to analyse both things and conceptions of things in a goal-directed and critical manner.

To comprehend a phenomenon means to establish its place and role in the concrete system of interacting phenomena in which it is necessarily realised, and to find out precisely those traits which make it possible for the phenomenon to play this role in the whole. To comprehend a phenomenon means to discover the mode of its origin, the rule according to which the phenomenon emerges with necessity rooted in the concrete totality of conditions. It means to analyse the very conditions of the origin of phenomena. That is the general formula for the formation of a concept and of conception. (Ilyenkov 1982: 177, italics in original)

In a later section from his contribution, Ilyenkov explains at greater length the characteristics of the germ cell or initial abstraction:
Abstraction must be, first, complete, and second, meaningful rather than formal. Only then will it be correct and objective. What does that mean, however?

We have shown already that fullness of abstraction assumes that it directly expresses something quite different from abstract universal features inherent in absolutely all particular phenomena to which this universal abstraction refers; rather it expresses the concrete characteristics of the objectively simplest further indivisible element of a system of interaction, a ‘cell’ of the analysed whole. (Ilyenkov 1982: 226, italics in original)

How can one be certain that one has derived the germ cell model that makes ascending to the concrete possible? This question leads to the third step of the dialectical cycle. The third step is described as a test and elaboration of the initial germ cell model by experimenting with the extent to which the proposed germ cell contributes to the comprehension of historically developing forms of the phenomenon under investigation.

A theoretical proposition must therefore contain only those abstractions which express the forms of existence of the given object necessarily inherent in it.

What is to guarantee that a proposition connects precisely these abstract definitions?

Empirical contemplation of a thing cannot answer this question. To separate the necessary form of the being of a thing from one that may or may not exist, without impairing the existence of a thing as the given concrete thing (a swan, a body of nature, labour, etc.), one should proceed from contemplation to the sensually practical experiment, to man’s social practice in its entirety.

It is only the practice of social mankind, that is, the totality of historically developing forms of actual interaction of social man with nature that proves to be both the basis and the verification criterion of theoretical analysis and synthesis. (Ilyenkov 1982: 229, italics in original)

These experiments could address the practice of activities, as Ilyenkov describes:

[…] each separate step and each generalisation in the course of working out a theory is constantly commensurated with the data of practice, tested by them, correlated with practice as the highest goal of theoretical activity. (Ilyenkov 1982)

The relation between theoretical work and practice however, remains marginal in Ilyenkov’s analysis of the method of ascending from the abstract to the concrete (Miettinen 2000).

The fourth and final step – and the ultimate aim of the whole cycle – is to ascend to the concrete; that is, the continual movement towards the ever more concrete theoretical comprehension of the richness, fullness, and variety of aspects of the phenomenon under investigation. Ilyenkov clarifies that this comprehension means a real reproduction of the developmental logic of the phenomenon under investigation up to its present stage:
This method of interpreting phenomena permits more than a mere description of
the aspect in which they emerge before direct contemplation on the surface of the
developed stage in their existence — it permits to reproduce, in the full sense of the
term, their origination, to trace their emergence and development into the present
state through the strictly necessary stages. (Ilyenkov 1982: 286)

Figure 2.3 depicts the explanation of the method of ascending from the abstract to
the concrete as a 4-step cycle.

![Figure 2.3: The dialectical cycle](image)

The founder of the tradition of CHAT, Lev Vygotsky, relied on the dialectical
method in his work:

> I want to find out how science has to be built, to approach the study of the mind
having learned the whole of Marx’s method. […] Marx analyzes a single living ‘cell’
of capitalist society – for example the nature of value. Within this cell he discovers
the structure of the entire system and all its economic institutions. […] Anyone
who could discover what a psychological cell is – the mechanism producing even a
single response – would thereby find the key to psychology as a whole. (Vygotsky
1978: 8)

In his theoretically oriented study of individual learning, the critical psychologist
Klaus Holzkamp explicitly made use of the method of ascending from the abstract
to the concrete, calling his procedure ‘abstracting-concretizing’ (1995: 180-181; see
Holzkamp 1983).

In his study of expansive learning, Yrjö Engeström (1987) applied also a type
of dialectical cycle:
The method used in this study is dialectical derivation and construction of categories. Each substantive chapter is a relatively independent cycle of analysis and construction, following roughly the same logical sequence. (1) The problem is presented by introducing certain antinomies or conceptual troubles within cognitive psychology. (2) The problem is elaborated using theory-historical data. (3) The new categories are provisionally characterized, defined and modeled. (4) The new categories are tested and further elaborated using general object-historical accounts or specific object-historical cases as data. (5) Some implications are discussed and an intermediate balance is drawn as a preparation for the next round of category construction. (Engeström 1987: 27–28)

If Engeström’s steps (1) and (2) are considered as one step, one gets roughly the 4 steps of the previously described dialectical cycle.

Against the background of the interpretation that sees the dialectical method as a common ancestor of the methodological procedures of Vygotsky (1962, 1978), Holzkamp (1983, 1995) and Engeström (1987), the different methodological procedures of these commentators can be understood as specific applications and elaborations of the dialectical method. These various elaborations of the dialectical method contributed significantly to the development of different theories (of higher psychological functions, individual learning and expansive learning). The outcome of Engeström’s 1987 study opened the path to a qualitatively new form of methodology. It extended the orientation of theory development towards ‘not only a methodology of research but also a methodology of practical societal transformation’ (1987: 26).

Engeström’s methodology of practical societal transformation is guided by the cycle of expansive learning (1987: 189, 322; see figure 2.4).

The first phase of the expansive learning methodology focuses on the delineation of the activity as well as on the first characterization of main problems in the work (by relying on ethnography). The second phase in the methodological expansive learning cycle focuses on the historical analysis of the development of the activity (‘object-historical analysis’), as well as of the historical development of main theoretical instruments used in the activity (‘theory-historical analysis’). The historical analyses are combined with the empirical analysis of the present situation of the activity, including the analysis of key problems and disturbances (‘actual-empirical analysis’). These complementary analyses are the basis for formulating an ‘historical hypothesis’ of main contradictions (‘double binds’) as the deeper reasons for present problems and disturbances. The third phase of the expansive methodology is an experimental phase whereby qualitatively new models are formulated as keys for resolving main contradictions. The process is enabled by the identification of a ‘springboard’, and also by constructing a ‘microcosm’, a group consisting of practitioners and researchers that takes over responsibility not only for elaborating the new model but also for turning it into new form of practice. The fourth phase includes the practical application, test, elaboration and generalization of the new model by defining ‘strategic tasks’ or ‘test fields’. The fifth phase consists of assessing the degree of consolidation of the new form of activity (Engeström 1987: 323–336; see figure 2.4).
Following the interpretation of Reijo Miettinen (2000: 114–115), it is argued here that the cycle of expansive learning corresponds with the logic of the dialectical cycle. The first phase of the expansive learning cycle (phenomenology, delineation) corresponds with the first phase of the dialectical cycle (object constitution). The second phase of the expansive learning cycle (historical hypothesis of contradictions) is called the ‘theoretical abstraction’ or the historical-analytical grounded hypothesis by Miettinen (ibid.: 116), and interpreted as corresponding with the second step of the dialectical method (here termed developing an initial ‘germ-cell’ model). The third step of the expansive learning cycle (experimental formation of new model of activity) makes it possible to turn the theoretical hypothesis into a working hypothesis, moving from the historical-analytical part of the expansive cycle to the practical-experimental (ibid.:116–119). This step corresponds with the third step of the dialectical cycle (test and elaboration of the initial model by experimenting). The last two steps of the expansive learning cycle (practical application, generalization and consolidation of new model) correspond with the last step of the dialectical cycle, ascending to the concrete fullness and richness of the activity (ascending to the concrete diversity of the object).

The methodological procedure associated with the expansive learning cycle can be understood as a ‘descendant’ of the methodological procedure associated with the dialectical cycle. Possibly the most distinct qualitatively new characteristic of the methodology associated with the expansive learning cycle is to have gone beyond theory development to enable the development of new forms of practical ac-
tivities, an issue that remained underdeveloped in the methodologies of Ilyenkov (Miettinen 2000: 112), Vygotsky (Engeström 1987: 322) and Holzkamp. In the context of a discussion about the changing characteristics of phenomena in work and organization, the question arises whether the use of the two methodological cycles as described here needs to be rethought in order to capture more extended and dynamic patterns.

2.1.4 Possibilities and obstacles for using CHAT concepts in this study

The previously described concepts of CHAT represent a framework used in various studies to trace the development of phenomena (such as higher psychological functions, and learning) in order to derive – guided by the dialectical cycle – new theoretical comprehensions of these phenomena. Furthermore, the framework was used to develop – guided by the expansive learning cycle – entirely new models of activity in the areas, among others, of healthcare, postal administration, or manufacturing activities (see Engeström 2005b).

The previous chapter suggested that the procedure to be applied in this investigation was to study the past, present and possible future development of forms of conducting interventions. Here it is argued that this idea can be realized by relying on an integrative unit of analysis, and by utilizing concepts geared towards capturing change and development provided by CHAT. In principle, Engeström’s orientation with regard to enabling the development of new forms of practical activities corresponds closely with the present study’s objective of contributing to the wider discussion at the same time as supporting the development of forms of conducting interventions with potential to address ‘post-industrial’ problems.

However, in most of these earlier studies of expansive developmental research (or Developmental Work Research)\(^9\), the methodological procedure was applied to clearly bounded phenomena (Toiviainen 2003: 213). By contrast, ways of conducting interventions were previously characterized as phenomena that possibly belonged to different societal spheres that were difficult to map or confine. Post-industrial problems (together with corresponding forms of conducting interventions that possess the potential to address them) are a global phenomenon that can emerge in seemingly ‘peripheral’ loci (such as New Zealand). The contrast might entail obstacles for deriving a methodology for this study.

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\(^9\) Engeström (1987) uses both ‘expansive developmental research’ and ‘Developmental Work Research’ (DWR) as terms for his expansive learning cycle-oriented methodology. In this study, the phrase \textit{expansive developmental research} is used in the context of a discussion relating to an overall expansive learning cycle-oriented methodology (the present chapter). DWR is used in the context of a discussion of (empirical) examples of ways of conducting interventions that rely on an interventionist methodology, guided by the cycle of expansive learning (see Chapter 9, Chapter 10 and Chapter 11). Both contexts overlap. Chapter 12 describes how the discussion in the present chapter might contribute to the development of DWR as a methodology for conducting interventions.
As described in subsection 2.1.3, expansive developmental research in its classic form commences with a phenomenology of problems and a delineation of the activity system under investigation:

The first step of expansive developmental research consists of (a) gaining a preliminary phenomenological insight into the nature of its discourse and problems as experienced by those involved in the activity and (b) of delineating the activity system under investigation.

[…] As to (b), expansive research is not dealing with activities ‘in general’ but with real activities realised by identifiable persons in identifiable locations. Delineation is this very act of identifying the personal and geographical locus and limits of the activity. The reason for putting delineation after phenomenology is obvious. Often the locus and limits of activity can be properly defined only after a relatively extensive ‘dwelling’ in it. (Engeström 1987: 324)

This citation of the point of departure of expansive developmental research makes it possible to identify obstacles to the application of a methodology to the phenomenon of intervention. As forms of conducting interventions with the potential to address post-industrial problems can emerge in seemingly ‘peripheral’ loci, there would appear to be no guarantee that a local activity system, selected at the beginning of the study, contains elements of such a new form. As locus and limits of new forms of conducting interventions are uncertain, selecting a predefined unit of analysis runs the risk of not fully capturing the phenomenon. The same risk exists for the step of historical analysis and also for the step of defining a zone of proximal development on the basis of an early selected local case and predefined unit of analysis. As the described uncertainty is part of the characteristics of the phenomenon under investigation, it cannot be eliminated in a simple manner.

A one-sided means of dealing with the obstacle entails certain dangers. Too speedy definition of locus and limits of forms of conducting interventions (e.g., by focusing on empirically established trends) threatens to brush aside new, emerging trends and the possibility of completely new constellations of forms of conducting intervention that would only be identifiable after a thorough theoretical/historical comprehension has been developed.10

To abandon empirically based expansive developmental research (by focusing solely on a discussion of given theories and methods of forms of conducting interventions), would mean to give up the possibility of grounding discussions of

10 Mäkinen’s (2007) investigation of changes in learning processes in the Finish military system, which focus mainly on the soldier’s or officer’s activity system and its resistance to utilizing ‘difficult’ theoretical models, might be considered as an example in which more fundamental contradictions, processes and contexts (e.g., longer-term developments concerning international military strategies) were neglected.
new forms of conducting interventions in empirical examples, entailing the risk of empirically untested wishful theoretical thinking (Miettinen 2000: 116–117)\textsuperscript{11}.

The described obstacle can be interpreted as belonging to more general challenges for CHAT caused by current changes in work and organization. Recent theoretical and methodological developments in the previous three subsections (e.g., a possible need to rethink the unit of analysis, and the use of a miniature cycle within larger cycles to describe expansive learning processes), are all understood as theoretical and methodological reflections of these most recent developments in work and organization.

CHAT and expansive developmental research are by no means fixed or completed. Rather they are part of a living tradition of research in which developments in work and organization have to be reflected by theoretical and methodological developments within that tradition (Engeström 2007). Conceptual instruments of CHAT in general, and the method of dealing with the described obstacle in particular, will be used in this spirit.

\section*{2.2 Using conceptual instruments from CHAT to develop an expansive methodological procedure}

\subsection*{2.2.1 Combined use of a dialectical and expansive learning ‘miniature’ cycle as a way of dealing with the obstacle}

Yrjö Engeström’s (1987: 324) suggestion that ‘often the locus and limits of an activity under investigation can be properly defined only after a relatively extensive “dwelling” in it’ opens a helpful narrative into ways for dealing with the obstacle described previously. While the uncertainty of locus and limits of forms of conducting interventions cannot be simply eliminated, it might nevertheless be possible to deal with it in an expansive developmental study by elaborating the initial ‘dwelling’. Engeström’s 1987 work leads towards an idea of just such an elaboration. His investigation addressed a phenomenon (human learning) that, prior to Engeström’s study, was frequently defined in a very narrow way. The phases in Engeström’s methodological procedure consisted of dialectical cycles, of ‘relatively independent cycles of analysis and category construction’ (Engeström 1987: 20).

Using the results of former cycles as basic conceptual instruments in latter cycles, Engeström developed step-by-step, a new comprehension and even a new form (‘expansive learning’) of the phenomenon he investigated.

As a consequence, extending methodological phases towards relatively independent methodological cycles will be an initial element in the central idea for dealing with the challenge of uncertainty of locus and limits of forms of conducting interventions. The suggestion is to follow the phases of the cycle of expansive

\textsuperscript{11} Studies from the tradition of critical psychology (e.g., Holzkamp 1983), which made use of the dialectical method but for the main part did not conduct empirical investigations, were often criticized as speculative.
learning but to extend one or more phases towards relatively independent smaller or ‘miniature’ cycles (see figure 2.5).

The term ‘miniature’ cycle is used here to emphasize that there exists a more fundamental logic than the logic of the ‘miniature’ cycle (the logic of an overall methodology, guided by a ‘bigger’ cycle) and that the miniature cycle fulfills a certain function within the more fundamental logic. It does not mean that the ‘miniature’ cycles can be conducted in short time, or with little effort. To the knowledge of the author of this study, the idea of the methodological use of ‘miniature’ cycles is implicitly given in some recent DWR studies, but has not yet been elaborated theoretically. This discussion is intended as a contribution to such an elaboration.

What are previous examples of the use of such ‘miniature’ cycles and how would ‘miniature’ cycles be used in expansive developmental research of the historical development of forms of conducting interventions?

Different scholars relying on CHAT seem to have – at least implicitly – been guided by more than one methodological cycle. Their cycles have differed depending on their object of investigation and their orientation to the outcome of their investigation.

As described previously, in Engeström’s (1987: 20–21) theoretically oriented study of human learning, the methodology comprised several dialectical cycles. Foot (2001, 2002) studied a network of conflict monitors in the post-Soviet sphere (the EAWARN). According to Foot, development of the network was characterized by two cycles of expansive learning which were partially overlapping. Some actions in the development of the network had a double meaning, representing both a later outcome of the first cycle and a constituting element of the second cycle (Foot 2001: 73). Hanna Toiviainen studied expansive learning processes in activities scattered across multiple systems by introducing the concept of different ‘vertical’ levels of network activity. She enriched knowledge of the expansive learning cycle by identifying a dynamic interplay of different expansive learning processes (2003: 43, 210–214).

Conclusions that can be drawn from these studies are that theoretically oriented investigations (such as Engeström 1987) relied – implicitly, at least – on dialectical (‘miniature’) cycles; by contrast, empirically oriented studies (such as Foot 2001) relied – implicitly – on expansive learning (‘miniature’) cycles.

A possible conclusion concerning the methodological procedure in this study might be that one should either make use of more theoretically oriented dialectical ‘miniature’ cycles, or deploy more empirically oriented expansive learning ‘miniature’ cycles. However, such dualism does not seem fruitful. Reijo Miettinen (2000: 116–117) argues that both the theoretical (or ‘historical-analytical’) and empirical (or ‘practical-experimental’) focus of expansive developmental research are essential. He emphasizes that the connection of the historical-analytical part and the practical-experimental part of expansive developmental research is particularly decisive and demanding.

The first element of the central idea to deal with the obstacle described earlier was to follow the overall logic of the expansive learning cycle, with the addition of extending the phases of the expansive developmental methodology towards rela-
tively independent ‘miniature’ cycle. Inspired by Miettinen’s argument, the second element of the central idea is to rely on one dialectical ‘miniature’ cycle, covering the mainly historical-analytical part of the study, and one expansive learning ‘miniature’ cycle, covering the mainly practical-experimental part. In a certain sense, the intent is to combine Engeström’s ‘old’ (dialectical cycle oriented) methodology applied in his study of 1987 with his ‘new’ (expansive learning cycle oriented) methodology derived in his study of 1987.

How does this idea solve the described obstacle?

The outcome of phase 1 of the expansive methodology is a phenomenology of the problems of the activity and the delineation of the activity. As described in the last subsection, the phenomenology and delineation of the phenomenon under investigation is usually conducted by selecting a case and by conducting an initial investigation of problems, as well as by selecting a unit of analysis and delineating the activity. It was argued that such selections are problematic if the limits of the phenomenon are uncertain and if the new forms of conducting interventions can emerge in seemingly ‘peripheral’ loci. The danger of not fully capturing the phenomenon is then ‘passed on’ to phase 2, where the historical analysis is conducted and the zone of proximal development defined on the basis of a potentially prematurely selected local case and a predefined unit of analysis.

Extending phase 1 and phase 2 of the overall methodology by following the dialectical cycle would mean starting to detail the constitution of the phenomenon by gathering current theoretical and empirical knowledge of the phenomenon (including present dilemmas in theory and practice). Such an object constitution should gather the ‘chaotic whole’ in the sense that the locus and limits remain open; in addition, seemingly peripheral pieces of the phenomenon might be included in the overall chaotic picture (see figure 2.5).

As the limits and locus of the phenomenon are uncertain, there would seem to be a need to derive (instead of selecting) a unit of analysis specific to the characteristics of the phenomenon of conducting interventions. Such a unit of analysis could be derived on the basis of the proposition of an initial ‘germ-cell’ model of the phenomenon under investigation. Following the dialectical method, the initial germ cell model would be derived by discovering the very conditions of the origin of the phenomenon of conducting interventions.

The unit of analysis as the elaborated form of the germ cell model could then be used to analyze the pieces of the ‘chaotic’ whole of forms of conducting interventions in their historical dynamic. The outcome of the dialectical cycle (the result of ascending to the concrete diversity of the object) would be a theoretical comprehension of the historical dynamic and diversity of forms of conducting interventions. This comprehension would be the basis for the formulation of a historically grounded hypothesis of the zone of proximal development of forms of conducting interventions. Formulating such a zone of proximal development

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12 Studies by Engeström (1987) and Vygotsky (1962, 1978) serve as examples of where the dialectical cycle has been used to derive a unit of analysis.
would be a good basis for discussing the field of possibilities vis-à-vis forms of conducting interventions that possess the potential to address post-industrial problems effectively.

However, as Miettinen (2000: 118–119) argued, in order to retain the essential characteristics of the expansive developmental research process, it is crucial to make the transition from the historical-analytical part to the practical-experimental discussion of forms of conducting interventions. New forms of phenomena emerge in local instances in practice and not in generalized theory.

The usefulness of being able to rely on the outcome of the dialectical cycles for dealing with the uncertainty of locus and limits of new forms of conducting interventions now becomes apparent. The further investigation can become more focused at each step. One or more ‘strategic cases’ can be selected on the basis of the developed historical comprehension. It is likely that such strategic selections would enable the analysis of qualitatively new forms of conducting interventions of the kind that have been discussed in this chapter (see Engeström 1987: 334, Miettinen 2000: 119).

The expansive learning ‘miniature’ cycle acts as a heuristic tool for addressing the ‘strategically selected’ main empirical case by guiding the usual steps of the expansive learning methodology: delineation and phenomenology, conducting historical analyses and formulation of a zone of proximal development, as well as the attempt to support the development of a qualitatively new form of conducting interventions. As the expansive learning cycle is used to address the empirical case, the historical hypotheses (of the zone of proximal development of forms of conducting interventions, as well as of new forms) develop towards empirically enriched hypotheses.

The methodology in this study will, in principle, follow the logic of Engeström’s methodology of expansive developmental research, with the additional idea of extending the phases of the expansive learning cycle towards relatively independent ‘miniature’ cycles. The first ‘miniature’ cycle is a dialectical cycle that dominates the historical-analytical part, carrying the overall methodological procedure from phase 1 to phase 2. The second is an expansive learning ‘miniature’ cycle that dominates the practical-experimental part, carrying the methodological procedure from phase 2 to phase 3.

In this way, the overall expansive developmental character of the methodological procedure is retained but the uncertainties concerning locus and limits of new forms of the phenomenon under investigation can be dealt with. Figure 2.5 sketches the overall proposal for an expansive methodology. The proposal will be described in more detail in the following section.
2.2.2 Phases and steps in this study’s methodological procedure

The overall methodology in this study will consist of two miniature cycles. The miniature cycles are not disjunctive, but overlap and complement each other (see figure 2.5). The first miniature cycle will be a dialectical cycle which will cover phase 1 and phase 2 of the overall methodology (phenomenology and delineation as well as the formulation of the historical hypothesis of the zone of proximal development of forms of conducting interventions). The dialectical miniature cycle leads to an comprehension of the current state of forms of conducting interventions and their contradictions. The second miniature cycle will be an expansive learning cycle which will cover phase 2 and phase 3 of the overall methodology (an empirically based instance of a form of conducting interventions approach-
ing the zone of proximal development as well as an empirically based instance of a new form of conducting interventions). The expansive learning miniature cycles leads to an empirically based discussion of a form of conducting interventions that could potentially address post-industrial problems effectively.

The direction and the logic of the methodological procedure will be guided by the phases of the overall expansive methodology. The specific steps of the methodological procedure will be guided by the steps of the miniature cycles. In what follows, the specific phases and steps of the methodological procedures will be described. The phases and steps constitute the logic of the chapters of this study and function as the basis for formulating research questions for each of the chapters (see table 2.2).

Phase 1 of the overall expansive methodology is concerned with gaining a preliminary phenomenological insight into the nature of discourse and problems of the phenomenon of conducting interventions, as well as with delineating the phenomenon. This is realized by conducting the first two steps of the dialectical miniature cycle.13

In Chapter 3, the first step of the dialectical miniature cycle is conducted. This calls for constituting the phenomenon of conducting interventions by gathering together current knowledge pertaining to it. It will be analyzed how previous studies contribute to a comprehension of past, present and future forms of conducting interventions. An overview of the main areas of scientific knowledge important for the comprehension of the phenomenon of conducting interventions will be the principal outcome of this chapter. The research question for Chapter 3 is:

*How do previous studies contribute to a comprehension of past, present and future forms of conducting interventions?*

In Chapter 4, the second step of the dialectical miniature cycle will be conducted, completing phase 1 of the overall expansive methodology (phenomenology and delineation of the phenomenon). By discovering the very conditions of the origin of forms of conducting interventions (in developed industrial societies), an initial ‘germ-cell’ model of the phenomenon will be derived and elaborated towards a unit of analysis. The overview of existing knowledge about forms of conducting interventions derived in Chapter 3 will serve as a basis for choosing a period for studying the very conditions of the origin of forms of conducting interventions.

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13 As previously described, in studies that conduct expansive developmental research the phenomenological insight is usually based on the ethnography of problems relating to an empirical case. The current study commenced with a discussion of problems connected with the practice of forms of conducting interventions, which fulfilled to a certain degree the function of gaining a ‘phenomenological’ insight into the nature of discourse and into problems associated with the phenomenon. The method was very different, however. A ‘real’ ethnography constitutes part of a later analysis of the empirical case.
As the object is the constituent element of an activity, the investigation of the origin of these forms will start with a study of the emergence and early development of the object of the phenomenon of conducting interventions. In Chapter 1, the preliminary comprehension of the object of forms of conducting interventions was related to social and organizational problems in work activities. Following the early development of social and organizational problems in Western societies, it is expected that there will be a period during which the emergence of the phenomenon of forms of conducting interventions can be observed. Activity-theoretical models and concepts will be used to capture how in the course of its emergence this phenomenon is ‘spatially’ and ‘temporally’ embedded in a broader context. This frame of concepts and models becomes the unit of analysis. This unit of analysis will function in the next step as a basis for the analysis of past and contemporary forms of conducting interventions. The research question for Chapter 4 is:

What were the preconditions for the emergence of forms of conducting interventions, and how can the context of the emergence be captured as a unit of analysis for the further study of forms of conducting interventions?

Phase 2 of the overall expansive methodology is intended to achieve a comprehension of the historical dynamic of forms of conducting interventions that leads to a hypothesis about the present situation, present contradictions, and a zone of proximal development concerning forms of conducting interventions. This will be realized by conducting the third and fourth step of the dialectical miniature cycle, as well as by conducting the first two steps of the expansive learning miniature cycle.

In Chapters 5, 6 and 7, the third step of the dialectical miniature cycle will be conducted. This will call for the application (as well as testing and elaboration) of the new unit of analysis (the elaborated germ-cell model) to follow the historical-genetic development of forms of conducting interventions. Principal forms of conducting interventions in the industrial era will be identified and analyzed. The overview of previous knowledge outlined in Chapter 3 will serve as an orientation concerning generations of forms of conducting interventions. One aim of the historical-genetic analysis is to express how more complex forms of conducting interventions (including present forms such as management consultancy) developed out of the ‘germ cell’ and other simpler forms. Chapters 5, 6 and 7 will each address a specific part of the industrial era – the ‘Electrification wave’, the ‘Motorization wave’ and the early period ‘Computerization wave’. The research questions for these chapters are:

What were main forms of conducting interventions in the Electrification wave (in the Motorization wave, in the early period of the Computerization wave), and what were the main characteristics of these forms?

In Chapter 8, the main part of the fourth step of the dialectical miniature cycle will be conducted. First, a theoretical comprehension of the overall dynamic
of past and present forms of conducting intervention will be developed. The resulting comprehension will be the basis for formulating a ‘historical hypothesis’ about limitations and main contradictions of previously identified established forms of conducting interventions at the beginning of the post-industrial era. The theoretical comprehension will also be the basis for outlining a hypothetical transitional area towards emerging, potentially more advanced forms of conducting interventions in the post-industrial era. This ‘historical hypothesis’ about a zone of proximal development will make it possible to identify forms of conducting interventions that might possess the potential for addressing post-industrial problems. A theoretically interesting form of conducting interventions which, it is hypothesized, has approached the zone of proximal development (a first, theoretical ‘strategic case’), will be selected. The research question for Chapter 8 is:

What is a historical hypothesis of a zone of proximal development of main forms of conducting interventions in the course of the shift from the industrial era to the post-industrial era?

In Chapter 9, a further part associated with the fourth step of the dialectical miniature cycle will be conducted. The selected theoretically interesting form of conducting interventions will be analyzed by making use of the previously developed unit of analysis. The selected form’s contribution to the understanding of the zone of proximal development of forms of conducting interventions will be assessed. On the basis of this assessment, a second (empirical) ‘strategic case’ that is engaged in conducting interventions and which, it is hypothesized, has further entered the zone of proximal development (and encountered post-industrial problems) will be selected. The research question for Chapter 9 is:

How does the experience of an innovation-oriented form of conducting interventions enrich the historically based comprehension of a zone of proximal development of forms of conducting interventions?

With the selection of the empirical case, the transition from the mainly historical-analytical part of the study (guided by the dialectical miniature cycle) to the mainly practical-experimental part (guided by the expansive learning miniature cycle) is made.

In Chapter 10, the first two steps of the expansive learning miniature cycle are carried out. The first step is concerned with gaining a preliminary phenomenological insight into current problems and discourses associated with the selected empirical case, and also seeks to delineate the activity. The second step is concerned with analyzing the historical development of the empirical case, including the discussion of the present local contradictions and a local zone of proximal development. The results of the dialectical miniature cycle (the historical comprehension of forms, the historical hypotheses of the zone of proximal development of forms of conducting interventions) will function as main reference points in offering a conceptual frame.
On the other hand, the historical comprehension will be enriched by insights from the empirical findings. The research question for Chapter 10 is:

*How does the experience of a specific case experimenting with finding a way of conducting interventions enrich the historically based comprehension of a zone of proximal development of forms of conducting interventions?*

Phase 3 of the overall methodology aims to address the zone of proximal development of forms of conducting interventions and will consider the possibilities of the emergence of a form of conducting interventions which might have the potential to address post-industrial problems effectively.

In Chapter 11, the third step of the expansive learning miniature cycle will be conducted. The experience of the ‘strategic empirical case’ with a possible instance of a qualitatively new way of conducting interventions that has the potential to address post-industrial problems effectively will be analyzed. The outcome of the analysis will be related to the historically gained understanding of the hypothetical transitional area of more advanced forms of conducting interventions in the post-industrial era (the zone of proximal development). The research question for chapter 11 is:

*How does the experience of a specific project where a new model of conducting interventions is developed enrich the historically based comprehension of a zone of proximal development of forms of conducting interventions?*

The final part of the methodology is directed towards a discussion of precisely such a possible instance of a qualitatively new form of conducting interventions with the potential to address post-industrial problems effectively. It is emphasized here that the case for asserting the emergence of a new form of conducting interventions would require more than one study (i.e. the experience from more than one empirical case). In this sense, the present contribution marks a beginning only, and, it is hoped, will serve as a possible basis and resource for further contributions. A summary and discussion of results, as well as an outlook on such possible future research, will be presented in Chapter 12.
Table 2.2 provides an overview of chapters, methodological phases and steps, as well as a guide to the main content and research questions in each of the chapters.

Table 2.2a: Overview of chapters, methodological phases and steps, as well as research questions

<table>
<thead>
<tr>
<th>Ch.</th>
<th>Phase of overall methodology</th>
<th>Step of miniature cycle</th>
<th>Main content</th>
<th>Research question</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Phase 1</td>
<td>Step 1 of dialectical miniature cycle</td>
<td>Gathering ‘chaotic whole’ of previous knowledge about the phenomenon of conducting interventions</td>
<td>How do previous studies contribute to a comprehension of past, present and future forms of conducting interventions?</td>
</tr>
<tr>
<td></td>
<td>Phenomenology and delineation</td>
<td>Object constitution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Phase 1</td>
<td>Step 2 of dialectical miniature cycle</td>
<td>Analyzing historical conditions of the emergence of phenomenon of conducting interventions, capturing it by germ cell that is elaborated towards unit of analysis for studying main forms of conducting interventions</td>
<td>What were the preconditions for the emergence of forms of conducting interventions, and how can the context of the emergence be captured as a unit of analysis for the further study of forms of conducting interventions?</td>
</tr>
<tr>
<td></td>
<td>Phenomenology and delineation</td>
<td>Developing an initial ‘germ-cell’ model</td>
<td></td>
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</tr>
<tr>
<td>5</td>
<td>Phase 2</td>
<td>Step 3 of dialectical miniature cycle</td>
<td>Identifying and analyzing historical development of main forms of conducting interventions in the ‘Electrification wave’</td>
<td>What were main forms of conducting interventions in the Electrification wave, and what were main characteristics of these forms?</td>
</tr>
<tr>
<td></td>
<td>Historical analyses</td>
<td>Test and elaboration of initial model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Phase 2</td>
<td>Step 3 of dialectical miniature cycle</td>
<td>Identifying and analyzing main forms of conducting interventions in the ‘Motorization wave’</td>
<td>What were main forms of conducting interventions in the Motorization wave, and what were main characteristics of these forms?</td>
</tr>
<tr>
<td></td>
<td>Historical analyses</td>
<td>Test and elaboration of initial model</td>
<td></td>
<td></td>
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<tr>
<td>7</td>
<td>Phase 2</td>
<td>Step 3 of dialectical miniature cycle</td>
<td>Identifying and analyzing main forms of conducting interventions in the early period of the ‘Computerization wave’</td>
<td>What were main forms of conducting interventions in the early period of the Computerization wave, and what were main characteristics of these forms?</td>
</tr>
<tr>
<td></td>
<td>Historical analyses</td>
<td>Test and elaboration of initial model</td>
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<td></td>
</tr>
</tbody>
</table>
Table 2.2b: Overview of chapters, methodological phases and steps, as well as research questions

<table>
<thead>
<tr>
<th>Ch.</th>
<th>Phase of overall methodology</th>
<th>Step of miniature cycle</th>
<th>Main content</th>
<th>Research question</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Phase 2</td>
<td>Step 4 of dialectical miniature cycle</td>
<td>Comprehending the present conditions of the main forms of conducting interventions, including main contradictions and prospects of development</td>
<td>What is a historical hypothesis of a zone of proximal development of main forms of conducting interventions in the course of the shift from the industrial era to the post-industrial era?</td>
</tr>
<tr>
<td></td>
<td>Formulation of zone of proximal development</td>
<td>Ascending to the concrete diversity of the object</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Phase 2</td>
<td>Step 4 of dialectical miniature cycle</td>
<td>Analyzing a ‘strategically selected’ form of conducting interventions in the ‘Computerization wave’ and relating the outcome of the analysis to the comprehension of the zone of proximal development</td>
<td>How does the experience of an innovation-oriented form of conducting interventions enrich the historically based comprehension of a zone of proximal development of forms of conducting interventions?</td>
</tr>
<tr>
<td></td>
<td>Formulation of zone of proximal development</td>
<td>Ascending to the concrete diversity of the object</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Phase 2</td>
<td>Steps 1 and 2 of expansive learning miniature cycle</td>
<td>Analyzing the experience of the ‘strategic empirical case’ about experimenting with different ways/models of conducting interventions, and relating the outcome to the historically derived comprehension of the zone of proximal development of forms of conducting interventions</td>
<td>How does the experience of a specific case experimenting with finding a way of conducting interventions enrich the historically based comprehension of a zone of proximal development of forms of conducting interventions?</td>
</tr>
<tr>
<td></td>
<td>Formulation of zone of proximal development</td>
<td>Phenomenology and delineation of local empirical case as well as historical analyses of local activity and formulation of local zone of proximal development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Phase 3</td>
<td>Step 3 of expansive learning miniature cycle</td>
<td>Analyzing the experiment of the ‘strategic empirical case’ with a new model of conducting interventions and relating the outcome to the historically derived comprehension of the zone of proximal development in general and prospects of development of a new form of conducting interventions in particular</td>
<td>How does the experience of a specific project where a new model of conducting interventions is developed enrich the historically based comprehension of a zone of proximal development of forms of conducting interventions?</td>
</tr>
<tr>
<td></td>
<td>Discussion of new form of phenomenon</td>
<td>Formation of empirically based instance of new model of local activity</td>
<td></td>
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</table>
3 Three perspectives on forms of conducting interventions

3.1 Mapping the field

The central task in this chapter is to investigate the extent to which existing models and studies assist in our understanding of the past, present and future forms of conducting interventions. The primary research question is as follows:

How do previous studies contribute to a comprehension of past, present and future forms of conducting interventions?

What kind of studies should be included in the review? A key aim is to broaden the outlook on forms of conducting interventions, moving from a ‘frog’s perspective’ to a ‘bird’s perspective’:

Numerous concepts, methods and methodologies serve as guidelines for conducting interventions in work and organization. Characteristics of intervention concepts and methodologies undoubtedly influence the chances of success or failure when addressing social and organizational problems in the world of work. Matters of business logic and other characteristics of activities or of a whole industry specialized on conducting interventions will also contribute to the understanding of the phenomenon of forms of conducting interventions. Furthermore, it will be argued here that forms of conducting interventions should not be studied independently from their spatio-temporal context. This context includes the evolution of client activities and their problems, as well as the societal innovation process.

Consequently, the review and analysis of available scientific knowledge will have the following three frames of reference:

(1) Studies addressing concepts and methodologies used in intervention (section 3.2)
(2) Studies addressing forms of conducting interventions as a business or industry (section 3.3)
(3) Studies addressing the spatio-temporal context of forms of conducting interventions, including the societal innovation process (section 3.4).

Section 3.5 draws conclusions from currently available scientific knowledge about the phenomenon under investigation.
3.2 Concepts and methodologies deployed in interventions

In the following section, different perspectives on concepts and methodologies of intervention are described. The number of available concepts and methodologies is sufficiently high to render an exhaustive discussion impossible. It is necessary, to consider a brief description of selected concepts and methodologies. In addition, different possibilities exist for classifying or grouping intervention concepts and methodologies. Each approach to typifying implies, whether explicitly or implicitly, a certain theoretical orientation. In this study, intervention concepts and methodologies are divided into five groups based primarily on differences in disciplinary background and the time that they emerged.

3.2.1 Early engineering related intervention methodologies

According to Fincham and Clark (2002: 3), the origins of consultancy lie in the efficiency movement pioneered by Frederick Taylor and other proponents of engineering science in the late 19th and the early 20th century. In the 1880s, these mechanical engineers founded the American Society of Mechanical Engineers (ASME), which established itself as an important forum for discussion and publication of procedures and instruments for efficiency-oriented interventions (Aitken 1960:18). The ASME’s contributions to improving companies’ efficiency constituted the first science-based tradition of interventions in work organizations (Guillén 1994: 40). A key contribution was Scientific Management, a system of different methods (including, for example, time and motion studies), derived from experiments by Frederick Taylor. Historically, Taylor’s Scientific Management can be seen as the earliest widely adopted intervention methodology (Nelson 1980: 122; 188–189).

3.2.2 Early behavioral science based intervention methodologies

Fincham and Clark (2002: 5–6) describe Organization Development (OD) as a tradition of intervention that was pre-eminent between the late 1950s and the mid 1980s. Proponents of OD were, and still are, overwhelmingly social scientists and psychologists, whose work is oriented towards describing and developing a social entity, within organization (Fincham and Clark 2002: 5). A range of instruments associated with OD interventions has been created since the 1950s, and others continue to be developed.

The OD movement can be divided into an early and late phase. The former is closely connected to the Human Relations movement, while the latter may be connected to themes associated with Organizational Culture and Organizational Learning.

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14 Methodologies in the sense of overall conceptual instruments that can include methods, theories or best practice models.
A number of Harvard scholars grouped around Mayo and Roethlisberger represent the earliest significant proponents of the Human Relations movement. Mayo and Roethlisberger’s method of ‘personnel counseling’ of individual workers – presented in Roethlisberger and Dickson’s famous volume, *The Management and the Worker* (1939) – can be regarded as the first specification of a Human Relations intervention (Gillespie 1991). However the group centered on Mayo and Roethlisberger is not currently seen as the most influential group of pioneers associated with Organization Development; this accolade is extended to Kurt Lewin and his followers (Cummings and Worley 2001: 6–7). It was with Lewin’s work in the 1930s and 1940s, which was mainly focused on the comprehension and development of human groups, that the basis of the main methods of OD, such as Laboratory Training of groups and Action Research/Survey Feedback, was established (French and Bell 1973; Cummings and Worley 2001).

Because of its close relation to Kurt Lewin, the socio-technical-systems approach (Emery and Trist 1969), pioneered by scholars from the Tavistock Institute of Human Relations in London, could also be described as an OD related method of intervention, although it has since grown into a methodology and movement of its own. The pioneering study of the approach conducted in British coal mines by Trist and Bamforth (1951) was published and widely discussed in the context of Human Relations research. As the approach attempts a ‘joint optimization’ of human and technical factors (Emery and Hill 1993), the approach can be seen as an attempt to combine elements of the engineering approach and the OD/Human Relations tradition (see von Eijnatten 1993, and Pihlaja 2005, for comprehensive analyses).

Intervention methodologies connected to the later phase of OD are discussed in subsection 3.2.4.

### 3.2.3 Management Science related concepts used in interventions

Since the 1930s and 1940s, but particularly after the Second World War, concepts from management science emerged that had a high impact upon the conduct of interventions in organizations based on widely accepted models of management and organization. Authors such as Drucker and Dale popularized in the USA discussions of concepts geared towards organizing management (Guillén 1994: 85).

While the OD movement’s conceptual instruments used in intervention consisted mainly of methodologies, those in the management science tradition consisted principally of ‘management concepts’ – examples and models of management practice.

In his book on management ideas, Thomas Davenport and his colleagues present an (already reduced) list of important management concepts: their study contains 140 concepts (2003: 217–218). In what follows, central concepts only will be highlighted.

The management concept that has been most influential in interventions following the Second World War is the decentralized or multidivisional form of organization, as described by Peter Drucker (1946, 1954). From the late 1960s to the early
1980s, several different concepts for analyzing and optimizing the portfolio of organizations were widely used. Main examples include the 4-field matrix of market share and market growth developed by the Boston Consulting Group (Henderson 1979), and Porter’s concepts (1980, 1985) for achieving competitive advantage. The previously described management concepts are all connected to the question of finding an optimal ‘strategy and structure’ of organizations (Chandler 1962).

In the 1980s, the question of improvement of quality (of products, processes, functions etc.) in organizations became popular. Concepts such as Lean production (Womack et al. 1990), or Total Quality Management (e.g., Hackman and Wageman 1995), became central themes of interventions.

3.2.4 Intervention methodologies related to later developments in Behavioral science

Between the late 1960s and the 1990s, a second generation of OD/Human Relations related intervention methodologies emerged. The second generation of OD related instruments was influenced by ideas of process consultation and organizational culture (Schein 1969; 1980), as well as by organizational learning (Argyris and Schön 1978, 1995; Senge 1990). Schein’s process consultation emphasizes the importance of a non-directive way of OD related interventions in which the interventionist structures the process of the intervention while the client focuses on the content – including making decisions about changes. Argyris and Schön’s ‘Action Science’ as well as Senge’s ‘Fifth Discipline’ address patterns of behavior that threaten organizational learning and suggest concepts that support change towards a higher level of organizational learning.

Unsurprisingly, OD proponents from different generations reveal and share some common ideas about how to conducting an intervention. Chris Argyris (1970: 32) clarifies that his approach to conducting interventions has its roots in Kurt Lewin’s method. He describes his understanding of intervention as follows:

The resources of the client system and the resources of the interventionist are joined together to conduct an intervention that helps the client understand the nature of its problem and adds to the basic theory of intervention. The objective of this intervention activity is to help the client system and simultaneously to develop new conceptual models that help to explain that particular case as well as others that may be identified in the future. (Argyris 1970: 32)

While OD proponents from different generations share common ideas about conducting interventions, there are also visible developments. For example an expansion of the object of interventions – from individuals (Mayo/Roethlisberger,) and groups (Lewin), towards whole organizations (Argyris, Schein, Senge), has taken place. Newer OD related contributions focus on the development of sophisticated methods to involve increasingly larger numbers of actors into interventions (Axelrod 1992; Klein 1992; Weisboard and Janoff 1995; Emery and Purser 1996; Bunker and Alban 1997; Gustavsen 1992, 2001).
Apart from the OD, other traditions with roots in Behavioral science have developed intervention methodologies in the later part of the 20th century. The ‘Systemic Approach’ is a form of conducting interventions that is widespread in Germany, Austria and Italy. It has its roots in theoretical approaches such as Niklas Luhman’s theory of social systems, the autopoietic concept of Maturana/Varela, cybernetics (e.g., von Foerster), and in constructivism. Furthermore, many ‘systemic’ concepts and tools have their origin in systemic family therapy (e.g., Gregory Bateson, Mara Selvini-Palazzoli). The systemic approach is not a well-structured tradition, and theories and methods are shared among its proponents. It is, then, a rather loose scientific and practitioners’ approach consisting of general notions.

Midgley (2000: 187–213) describes different waves of ‘systems thinking’ that moved from a first wave of ‘real world’ models based on quantitative applied sciences (including von Bertalanffy’s open systems theory from 1950), and on early models of Operational Research and Systems Dynamics (e.g., Forrester 1961), to a second wave concerned with the comprehension of systems as constructs to aid understandings (e.g., Checkland 1981), and finally to a third wave that emphasized the inclusion of an analysis of power relations and the use of a great variety of methods in a pluralist intervention practice (e.g., Midgley 2000).

3.2.5 Intervention methodologies related to later developments in Management Science and ICT

From the 1990s onwards, conceptual instruments for interventions have been largely influenced by new possibilities opened up by the ICT revolution. The following examples represent a selection of newer ICT and Management Science related concepts often used in interventions (Fink and Knoblach 2003). The most important early ICT/management concept is Business Process Reengineering or redesign (BPR), which implies radical change – mainly rationalization – to organizational processes on the basis of ICT applications (Davenport and Short 1990; Hammer 1990).

A further concept is Customer Relationship Management (e.g., Pepper and Roger 1993), which is used to gain a competitive advantage by establishing specific relationships with customers, based on the possibilities of collecting and analyzing data about customers offered by ICT.

Concepts such as E-Commerce (or E-Business) were introduced to describe new forms of commercial transactions supported by ICT networks (e.g., Kalakota and Whinston 1996).

As knowledge became a significant resource in the business context, the way in which knowledge was managed became an important issue within organizations. Concepts of knowledge management (e.g., Nonaka and Takeuchi 1995) thus became a general heading for a number of interventions focused upon responses to ICT systems and demands.

A further key ICT/management concept is ‘Mass Customization’ (e.g., Pine 1992). The core idea of Mass Customization is to determine how to combine the low unit costs of mass production processes with the flexibility of individual customization.
While the ‘management concepts’ described in subsection 3.2.3 mainly addressed single firms (e.g., their strategy and structure), more recent ICT/management concepts address objects that include more than one organization or activity. This expansion becomes very clear in the case of the concept of ‘Co-creation’ (e.g., Prahalad and Ramaswamy 2004). Proponents of Co-creation argue that value is increasingly being co-created by the firm and the customer, rather than being created entirely inside the firm. Co-creation consequently supports the direct and active involvement of users in the design of products and services.

Similar to the ‘management concepts’ described previously, ICT/management concepts that emerged in the 1990s and 2000s serve as models of ‘best practice’, and are used to define visions for client activities targeted in interventions.

3.2.6 Oppositions concerning groups of intervention concepts and methodologies: rational and normative approaches

The intervention concepts and methodologies outlined to this point can be divided into five groups based principally on differences in disciplinary background and the period in which they emerged. Alternative ways of classifying intervention methodologies other than by reference to their disciplinary background could address specific dilemmas of intervention methodologies and group the intervention methodologies according to their ways of dealing with those dilemmas: e.g., tending to one extreme position, tending to the opposite extreme position, or attempting to find a way of integrating extreme positions.

One such alternative classification might be based on the model of Barley and Kunda (1992). According to them, the evolution of managerial discourse can be described as an interplay between ideologies of normative and rational control; they note that rational approaches have been dominant.

Barley and Kunda criticize former historical analyses of managerial discourse for being ‘linear’ or ‘one-dimensional’. Rather than having evolved in a linear fashion, managerial discourse appears to have alternated, in a wave-like manner, between ‘ideologies’ of normative and rational control (Barley and Kunda 1992: 363f.; see table 3.1). This wave-like development is related by the authors to more fundamental economical processes of expansion and contraction – so called ‘long-waves’ or Kondratiev waves (1992: 389–391; see subsection 3.4.3).

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15 This sixth ideology was subsequently added to the original model of five ideologies in a paper authored by Gideon Kunda and Galit Ailon-Souday (2005): 201.
Table 3.1: Normative and rational waves of managerial discourse (Barley and Kunda 1992: 364; Kunda and Ailon-Souday 2005: 201)

<table>
<thead>
<tr>
<th>Ideology</th>
<th>Era of ascent</th>
<th>Tenor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Betterment</td>
<td>1870–1900</td>
<td>Normative</td>
</tr>
<tr>
<td>Scientific Management</td>
<td>1900–1923</td>
<td>Rational</td>
</tr>
<tr>
<td>Human Relations</td>
<td>1923–1955</td>
<td>Normative</td>
</tr>
<tr>
<td>Systems Rationalism</td>
<td>1955–1980</td>
<td>Rational</td>
</tr>
<tr>
<td>Organizational Culture</td>
<td>1980–1992</td>
<td>Normative</td>
</tr>
<tr>
<td>Market Rationalism</td>
<td>1992–present</td>
<td>Rational</td>
</tr>
</tbody>
</table>

According to Barley and Kunda, the described ideologies have never actually disappeared; instead, images and practices central to each of the ideologies have been gradually institutionalized.

It therefore seems that American managerial discourse has been elaborated in consecutive waves […] of two broad types […] ideology of rational control [and] ideology of normative control, […] alternated through time, at least insofar as instances of one or the other were considered to be at the cutting edge of managerial thought. Each of the rational rhetorics surged to prominence in the wake of a normative rhetorics heyday and vice versa. (Barley and Kunda 1992: 365)

In their further analysis of management ideologies, Barley and Kunda describe characteristics of the five ideologies. They clarify when and why each waves occurred, what the main rhetoric, contributions and proponents was, and what might have triggered the emergence of the next wave to dominance.

The present study argues that a strong relation exists between Barley and Kunda’s ideologies of managerial discourse and intervention approaches – with the exception of ‘industrial betterment’ ideology. Roughly, the intervention concepts, methods and methodologies commented on in subsection 3.2.1–3.2.5 correspond to Barley and Kunda’s groups of Scientific Management, Human Relations, Systems Rationalism, Organizational Culture and Market Rationalism.

16 ‘Industrial betterment’ was a ‘welfare’ ideology of managers with its origins in the attempts of railroad managers to offer their workers better living and working conditions. Popular initiatives included building libraries and recreational facilities, offering classes for employees and their families and improving the aesthetics and sanitation of factories (Barley and Kunda 1992: 365–366).
Adler (2001)\textsuperscript{17}, an organizational scientist, has contributed to this discussion by further elaborating Barley and Kunda’s work.\textsuperscript{18} Furthermore, Adler presents alternatives to the concepts ‘rational’ and ‘normative’ control. Instead of rational and normative approaches, he distinguishes between control and commitment-oriented approaches. Control (e.g., by Scientific Management) and commitment (e.g., by Human Relations) are seen as opposing needs of management that analysts tried to combine in the course of the 20\textsuperscript{th} century.

[...]

Contrary to Barley and Kunda he does not see that this is simply a pendulum movement; instead tendencies towards integrating the opposing needs of management such as socio-technical-systems approach existed.

\textsuperscript{17} Barley and Kunda (1992) wrote their contribution before the 3\textsuperscript{rd} rational wave was clearly identifiable and did not include a third rational wave in their original model. Adler’s suggestion of a third rational wave (business process reengineering, outsourcing, and networks) can also be considered as an elaboration of their original model.

\textsuperscript{18} A further interesting contribution came from Mauro Guillén. Guillén conducted a comparative sociological study of the adoption of ‘Scientific Management’, ‘Human Relations’, and ‘structural analysis’ (‘systems rationalization’, in Barley’s and Kunda’s sense) as organizational paradigms in the United States, Germany, Spain and Great Britain over the last century. He explores how managers and employers perceive and solve organizational problems related to the maintenance of authority in the workplace and the management of organizations (Guillén 1994: xi). His goal is to evaluate, understand, and explain the success or failure of organizational ideologies and techniques among two distinct groups of managers, namely management intellectuals and management practitioners (Guillén 1994: 4). He shows that methodologies such as Scientific Management, Human Relations and structural analysis (or systems rationalization) left imprints in the organizations of the analyzed societies – though in a different degree and form, depending on the different systemic contexts prevalent in individual countries.
Finally, the sequence of control innovations – from scientific management to systems rationalism to reengineering – seems to have become increasingly hospitable to commitment oriented variants. Within two or three years of publishing a text popularizing a rather brutally coercive method of business process reengineering (Hammer and Champy 1993), both James Champy and Michael Hammer published new volumes (Champy 1995; Hammer 1996) stressing the importance of the human factor and the need for job redesigns that afford employees greater autonomy. The undeniably autocratic character of much early reengineering rhetoric and its rapid ‘softening’ compares favorably with more unilateral and enduring forms of domination expressed in post-War systems rationalism. It compares even more favorably with the even more unilateral and rigid rhetoric in turn-of-the-century scientific management: scientific management only softened its relations with organized labor after nearly two decades of confrontation (Adler 2001: 28).

Adler perceives a tendency towards integration of both needs, a trend towards ‘collaborative interdependence’ (see figure 3.1).

![Figure 3.1: Adler’s reinterpretation of the dynamics of rational and normative approaches (2001)]
An additional contribution that describes different groups of approaches in a similar manner is the model offered by Beer and Nohria (2000). These authors distinguish between approaches to organizational change oriented around ‘Theory E’ (with the aim of creating economic value), on the one hand, and approaches oriented around ‘Theory O’ (with the aim of developing an organization’s human capabilities), on the other (2000: 1–5). Table 3.2 describes their distinction (2000: 1–4).

<table>
<thead>
<tr>
<th>Purpose and Means</th>
<th>Theory E</th>
<th>Theory O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Maximize economic value</td>
<td>Develop organizational capabilities</td>
</tr>
<tr>
<td>Leadership</td>
<td>Top-down</td>
<td>Participative</td>
</tr>
<tr>
<td>Focus</td>
<td>Structure and systems</td>
<td>Culture</td>
</tr>
<tr>
<td>Planning</td>
<td>Programmatic</td>
<td>Emergent</td>
</tr>
<tr>
<td>Motivation</td>
<td>Incentives lead</td>
<td>Incentives lag</td>
</tr>
<tr>
<td>Consultants</td>
<td>Large/knowledge driven</td>
<td>Small/process driven</td>
</tr>
</tbody>
</table>

**Table 3.2: Theories E and O of change (Beer and Nohria 2000)**

### 3.2.7 Attempts at integrating dilemmas within intervention methodologies

Some scholars who identified dilemmas among intervention methodologies attempted to develop integrative approaches. An example of such an attempt at integrating oppositions between methodologies is the socio-technical-systems approach, as previously described (Emery and Trist 1969; see subsection 3.2.2). The approach can be regarded as an effort to deal with the dilemma of ‘technical’ vs. ‘social’ intervention methodologies through integrating elements of the engineering and the OD/Human Relations traditions (see Pihlaja 2005).

In the late-1980s, Developmental Work Research (see Chapter 3 and section 7.3), an original approach to research and intervention, started to develop in Finland. The approach was based on the theoretical and empirical work of Yrjö Engeström. He developed his theory of expansive learning and formulated the methodological principles of Developmental Work Research inspired by theoretical and methodological ideas from the traditions of the Cultural Historical Activity Theory (Vygotsky 1962, 1978; Leontjev 1978; Davydo 1977; Engeström 1987). This approach can be understood as integrating concepts with different disciplinary backgrounds in an endeavor to facilitate the development of new models of work organization.

Beer and Nohria (2000) not only discuss the difference between approaches oriented on ‘Theory E’ (focusing on creating economic value) and approaches oriented on ‘Theory O’ (focusing on developing the organization’s human capabilities), but also criticize the separation of both ways of conducting change and discussed ways of resolving the tension between Theory E and Theory O. One way
to deal with this tension would be to conduct a Theory E-oriented intervention and later to conduct a Theory O-oriented one. However, Beer and Nohria propose to hold the tension and integrate E and O simultaneously (ibid.: 19–23).

Their example for illustrating the integration of Theory E and Theory O is the case of Asda, a major British grocery chain focused mainly on superstores and which was nearly bankrupt at the beginning in the 1990s. Led by a new CEO the company went through a period of radical restructuring in the course of the 1990s. After successful restructuring, in 1999 Wal-Mart acquired Asda for eight times its 1991 value (ibid.: 19–23). Before restructuring, Asda had acquired many superstores from a rival company which embroiled it in a financial crisis leading to the resignation of the former CEO. ‘Asda had perhaps bitten off more than it could chew’ (Grant 2005). Beer and Nohria analyze the restructuring of Asda in the 1990s and conclude that a synthesis of Theories E and O of change was in fact achieved:

Economic goals such as an increase of shareholder value were emphasized (Theory E), but the value of teamwork, excellence and openness to teamwork were also articulated (Theory O). The change process of Asda followed a three-year plan and was led from the top by the new CEO who also set the overall direction (Theory E). At the same time, the restructuring plan was relatively open to changes and also to bottom-up processes that involved employees at all levels in surfacing problems and in initiating the creation of solutions (Theory O). The organization design of Asda was changed towards a flatter structure first tested at selected Asda stores and then replicated in all stores (Theory E). On the other hand, a culture of open debate and discussions was also established (Theory O). Financial incentives within the change process (e.g. the compensation and stock ownership plans) were important (Theory E), but better management was seen as the primary compensation (Theory O). Large consultancies such as McKinsey were used to support the change process, bringing in outside expertise (Theory E); nevertheless, consultancy engagements were clearly delimited and controlled by the company (Theory O).

Other commentators on Asda’s change in the 1990s also highlight the process of revamping Asda’s brand image, broadening its product mix, and lowering prices – all business strategies employed by the enormously successful US company Wal-Mart, which acquired Asda in 1999 (Grant 2005).

3.2.8 Limitations of focusing on intervention methodologies

All of the traditions of intervention concepts, methods and methodologies analyzed thus far are relevant in the sense that they have a relation to the object of this study. What is notable is that many of the still active traditions seem to have developed newer approaches that address larger formations of work activities where post-industrial problems could emerge. Correspondingly, each of these newer approaches may represent an important contribution to the discussion of forms of conducting interventions with the potential to address post-industrial problems effectively. However, how are we to initiate such a discussion? The selection and grouping of methodologies for discussion already runs the danger of arbitrariness
as became clear with the 140 listed concepts of Davenport et al. (2003) (see subsection 3.2.3).

The problem here is not merely the sheer number. There also seems to be a lack of meaningful relations between methodologies – which is the case even within single research traditions. This issue is illustrated by an interesting example from Amy Edmondson. Her analysis is focused on differences between the theories and methods of intervention approaches developed by Chris Argyris, Edward Schein and Peter Senge (all related to the themes of Organizational Culture and Learning). Taking on the same virtual client, the 3 scholars proposed 3 different ideas for analysis and intervention (Edmondson 1996). Edmondson writes that this kind of divergence is not the exception. On the contrary, there is a long tradition among groups of scholars of interventions to develop separate theories and methods as well as to avoid investing efforts in the development of a joint theory (Edmondson 1996: 571–572.)

Edmondson’s example suggests that even within a single research tradition of intervention methodologies there is a lack of meaningful relations between different theories and methods. A too narrow definition of ‘important’ forms of conducting interventions would clearly lead to the danger of theoretical randomness or arbitrariness (Holzkamp 1987) – the danger of ‘answering the wrong question right’. The overview developed by the models of Barley and Kunda (1992) and Adler (2001) suggests a general idea of groups of intervention methodologies and can be used to address the danger of arbitrariness.

Based on their distinctions, one could choose to stop here with the overview of forms of conducting interventions and start a discussion about the possibilities of integrating rational and normative approaches. While such a discussion would be interesting, its significance would remain unclear. Many approaches to intervention methodologies were developed in the 20th century; a significantly smaller number have been applied to address problems existing in work activities; and even less have led to sustained forms of conducting interventions. This study argues that it would be useful to develop a broader focus as a basis for a discussion of future forms of conducting interventions.

3.3 Interventions as part of a business or an industry

Discussing forms of conducting interventions where they are a sustained system or the basis of a business, means moving beyond a focus on certain methodologies for intervention. A major area of research in this context focuses on Management and IT consultancy firms. In this study, existing consultancy firms are seen as the dominant forms of conducting interventions, but they are not seen as the only business model for establishing and conducting interventions.

3.3.1 Critical studies of consulting

In 2002, two volumes that provided a critical overview of some perspectives of forms of conducting interventions were published (Kipping and Engwall 2002;
Clark and Fincham 2002). Their objective was less concerned with particular methodologies or concepts of intervention, but rather on intervention as a business and as an industry. While those studies are mainly focused on consultancy forms of conducting interventions, they also consider other forms and can be used as a starting point for discussion. The introduction to both volumes distinguish between earlier (rather uncritical) perspectives and later, more critical, perspectives on conducting interventions.

Engwall and Kipping (2002: 1–2) describe the perspective of early innovation researchers (such as Rogers 1962) on conducting interventions. They perceive interventionists as important ‘carriers’ in the diffusion of scientific knowledge and innovations. A similar ‘benevolent’ view of conducting interventions can be found in studies of the knowledge economy and society (e.g., Drucker 1993), where consultants are seen as prototypes of knowledge workers (Engwall and Kipping 2002: 3). Fincham and Clark (2002) describe the OD tradition as an early example of such ‘benevolent’ perspectives.

According to Fincham and Clark (2002: 6–7), the critical perspective on consultancy emerged in the 1980s. It differs from the OD perspective in a number of important aspects:

First, the critical tradition does not focus on how to give prescriptive advice (as interventionists give to clients), but on the strategies employed by consultants to convince clients of the worth of their advice.

Second, instead of seeing interventionists as professional helpers from the critical perspective, consultants’ claims of professionalism are seen as resources used to enhance consultant authority and credibility. Further, the critical perspective does not focus on one particular approach (as in the case of OD), but on the full range of forms of intervention approaches including human resource management, information technology and strategy.

Third, the critical perspective does not seek to conduct studies on the utility and effectiveness of interventions. Instead references to effectiveness are seen as part of the power games and rhetorical strategies employed by consultants to legitimize their knowledge claims.

Fincham and Clark argue that the consultancy business can be described by fashion theory. They refer to Abrahamson who claims that management ideas and techniques (such as Total Quality Management or Business Process Reengineering) are often, though not always, subject to swings, just like clothing styles. The need for a flow of new management fashions is created because managerial norms of progress and rationality govern managerial behavior. These norms are societal expectations that managers will use new management techniques and the most efficient ones. As a fashionable technique becomes older these norms lead to a pressure on managers to stay open-minded and move on to the next technique (Abrahamson 1996: 256–257). Management fashion-setters, like management consultants, management gurus, business schools and mass-media organizations compete in creating collective beliefs that their particular management fashion is the most efficient and innovative in a particular managerial area (Abrahamson 1996: 267).
According to Fincham and Clark, management consultants use power games, rhetorical tricks and other instruments to convince managers that their particular techniques are state-of-the-art and meet managers’ immediate need (Fincham and Clark 2002: 2). Consequently, central themes within the critical perspective are rhetoric and persuasion in consultancy and the relation of consultants to their clients (Fincham and Clark 2002: 8–11). Studies following the critical consulting tradition rarely focus on ‘positive’ contributions/aspects of forms of conducting interventions or discuss possibilities of their future development. They focus rather on the description and criticism of some ‘negative’ elements of the business models of the consultancy form of conducting interventions.

3.3.2 Historical studies of consultancy

Business historians have joined and influenced the critical consulting discourse. Christopher McKenna claims that the basis for understanding consulting is to trace its origins. While it is often claimed that the origins of consulting and intervention are related to Taylor’s Scientific Management, McKenna distinguishes between two different roots: Scientific Management related interventions, and modern management consulting (1995: 51–52).

According to McKenna, the origins of modern management consulting are to be found in the 1930s. The investment bankers in the USA were forced by government regulations (such as the ‘Glass-Steagall Act’) following the 1929 crash, to abandon their practice of offering advice to top management of client companies. This development opened the possibility for specialized management consultancies such as McKinsey to fill the gap, and led – according to McKenna – to their institutional and professional growth, and later to their predominant position (1995: 56–57).

McKenna is close to the position of many within the critical consulting tradition when he claims, together with Djelic and Ainamo, that in the case of management consultants the offering-solution-to-problems aspect of their activity is not central. Management consultancies contribute more to a redefinition of the institutional rules of the capitalist games in the countries where they become players, than to the diffusion of knowledge and practices. In this way, they play an important role in diffusing the American version of capitalism in the process of globalization (Djelic, Ainamo and McKenna 2002; see also Faust 2000).

Matthias Kipping challenges the fashion theory based view of some scholars of the critical consulting tradition. He argues that while fashion theory has greatly advanced the understanding of consulting, its perspective is not helpful in explaining longer-term historical trends in consulting industries. If, as this view suggests, consultants (and others) continually launched new fashions, replacing the previous ones, all they would tend to do is ensure their survival and the stability of demand, and no radical changes would be visible. This conflicts however, with the research findings of historians such as Kipping himself and McKenna, that fundamental shifts in the focus of consulting work itself have indeed occurred (Kipping 2002).
Kipping adopted a long-term historical perspective on the evolution of management consulting during the twentieth century. He examined a relatively limited number of consultancy firms: the largest and most visible service providers of their period, which could be considered as representing a single type of consulting industry as a whole at a given moment. Kipping identified – in contrast to McKenna – three major generations of consultancies that emerged over the course of the twentieth century. Their main themes can be characterized tentatively as Scientific Management, organization and strategy, and IT-based networks. Kipping claims that the emergence – and also decline – of different waves of management consultancies is closely linked to major changes in the client companies, in terms of management practice and ideology (Kipping 2002: 28ff.). Kipping’s three ‘waves’ can be distinguished in table 3.3.

Table 3.3: Consultancy waves (Kipping 2002: 38)

<table>
<thead>
<tr>
<th>Wave</th>
<th>Key issues</th>
<th>Overall Duration</th>
<th>Major Expansion</th>
<th>Pre-eminent consultancies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific</td>
<td>Efficiency of workers and</td>
<td>1900s–1980s</td>
<td>1930s–1950s</td>
<td>Emerson, Bedaux, Production Engineering Urwick Orr, Personnel Administration, Maynard</td>
</tr>
<tr>
<td>Management</td>
<td>production</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and strategy</td>
<td>planning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT-based</td>
<td>Internal and external</td>
<td>1960s–????s</td>
<td>1990s–????s</td>
<td>Andersen/Accenture, Deloitte &amp; Touche, Ernst and Young, KPMG, PWC, EDS, CSC, Gemini</td>
</tr>
<tr>
<td>networks</td>
<td>co-ordination</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Kipping found that there were significant differences between the consultancy generations concerning their source of reputation, the background of their consultants, the primary type of project, and the internal hierarchy (see table 3.4). According to Kipping (2002: 29–30), a very close relationship exists between the experience of staff in a consultancy and their degree of standardization of solutions. He refers to Maister (1993: 3–20) when he distinguishes between the almost unique ‘brains’ projects (largely carried out by experienced senior staff), the slightly more standardized ‘grey hair’ projects (requiring senior staff with experience, but also offering delegation of tasks to junior consultants), and highly standardized ‘procedure’ projects (carried out by a large number of junior consultants under the supervision of more senior staff).
According to Kipping, most projects in Scientific Management were of the ‘brains’ type. In the organization and strategy-consultancy wave, most projects were of the ‘grey hair’ type, allowing a limited degree of standardization and involving a higher number of junior staff.

Most projects concerning IT-based consultancies were of the highly standardized ‘procedure’ type (requiring less first-hand experience), where the senior-junior consultant ratio was approximately one to twenty. According to Kipping, this ratio also explains why strategy and organization consultancies have problems in direct price-based competition with IT consultancies.

### Table 3.4: Consultancy waves and business characteristics (Kipping 2002: 44)

<table>
<thead>
<tr>
<th>Wave</th>
<th>Source of reputation</th>
<th>Background of consultants</th>
<th>Type of project</th>
<th>Hierarchy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific Management</td>
<td>‘Efficiency experts’</td>
<td>Experienced engineers</td>
<td>‘Brain’</td>
<td>Founder + equal consultants</td>
</tr>
<tr>
<td>Organization and strategy</td>
<td>‘Top level advisors’</td>
<td>MBA/Business Graduates</td>
<td>‘Grey hair’</td>
<td>Substantial partner group</td>
</tr>
<tr>
<td>IT-based networks</td>
<td>‘Implementation specialists’</td>
<td>IT skills plus in-house training</td>
<td>‘Procedure’</td>
<td>High junior to partner ratio</td>
</tr>
</tbody>
</table>

3.3.3 Dilemmas concerning forms of conducting interventions and attempts at integration

Kipping’s work from 2002 can be seen as an attempt to arrive at a historically based overview of different intervention forms. In contrast to Kipping, other scholars characterize groups of forms of conducting interventions by dilemmas or oppositions.

Authors such as German scholar Walger (1995) have characterized the way in which large consultancies such as McKinsey conduct interventions as ‘expert centered’. Heckscher et al describe how historically two opposing ways of conducting interventions can be distinguished: the ‘expert approach’ and the ‘interactive’ or ‘process oriented’ approach (2003: 107–128, see also Schein 1969). In the expert-driven approaches, interventionists conduct an intervention process based on expert knowledge from outside, moving towards a best practice solution. In the process-oriented approaches, there is no predefined goal but it is assumed that relevant knowledge is already present in the organization; the interventionists see their role rather as supporting the mobilization of this knowledge by stimulating and facilitating organizational dialogue (2003: 107–112).

In a similar way, Jaakko Virkkunen (2004: 51–52) distinguishes between ‘deductive’ orientations of expert-centered approaches of consultancy and ‘inductive’ orientations of procedural approaches. He claims that both ways of conducting interventions are problematic. Interventions based on approaches that are ‘deductively’ oriented are problematic since given general concepts are applied without proper analysis of the nature of existing problems in organizations and their ‘root’
causes. Interventions based on approaches that are ‘inductively’ oriented are similarly problematic since interventionists expect practitioners to find new solutions based on analysis of the practitioners’ experiences and problems – without referring to more ‘advanced’ models and knowledge from the outside.

The scholar Van de Ven (2000) argues for a somewhat different formulation of contradictions. He addresses the difference between research and consultancy as well as between knowledge creation and the application of knowledge. Van de Ven argues that professional learning communities at universities have to balance the creation of new knowledge for the scientific discipline (pure research orientation) as well as the application of knowledge and the advance of the practice related to the discipline (management consulting orientation).

There is at least one approach\(^{19}\) that can be interpreted as an attempt to move partially beyond the dilemmas discussed in this section: the ‘Full Engagement’ approach, which is an intervention approach developed jointly by Charles Heckscher, Michael Maccoby, Rafael Ramirez and Pierre-Eric Tixier (2003).

According to these authors, a new approach becomes necessary as old ‘stakeholder relations’ (e.g., between management of corporations, unions, and government agencies) are replaced by a completely new regime of stakeholder relations. The new kind of problem (characterized as a ‘post-industrial problem’ in Chapter 1) is consequently related to catalyzing the transition to a new kind of relations (Heckscher et al. 2003: 12).

The most significant cases examined by the authors are intervention experiences in AT&T, FS (the Italian Railroad), Lucent (a spin off from AT&T) and EDF (the French, state-owned, former monopoly Electricity Company), each having been a client company of one of the authors. According to Heckscher et al., all companies had faced ‘relational’ challenges – that is, difficulties in the union/workers-management relations – as well as ‘strategic’ challenges – and had to redefine themselves as they moved from (quasi-)monopoly to more competitive environments (2003: 13–15).

Heckscher et al. describe three basic aspects of their ‘Full Engagement’ intervention approach:

1. The interventions must be ‘interactive’, which means that the interventionists must help clients to define their own problems without imposing predefined ideas of problems and ‘expert’ solutions on them. The authors relate this interactive way of conducting interventions to the work of Lewin and Argyris, distinguishing it from the expert-centred ways of conducting interventions deployed by Taylor, McKinsey and Accenture (2003: 107–111).

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\(^{19}\) As the oppositions in this and the previous section partly overlap, some of the attempts at integration in the last section (e.g., the DWR methodology) could have been discussed here, and vice versa (see the comment in the next subsection).
The interventions must capture ‘sociodynamic’ aspects of organizations that are related to group identities and memories which produce resistance and ‘irrational’ behaviour. The authors draw an analogy here with ‘psychodynamic’ patterns that can drive individuals to self-destructive behaviour and transfer it to the group and organizational level (2003: 107, 113–121).

The interventions must be ‘systemic’ in the sense that must involve holistic reconfigurations of different levels and stakeholder groups including among others the plant/production level, the operational planning (middle management) level, the top strategic level, and union representatives. Dimensions and organizational components that are normally treated separately have to be reconnected. The authors’ distance from earlier ‘top down’ or ‘bottom up’ focuses, emphasizes that the interventionist constantly has to scan different parts of the entire client organization for ‘openings’ for action (2003: 117–118, 121–125).

In addition to these three aspects of conducting interventions, the interventionist should bear in mind that past (being the root of hidden dynamics concerning identity and resistance), present (present ‘political’ processes) and future (aspirations, fears, visions) come together, and thus have to be addressed in the intervention process. The authors present different techniques that reinterpret sociodynamic patterns from the past (e.g. by explaining at greater length how various points of view held by different parties in ‘historical struggles’ relate to each other), create dialogue (e.g., by building forums), and envisage the future (e.g., by using the ‘7s’ framework of McKinsey consultants Peters and Waterman) (2003: 126–142).

While the authors of the ‘Full Engagement’ approach favour an interactive or process-oriented approach in conducting interventions, they at least partly integrate concepts from the expert-centred approach (e.g., using the ‘7s’ framework). More importantly, the full engagement idea emphasizes the holistic involvement of different levels and stakeholder groups, in this respect clearly moving beyond the earlier expert-centred ‘top down’ vs. the procedural ‘bottom up’ dichotomy.

3.3.4 An overview of main intervention methodologies and businesses and remaining limitations of previously applied perspectives

Dilemmas of forms of conducting interventions thus far discussed overlap partly with the rational vs. normative dilemma of intervention methodologies. Kipping relates changes in forms of conducting interventions to shifts in managerial discourse – referring to the model of Barley and Kunda (1992). Intervention businesses can be seen as a kind of reflection of managerial problems and definitions (Kipping 2002: 3). Barley and Kunda’s rational ideologies/waves correspond largely to Kipping’s consultancy waves.
An integration of Barley and Kunda’s and Kipping’s models – appropriately modified and extended – is described in table 3.5. This diagram provides an overview of the main groups of intervention concepts/methodologies and intervention businesses (or other types of conducting interventions). The model is termed the ‘overview model’.20

Table 3.5: Overview of groups of intervention methodologies and of intervention businesses based on Barley and Kunda (1992) and Kipping (2002); modified and extended

<table>
<thead>
<tr>
<th>Era of ascent</th>
<th>Rational Wave</th>
<th>Normative Wave</th>
<th>Key issues/problems</th>
<th>Examples of important proponents and main forms of conducting interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900s–1920s</td>
<td>Scientific Management</td>
<td></td>
<td>Efficiency of workers and production</td>
<td>Taylor; Emerson, Bedaux, Production Engineering, Urwick Orr, Personnel Administration, Maynard</td>
</tr>
<tr>
<td>1920s–1950s</td>
<td></td>
<td>Human Relations</td>
<td>Harmony in the workplace and motivation</td>
<td>Mayo and Roethlisberger; Lewin and followers</td>
</tr>
<tr>
<td>1980s–1990s</td>
<td>Organizational culture, learning and quality</td>
<td></td>
<td>Collaboration and employee involvement</td>
<td>Schein, Argyris, Senge, Quality movement gurus Systemic interventionists</td>
</tr>
<tr>
<td>1990s–?</td>
<td>IT-based networks</td>
<td></td>
<td>Internal and external coordination/networks</td>
<td>Hammer, Davenport; Andersen/Accenture, Deloitte &amp; Touche, Ernst and Young, KPMG, PWC, EDS, CSC, Gemini</td>
</tr>
</tbody>
</table>

Although the overview model reduces the risk of theoretical arbitrariness, there are still serious problems preventing a satisfactory integrative comprehension of the phenomenon of conducting interventions.

20 The most important proponents of waves are taken from Kipping (rational forms) and Barley and Kunda (1992) (normative forms). Therefore the earlier OD-related approaches (such as Mayo/Roethlisberger, Lewin) can be found within the Human Relations forms and the later among the Organization Culture and Quality forms. Following Barley and Kunda within the culture and quality group, interventions related to the theme of quality can also be found, although these were discussed in the subsection related to Management science (subsection 2.2.3).
There is still no genuine integration between a focus on intervention concepts, methods and methodologies, on the one hand, and a focus on conducting interventions as a sustained activity or business (e.g., a consultancy business) on the other. Kipping focuses on dissemination of knowledge via consulting companies. Although he relates his model to managerial discourses and problems in client companies, he does not deal with relationships between problems in client companies, the generation of innovative solutions, or their influence on managerial discourse. The question of the production of innovative solutions – that is, how certain theories and methods of intervention are used as instruments for addressing problems in work activities – is not addressed in detail. Kipping’s interpretation of Human Relations interventions is an interesting illustration of this point.

Kipping mentions Human Relations consultants, most of whom originated during the 1930s or 1940s, as an element of consideration. He argues that they represent, to a certain degree, an extension of the Scientific Management period (Kipping 2002: 32). This interpretation is understandable – though not agreed – if the interpretation is based on a high degree of abstraction from the concrete intervention methodologies (of Scientific Management or Human Relations), and from the creation of these intervention methodologies.

This chapter argues that considering the phenomenon of conducting intervention apart from the process of creation of intervention concepts is a serious problem because the logic of development of intervention concepts has a key impact on the outcome of intervention processes. However, the research in the areas of innovation and science and how that research might apply to a theory of intervention appears to be outside the scope of many of the previously discussed studies on intervention. In the following section, these areas will be included in discussion, leading to a more ‘bird’s eye’-type view on the phenomenon of conducting interventions.

### 3.4 Intervention as part of the societal innovation process

#### 3.4.1 From linear to non-linear models of innovation

Kipping and Engwall consider the relationship between intervention businesses and the innovation generation process (2002: 1–3). However, they seem to follow the perspective of early innovation researchers (such as Rogers 1962) on interventions. These researchers see interventionists as important ‘carriers’ with regard to the diffusion of scientific knowledge and innovations. Thus, interventions are associated primarily with the penultimate step (the diffusion and adoption of innovation) of a linear model of innovation (Rogers 1995: 133; figure 3.2).

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21 Rogers (1969: 254–255) mainly uses the term ‘change agent’, which he borrowed from the OD tradition. Other scholars have used the terms ‘consultant’, ‘diffusion agent’ or ‘advocate of change’ (Havelock et al.: 1972: Chapter 7: 4–9).
Figure 3.2: Linear model of innovation development (Rogers 1995: 133); graphically modified

According to the Kline and Rosenberg (1986), this linear model was the generally accepted model of innovation from World War II up to the 1980s. They describe it as follows:

In this model, one does research, research then leads to development, development to production, and production to marketing. These events are implicitly visualized as flowing smoothly down a one-way street. (Kline and Rosenberg 1986: 285)

In the 1970s another linear model emerged that criticized the ‘technology push’ perspective of classic linear model and proposed instead a ‘market pull’. In this newer linear model, the basic mechanism is that market demand triggers research, followed first by development and later by dissemination of the innovation. The linearity of the innovation model with separate successive steps is preserved, however.

In the 1980s more complex models of the innovation process emerged (Trott 1998: 16–20). Kline and Rosenberg proposed a non-linear model to describe the innovation process, known as the ‘chain-linked model’. In this model, research is not included as merely one moment in the innovation generation processes. Kline and Rosenberg claim that modern innovation is often impossible without the accumulated knowledge of science, adding that explicit development work often points to the need for research, that is, new science. Thus the linkage from science to innovation extends all through the development process. Science can therefore be seen as lying alongside development processes, ready to be used when needed. Research (new science) is necessary only when knowledge (old science), accumulated within the organization, is insufficient for the innovation process:

A much clearer view of innovation is obtained when we understand not only that the linkage to science lies alongside development processes, but also that the use
of science occurs in two stages corresponding to the two major parts of science delineated in the definition of science given above. When we confront a problem in technical innovation, we call first on known science, stored knowledge, and we do so in serial stages. Only when all stages fail to supply the needed information, as often happens, is a call for the second part of science, research, needed and justified. [...] In sum, the use of the accumulated knowledge called modern science is essential to modern innovation; it is a necessary and often crucial part of technical innovation, but it is not usually the initiating step. It is rather employed at all points along the central-chain-of-innovation, as needed. It is only when this knowledge fails, from all known sources, that we resort to the much more costly and time-consuming process of mission-oriented research to solve the problems of a specific development task. (Kline and Rosenberg 1986: 291)

Figure 3.3: Elements of the ‘chain-linked model’, after Kline and Rosenberg (1986; simplified)

Corresponding to a more multifaceted relation between research, knowledge and other factors, in Kline’s and Rosenberg’s model of innovation (see a simplified version in figure 3.3) we find not one major linear path of innovation processes, but five.

The first path within an innovation process is called the central-chain-of-innovation and comes close to the earlier linear model. The path begins with a design, passing subsequently to the other elements of the earlier linear model.

The second path is a series of feedback links which are possible after each of the steps. Feedback makes the model non-linear, leading to iteration of the steps and connecting back directly from perceived market needs and users to potentials for improvement of product and service performance in the next round of design.

The third path provides the rationale for the term ‘chain-linked model’. Kline and Rosenberg refer here to the linkage between development work, accumulated knowledge (old science), and research (new science). Chain-linkages from (old
and new) science to innovation are possible, and often necessary, all through the development process alongside the central-chain-of-innovation.

The fourth and fifth paths describe qualitatively different direct linkages between new science and innovation. The fourth path captures the phenomenon of new science making possible radical innovations from time to time. These occurrences are rare, but often mark major changes that give rise to whole new industries (e.g., semiconductors, lasers, atom bombs, genetic engineering).

The fifth path is the feedback from the products of innovations, to science. It describes the support of scientific research by instruments, machines, tools, and procedures of technology.

For Kline and Rosenberg, it becomes clear that the role of science is different in this new model of the innovation process:

It is also important to note that the type of science that is typically needed is different at various stages in the central-chain-of-innovation. The science needed at the first stage (design or invention) is often pure, long-range science that is indistinguishable from pure academic science in the relevant discipline. The research generated in the development stage is more often of a system's nature and concerns analysis of how the components of the system interact and of the 'holistic' or system properties that are generated when the components of the product envisaged are hooked together to obtain the complete function needed. For example, in a design of a new airplane, steam power plant, or computer, an important consideration will be the stability of the system as a whole when the various new components are put together into a single operating entity – a system. The research that is spawned in the production stage is more often process research: studies of how particular components can be manufactured and how the cost of manufacture can be reduced by improved special machinery or processes or by use of improved or less expensive materials. (Kline and Rosenberg 1986: 291–292)

In discussions of innovation processes, non-linear models such as that championed by Kline and Rosenberg have more or less replaced previous linear models (Trott 1998: 18–20).

Donald E. Stokes (1997: 10) claims that the most significant flaw of the linear model of innovation is the premise that the flow of information is uniformly one-way, from basic science to applied science to technological development, and so on: ‘The annals of science suggest that this premise has always been false to the history of science and technology’ (Stokes 1997: 20).

Stokes’ study focuses on the traditional dichotomy between pure and applied science. In contrast to the notion of linearity and the separation of basic and applied research, Stokes proposes a non-linear understanding, which he derives from an analysis of different historical cases. He takes Niels Bohr’s work on the model of atomic structure as an example of high level basic research, Thomas Edison’s

22 Another example of a non-linear model is that of Rothwell and Zegveld (1985)
work on electric lighting as an example of high level applied research and Louis Pasteur’s work on microbiological processes and disease as an example of high level basic and applied research. Stokes claims that the possibility of unifying basic and applied research is not limited to Pasteur. Accordingly, he proposes a two-dimensional model with basic and applied research as its dimensions (see figure 3.4).23

Figure 3.4: Stokes’s quadrant model of scientific research (1997: 73; modified and extended)

Although the previously described non-linear innovation models do not specifically address the question or the role of interventions in the innovation process, it is clear that interventions are ‘positioned’ differently in non-linear models such as that of Kline and Rosenberg than in the linear model. The ‘position’ of intervention seems not only to change with regard to innovation processes, but also in respect of societal systems or spheres.

23 There are some aspects of Stokes’ model that are disputable: The role of Edison has been interpreted differently by other authors (e.g., Hughes 1983). The role of research and innovation in Stokes’ model (and in other studies on innovation) seems to be limited to technical innovation and to the natural sciences. There is no focus on social innovation, which would be important for intervention research. Nonetheless, Stokes’ general way of moving from separation of processes to their integration is interesting. If it were clear what main processes characterize forms of conducting interventions, one could begin a discussion about a higher degree of integration of such processes in a similar manner that Stokes did for basic and applied research.
3.4.2 Overlapping societal spheres as the new context of knowledge production

Studies by Etzkowitz (1998), Gibbons (2000), Ziman (2000), and Nowotny, Scott and Gibbons (2001) address new developments in the relationship between science/research, industry and state. The most widely discussed model in this regard is the ‘triple helix’ of university-industry-government relations presented by Etzkowitz (1998, 2003). The triple helix describes the increasing overlap between the previously separate spheres of academia, industry and state (figure 3.5). Traditional relations to knowledge change in the overlapping area: The Academic relation to knowledge (‘extension of knowledge’) and the industrial relation to knowledge (‘capitalization of knowledge’) become increasingly combined (Etzkowitz 1998: 824-829). Forms of intervention have been related to each of the three different spheres. Consequently, examples of forms of conducting interventions might be found inside the area of overlapping spheres of the triple helix.

![Figure 3.5: The triple helix model (Etzkowitz 2003: 302), modified to include the hypothetical position of new forms of conducting interventions](image)

Ziman discusses the influence on science and knowledge production from the other spheres. He states that science can be understood as a specific ‘culture’ or as a ‘social institution’ dedicated to a characteristic mode of inquiry that produces a characteristic type of knowledge to solve problems in a society (Ziman 2000: 84).

This culture is now entering a period of rapid and profound change from ‘academic science’ to ‘post-academic science’, with a new ‘mode’ of knowledge production emerging.
Ziman refers here to Gibbons, who claims that scientific activities become far more open to addressing problems in the ‘context of application’ (Gibbons et al 1994). The increasing importance of the context of application is a key characteristic for the period of profound change experienced by the academic world at present. The paradigmatic shift is leading towards an entirely new ‘mode’ of scientific knowledge production, termed ‘Mode 2’ (Gibbons 2000: 40, see Ziman 2000: 172).

Ziman characterizes this new development in the following manner:

More generally, knowledge production in ‘Mode 2’ arises directly or indirectly ‘in the context of application’. […] Basic research and technological development already interpenetrate one another: in the long run, they become indistinguishable.

‘The context of application’ is a misty, unknown—even hostile territory for academic science. But it is certainly not an empty land, waiting to be colonized by enterprising post-academic researchers. On the contrary, it is already heavily populated with professional and technical communities. Immigrants from academia soon discover that it is closely subdivided into regions governed by other major social institutions – industrial enterprises, commercial firms, government departments, health-care organizations, practitioner associations, and so on. In other words, it is a place where scientific communities interact with a variety of organizations strongly linked to the major interest groups of society at large. (Ziman 2000: 172–173)

In ‘Mode 2’ knowledge production, knowledge is created in networks, where other rules are more valid than in ‘Mode 1’:

In ‘Mode 2’ […] knowledge is produced by teams of researchers networked […] across a wide range of organizations. The members of these teams often have quite different epistemic responsibilities, depending on their terms of employment. Those who work for governmental organizations or industrial firms cannot disregard the political or commercial potentialities of their research. University employees doing commissioned research on short-term contracts are not in a position to take an independent line. The barriers against external influences are thus much weaker than in traditional academic research. (Ziman 2000: 172–173)

Nowotny, Scott and Gibbons (2001) call the territory referred to by Gibbons and Ziman as the ‘context of application’, the ‘agora’:

The sites of problem formulation and negotiation of solutions move from their previous institutional domains in government, industry and universities into the agora. The agora is the public space in which ‘science meets the public’, and in which the public ‘speaks back’ to science. It is the domain (in fact, many domains) in which contextualization occurs and in which socially robust knowledge is continually subjected to testing while in the process it is becoming more robust. Neither state nor market, neither exclusively private nor exclusively public, the agora is the space in which societal and scientific problems are framed and defined, and where
what will be accepted as a ‘solution’ is being negotiated. (Nowotny et al 2001: 247; italics in original)

Within the area of the triple helix’s overlapping spheres, the ‘context of application’ or ‘agora’, some interesting developments appear to take place. New types of knowledge creating practices such as ‘open source innovation’ (Chesbrough 2003; Von Hippel 2005: 77–92), seem to emerge in this space. Indeed, the theory of the triple helix suggests a new understanding of the spatial context of forms of conducting interventions, one that is markedly different from previous understandings suggested by the linear model of innovation.

3.4.3 Historical changes of contexts of knowledge production: technological revolutions and techno-economic waves

Freeman and Louçã (2001), as well as Perez (2002), developed a theory to explain the phenomenon of long waves of economic development (so-called ‘Kondratiev waves’), using the relationships between technological revolutions and social institutions as the basis for their explanations. Their theory can be used to understand the longer-term historical changes of widespread social and organizational problems, as well as longer-term historical changes in knowledge production and innovation. Both Barley and Kunda (1992) and Kipping (2002) refer in their own models to longwaves of economic development.

Freeman and Louçã begin by addressing the characteristics of learning and knowledge production in an early phase of human development.

With the domestication of other animals, the use of fire, and above all with settled agriculture, […] learning and dissemination became far more complex, but it was still based essentially on search, experiment, language, communication, and of course serendipity. Contrary to many theories of history, it would therefore be possible to date the origins of science not in the Middle Ages but in Palaeolithic times or even earlier. What has changed is not the search, observation, and learning, – but the modes of conducting and organizing search, re-search, learning, accumulating, recording, validating, and disseminating knowledge about the natural world (science) and about ways of producing, using, and improving tools and artifacts (technology). As the division of labor proceeded within families and tribes and in varying different geographical environments, learning about production and exchange systems (economics) became increasingly important. As some knowledge became routinized in customs and traditions (culture) and in forms of regulating social behavior (politics, war, slavery), so the separate streams of knowledge became increasingly important as well as their intermingling in general culture. (Freeman and Louçã 2001: 132)

Freeman’s and Louçã’s study distinguishes between five social subsystems – science, technology, economy, politics, and culture – each of which is interrelated. Together, they exert an enormous influence on the development of a society:
The social subsystems (science, technology, economy, politics, culture) generate a large number of irregular fluctuations, namely cyclical and wave-like movements with different approximate periodicities, caused either by specific subsystem cycles (political business cycles, technological trajectories, cultural movements, life-cycles of products or industries, etc.) or by the lags and feedbacks in the inter-subsystem connections. […] Those streams are combined in some bands of fluctuation by specific coordination processes emerging after structural crises. These coordination processes are therefore the crucial causal determination for the business cycles and the long wave movements in real historical development […] (Freeman and Louçã 2001: 121).

According to the two scholars, a recurrent pattern of long waves can be explained by ‘successive industrial revolutions’ with certain constellations of technical and organizational innovations:

[…] we listed several features of the successive industrial revolutions, […] which together might explain the recurrence of long waves in the economy and the social system. Foremost among these features was the periodic emergence and diffusion of a new constellation of technical and organizational innovations offering in each case exceptional super-profits of innovative entrepreneurship. (Freeman and Louçã 2001: 336)

The expression used by Freeman and Louçã to describe these constellations of clustering technical and organizational innovations is ‘technology system’. Relying partially on previous work from Perez (1983), they distinguish the following phases in the life cycle of a technology system (first pointing out that these phases are described in a simplified and schematic way):

1. the laboratory-invention phase, with early prototypes, patents, small-scale demonstrations and early applications;
2. decisive demonstrations of technical and commercial feasibility, with widespread potential applications;
3. explosive take-off and growth during a turbulent phase of structural crisis in the economy and a political crisis of coordination as a new regime of regulation is established;
4. continued high growth, with the system now accepted as common sense and as the dominant technological regime in the leading countries of the world economy; application in a still wider range of industries and services;
5. slow-down and erosion of profitability as the system matures and is challenged by newer technologies, leading to a new crisis of structural adjustment;
6. maturity, with some ‘renaissance’ effects possible from fruitful coexistence with newer technologies, but also the possibility of slow disappearance. (Freeman and Louçã 2001: 146)
The theory of techno-economic waves is still in a relatively early phase of elaboration. There is as yet no consensus on theoretical concepts or terminology. Freeman and Louçã focus on phases 2-5 of the life-cycle of a technology system. This part of the life-cycle has been associated by previous scholars, notably Nikolai Kondratiev, with wavelike movements in the economic system, designated ‘Kondratiev waves’, or cycles (Freeman and Louçã 2001: 146). The duration of these waves is in the order of 50–60 years. Freeman and Louçã distinguish between periods of ‘upswing’ (or ‘boom’), and ‘downswing’ (or ‘crisis of adjustment’). The *entire* life-cycle of a technology system phases, could take much longer than 50–60 years (Freeman and Louçã 2001: 146).

A summary of the different techno-economic waves is presented in table 3.6\textsuperscript{24}.

\textsuperscript{24} The definition of a beginning and an end with regard to the techno-economic wave depends on the theoretical focus of the scholar. Here, the time frame used by Freeman and Louçã was taken as a starting point, and extended to capture the early phases of the techno-economic wave (beginning with examples of highly visible, technically successful innovations – ‘big bangs’). As a consequence, the time frames of the waves overlap. The downswing period of one wave – in Freeman’s and Louçã’s sense – coincides with the early phases of the subsequent wave.
Table 3.6: Condensed summary of Kondratiev waves (Freeman and Louçã 2001: 141); modified to integrate early phases of techno-economic wave within the overall time frame.

<table>
<thead>
<tr>
<th>Constellation of technical and organizational innovations</th>
<th>Examples of highly visible, and successful, innovations ('technological big bang')</th>
<th>‘Carrier’ branch and other leading branches of the economy</th>
<th>Core input and other key inputs</th>
<th>Transport and communication infrastructure</th>
<th>Managerial and organizational changes</th>
<th>Approx. timing from ‘big bang’ till end of downswing</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Water-powered mechanization of industry</td>
<td>Arkwright’s Cromford mill (1771)</td>
<td>Cotton spinning</td>
<td>Iron Raw cotton Coal</td>
<td>Canals Turnpike roads Sailing ships</td>
<td>Factory systems Entrepreneurs Partnerships</td>
<td>1770s–1840s</td>
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<td></td>
<td>Henry Cort’s ‘puddling’ process (1784)</td>
<td>Iron products</td>
<td>Coal</td>
<td>Sailing ships</td>
<td></td>
<td>1780s–1815</td>
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<tr>
<td></td>
<td></td>
<td>Water wheels</td>
<td></td>
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<td>1815–1848</td>
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<td></td>
<td>Bleach</td>
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<tr>
<td>2. Steam-powered mechanization of industry and transport</td>
<td>Liverpool-Manchester Railway (1831)</td>
<td>Railways and railway equipment</td>
<td>Iron Coal</td>
<td>Railways Telegraph Steam ships</td>
<td>Joint stock companies subcontracting to responsible craft workers</td>
<td>1830s–1890s</td>
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<td></td>
<td>Brunel’s ‘Great Western’ Atlantic steamship (1838)</td>
<td>Steam engines</td>
<td>Coal</td>
<td></td>
<td></td>
<td>1848–1873</td>
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<td></td>
<td></td>
<td>Machine tools</td>
<td></td>
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<td>1873–1895</td>
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<td></td>
<td></td>
<td>Alkali industry</td>
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<tr>
<td>3. Electrification of industry, transport, and the home</td>
<td>Carnegie’s Bessemer steel rail plant (1875)</td>
<td>Electrical equipment</td>
<td>Steel Copper Metal alloys</td>
<td>Steel railways Steel ships Telephone</td>
<td>Specialized professional management systems ‘Taylorism’ Giant firms</td>
<td>1870s–1940s</td>
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<td></td>
<td>Edison’s Pearl St. New York Electric Power Station (1882)</td>
<td>Heavy engineering</td>
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<td>1895–1918</td>
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<td></td>
<td></td>
<td>Heavy chemicals</td>
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<td>1918–1940</td>
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<td>Steel products</td>
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<td></td>
<td>Burton process for cracking heavy oil (1913)</td>
<td>Trucks Tractors, tanks Diesel engines Aircraft Refineries</td>
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<td>1941–1973</td>
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<td></td>
<td></td>
<td>Oil Gas Synthentic materials</td>
<td></td>
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<td>1973–?</td>
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<tr>
<td>5. Computerization of entire economy</td>
<td>IBM 1401 and 360 series (1960s)</td>
<td>Computers Software Telecommunication equipment Biotechnology</td>
<td>‘Chips’ (integrated circuits)</td>
<td>‘Information Highway’ (Internet)</td>
<td>Networks; internal, local, and global</td>
<td>1970s–?</td>
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<td></td>
<td>Intel microprocessor (1971/1972)</td>
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</table>
While Carlota Perez (2002: 14–18) identifies identical techno-economic waves to Freeman and Louçã, she also includes early phases of the wave in her focus. She correspondingly suggests different time frames for the five waves. Perez (2002: 23) terms examples of highly visible, technically successful innovations technological ‘big bangs’, and uses the designation ‘installation period’ for the time when new technologies and the corresponding techno-economic paradigm begin to gain ground in some core industries. Perez uses the term ‘deployment period’ for the stage when the new techno-economic paradigm is diffused more evenly across society. This deployment period is often perceived as a ‘golden age’, and corresponds with Freeman’s and Louçã’s ‘upsing’ (2002: 22; 36–46). In the present study, Freeman and Louçã, as well as Perez, will be used as complementary sources for describing key characteristics of techno-economic waves. While Freeman’s and Louçã’s study (2001) provides a sophisticated overview of the five techno-economic waves, Perez’s studies (2002, 2005/2007) offer a significant discussion of the ‘inner logic’ of techno-economic waves in general, and the Computerization wave in particular.

Both, Freeman and Louçã (2001: 146–150), and also Perez (2002: 41–43), emphasize that the possibilities opened up by technical revolutions cannot be adopted without first addressing social and organizational problems, and also require the development of corresponding social innovations and changing regulatory regimes.

It is argued in this thesis that changing social/organization problems and innovations that have their roots in the radical transformations associated with techno-economic waves can be understood as key context factors of forms of conducting interventions.

The studies of societal innovation processes discussed in this section do not focus explicitly on forms of conducting interventions. These studies can be used however, to present existing knowledge on conducting interventions (studies about intervention methodologies and intervention as a business or industry) in a different light, which will be further elaborated in the next section.

### 3.5 Conclusions

In the previous sections, three groups of studies, each with a different focus, were discussed: models and theories related to the intervention methodologies, models and theories related to intervention as part of a business or industry, as well as models and theories related to intervention as part of the societal innovation process.

By juxtaposing models and theories related to the three perspectives, it is possible to address the research question in this chapter:

*How do previous studies contribute to a comprehension of past, present and future forms of conducting interventions?*

This chapter argues that newer developments in the field of science/research and innovation towards non-linearity and mutual penetration of spheres (state,
academia, industry) does not appear to be fully reflected in studies of intervention methodologies nor in studies of intervention as an activity/industry (largely studies of consultancy). This seems to be so, even though innovation and research are an important part of the context relating to forms of conducting interventions.

Kipping’s (2002) and Barley and Kunda’s (1992) work can be viewed as attempts to relate to the innovation generation process. Nevertheless, the role of science, research and innovation within the intervention process remains unclear. Kipping’s exclusion of ‘normative’ generations of interventions (Human Relations and Organizational Culture) can be interpreted as an example of this problem, since the normative approaches are developed by academic researchers such as Lewin, Argyris, and Schein. Kipping and other consultancy scholars seem to accept implicitly the linear model of innovation.

Neglecting processes of innovation when studying intervention may have been more justified in periods when science and industrial practice were more separated than they are today – as suggested by the linear model of innovation and by the notion of more clearly separated societal spheres. More recent developments as described in the models of Kline and Rosenberg, Gibbons and Etzkowitz, however, strongly support the idea that forms of conducting interventions should be analyzed in the broader context of science, research and innovation.

Following the previously described studies on innovation and science, forms of conducting interventions can be regarded as representing part of the activities in the 'context of application', the 'agora', or overlapping section of the triple helix (figure 3.5). Being situated within a context that is positioned between traditional academic science, industry and the state, interventions could be conducted by scientists, consultants or by other kinds of actor. The objects and instruments of the interventions could originate in very different areas such as science, the state, industry or other spheres or subsystems of society.

This study argues that if the relatively ‘narrow’ focus of studies on intervention methodologies (e.g., focusing on one tradition such as Organization Development) or consultancy is applied, the phenomenon of intervention cannot be fully comprehended. A discussion of future forms of conducting interventions will potentially capture only a limited aspect of newer developments, thus entailing the danger of missing this study’s objective.

The intent in this chapter was to diminish this ‘danger of arbitrariness’ (an arbitrary focus on parts of the phenomenon of intervention) by deriving an ‘overview model’. This was realized through integrating the models of Barley and Kunda (1992), Adler (2001), and also the model of Kipping (2002) – see table 3.5 –suggesting the general idea of historically changing groups of forms of conducting interventions. The studies thus far discussed can be interpreted as offering pieces of the phenomenon of intervention that have yet to be positioned into a unifying picture. The overview model is used in this study as a central tool that contains important pieces of the phenomenon under investigation. This model will now be elaborated to encompass not only intervention concepts and methodologies (referring to Barley and Kunda) and intervention as a business (referring to Kipping) but also a relationship to societal innovation process.
The models of Kipping and Barley and Kunda can be related to the general perspectives on societal innovation processes studied in depth by Freeman, Louçã and Perez. This relation is possible since Barley and Kunda refer to techno-economic waves. The relation is illustrated using the example of Scientific Management:

(1) Freeman and Louçã address the circumstances of emergence and diffusion of Scientific Management,
(2) Barley and Kunda address the managerial discourse concerning Scientific Management,
(3) Kipping addresses the dominant organizational form of conducting interventions related to Scientific Management (the Bedaux consultancy),

A reference to the broader societal context of the emergence of forms of conducting intervention is incorporated in the overview model by including upswings and downswings of techno-economic waves as described in Freeman and Louçã’s model (see table 3.7). The model provides an overview of the emergence of societal problems and solutions in different periods, and indicates their possible relation to intervention methodologies and important forms of intervention businesses.

The present study emphasizes that the overview captures important ‘pieces’ of scientific knowledge about the phenomenon of conducting interventions; however, it does not offer a theoretical integration of them. Each piece has been previously identified, analyzed and interpreted by scholars from different traditions, using different theoretical frames.

An integrative comprehension of the phenomenon of conducting interventions has yet to be developed. It has been suggested that such a comprehension would be derived through reconstructing the origin and historical dynamic of forms of conducting interventions. The overview model will be used as an orientation in this process.
<table>
<thead>
<tr>
<th>Constellation of technical and organizational innovations</th>
<th>Techno-economic wave</th>
<th>Rational groups of intervention and their era of ascent</th>
<th>Normative groups of intervention and their era of ascent</th>
<th>Key problems</th>
<th>Examples of important proponents and main forms of conducting interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Water-powered mechanization of industry</td>
<td>1780–1815 Upswing</td>
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<td></td>
<td>1815–1848 Downswing</td>
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<td>2. Steam-powered mechanization of industry and transport</td>
<td>1848–1873 Upswing</td>
<td></td>
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<td></td>
<td>1873–1895 Downswing</td>
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<tr>
<td>3. Electrification of industry, transport and the home</td>
<td>1895–1918 Upswing</td>
<td>Scientific Management 1900s–1920s</td>
<td>Efficiency of workers and production</td>
<td></td>
<td>Taylor; Emerson, Bedaux, Production Engineering, Urwick Orr, Personnel Administration, Maynard</td>
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<td></td>
<td>1918–1940 Downswing</td>
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<td></td>
<td></td>
<td>Human Relations 1920s–1950s</td>
<td>Harmony in the workplace and motivation</td>
<td></td>
<td>Mayo and Roethlisberger; Lewin and followers</td>
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<tr>
<td></td>
<td>1973–? Downswing</td>
<td>Organizational culture, learning and quality 1980s–1990</td>
<td>Collaboration and employee involvement</td>
<td></td>
<td>Schein, Argyris, Senge; Quality gurus; Systemic interventionists</td>
</tr>
<tr>
<td>5. Computerization of entire economy</td>
<td>Upswing</td>
<td>IT-based networks 1990s–?</td>
<td>Internal and external coordination/networks</td>
<td></td>
<td>Hammer, Davenport; Andersen/Accenture, Deloitte &amp; Touche, Ernst and Young, KPMG, PWC, EDS, CSC, Gemini</td>
</tr>
</tbody>
</table>

Table 3.7: Extended and modified overview model of forms of conducting interventions, based on Barley and Kunda, Kipping and Freeman and Louçã
4 Preconditions for the emergence of forms of conducting interventions

4.1 Introduction and procedure

In this study’s methodological chapter, it was emphasized that forms of conducting interventions will be comprehended and studied through following the dynamic of its object. This chapter traces the early origins of forms of conducting interventions. The purpose is to comprehend how the activity under investigation is ‘spatially’ and ‘temporally’ embedded in the course of its emergence, and to capture this comprehension with concepts that can be elaborated as an analytical framework (a unit of analysis) for the entire study.25

However, what is the object of forms of conducting interventions and what are its historical origins?

To this point, only provisional answers to these questions have been developed. In Chapter 1, it was argued that general social and organizational problems as well as forms of conducting interventions addressing them have a historical character. Both might be connected to radical transformations in society. In Chapter 3, aspects of knowledge concerning these specialized activities – recurrent periods of radical change, emerging problems and innovations, intervention concepts and methodologies, intervention businesses – were compared and contrasted thus constituting an ‘overview model’ (see table 3.7).

While this understanding about interventions remains provisional and fragmentary, it points to two hypotheses that serve as a starting point for further investigation:

(1) The object of forms of conducting interventions seems to be in some manner related to historically varying social and organizational problems contingent on radical change processes.

(2) Activities that address general problems rooted in radical change processes seem to have become an important factor in the later decades of the 19th century, as well as in the early decades of the 20th century (the third techno-economic wave, i.e. ‘Electrification wave’; see subsection 3.4.3).

25 The rationale for investigating the roots of forms of conducting interventions is to follow the emergence of the object as the constituent element of forms of conducting interventions. As the formation of the object is reconstructed, investigation will be carried out into what activities took part in addressing the object, and whether, among these activities, new types of activity emerged that were in some sense related to forms of conducting interventions. The aim is to capture conceptually how such new types of activity are ‘spatially’ and ‘temporally’ embedded in the course of their emergence. Resulting concepts and models will be elaborated towards an integrated conceptual model that functions as a unit of analysis (an analytical framework). The unit of analysis will serve as a theoretical means of analyzing forms of conducting interventions in its emergence and historically evolving diversity.
It follows that the Electrification wave may potentially represent an interesting period in which to study the emergence of forms of conducting interventions. However, that is not the focus of this analysis. To discover the preconditions for the emergence of the phenomenon under investigation, it is necessary to examine that phenomenon in its earliest stage – indeed, to study the stage before its emergence becomes clearly discernible.²⁶

The research question for this chapter is:

*What were the preconditions for the emergence of forms of conducting interventions, and how can the context of the emergence be captured as a unit of analysis for the further study of forms of conducting interventions?*

The following discussion, then, turns attention to the period immediately prior to the Electrification wave – the early stages of the industrial era, characterized by techno-economic waves of Mechanization (figure 4.1, see section 3.4.3).

*Figure 4.1: Focus of analysis in this chapter

²⁶ The question about the early origins of forms of conducting interventions has not been adequately clarified to date. McKenna (1995: 51–52) distinguishes two different kinds of roots: those of Scientific Management-related interventions (related to the activity of mechanical engineers), and those of (modern) management consulting (related to the activity of bankers and lawyers, and managers). One could also discuss roots associated with the activities of early social scientists such as Münsterberg (1913).*
Before examining the early industrial period, certain characteristics of dealing with problems in the pre-industrial era should be discussed (section 4.2). A historical case from the early industrial period (the Mechanization waves) will then be examined (section 4.3). On the basis of the analysis of the historical case in the early industrial period, the unit of analysis applied to studying forms of conducting interventions will be derived (section 4.4). In section 4.5, conclusions relating to the preliminary comprehension of forms of conducting interventions will be summarized.

### 4.2 Characteristics of problem-solving in the pre-industrial era

In this section, some characteristics of problem-solving in the pre-industrial era will be described. The main source for this section is the work of Rainer Seidel (1976). Seidel developed a general theory to explain how problems and solutions emerge in human societies. He began by analyzing early examples of problems and solutions in society before moving on to more recent ones. The emergence and resolution of ‘societal problems’ was related to important changes in human societies. The first reason for the emergence of such ‘societal problems’ he identified as necessity: Nature forces human beings to resolve certain problems. The second reason for their emergence was that fulfillment of ‘natural’ necessities leads to new possibilities, and also to the urge to exploit new opportunities. Seidel uses ‘societal’ in the following sense:

Change processes leading to new opportunities, and the corresponding formulation of problems to utilize these possibilities, not only affect individuals or small groups but also have a societal dimension. Furthermore, the ability to deal with problems reflects the societal state of current knowledge, the means of a society to solve problems (Seidel 1976: 90–91). Leontjev (1933a: 8) addresses the same point when he emphasizes that ‘the human being is no Robinson Crusoe, who makes every little discovery all by himself’.

Societal problems are characterized as leaps in the development of societal human activities, where qualitatively new products, instruments or knowledge are needed. The societal nature of formulating and dealing with problems is not independent of the technological means – such as transport and interconnection between local human activities (Seidel 1976: 90–91). As the means of interconnection were limited in the pre-industrial era, appreciation of the societal nature of problems was similarly limited.

Seidel uses the term ‘historical’ to characterize societal problems in the following manner:

1. In an initial stage, societal problems emerge in the course of development of societal human activity and remain ‘acute’ in the form of ‘bottlenecks’ over a certain period in time.
2. Next, there is the possibility for the development of a solution to the ‘historically new’ problem.
Seidel’s concept of societal problem can be interpreted as a life-cycle model, consisting of a problem-solution-diffusion cycle with the following phases:

1. The emergence of a problem within a human society, triggered by necessity or by the arrival of new opportunities;
2. The development of a solution to the problem within a single context; and
3. The gradual diffusion of the solution to other contexts.

This simple ‘life-cycle of a societal problem’ is an intermediate conceptual model based on Reiner Seidel’s comprehension of early problem-solving processes. It will be used as a frame for analyzing more complex problems solving processes in the early industrial era when potentially new specialized forms of problem-solving activities emerged.

### 4.3 The steam engine as an example of a problem-solving process and the emergence of specialized activities in the early industrial era

An important problem-solving process that emerged over the course of the first two techno-economic waves was associated with the use of the steam engine as a source of power. This problem-solving process is described and analyzed in the following section, using the phases of problem-solution-diffusion as a preliminary analytical frame.27

The context of the development and diffusion of steam power was characterized by new possibilities for using iron and later coal as increasingly cheap core inputs. Furthermore, new possibilities for substituting human labor through the deployment of increasingly sophisticated mechanical machine tools existed (Freeman and Louçã 2001: 162, 169, 188). The use of mechanical machines was dependent upon a power source. Prior to the establishment of the steam engine, the main power sources were wind or water, which could only be harnessed in certain locations. There was, therefore, a growing imbalance between developed mechanical machine tools and underdeveloped power machines that required wind or water. This contradiction entailed a general, but largely latent, need for an effective and generally available power source in order to exploit the machine tools (Seidel 1976: 86–87, Nuvolari 2001: 4).

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27 The case of the steam engine represents one of Rainer Seidel’s (1976) principle frames of study. He focuses mainly on different phases of problem emergence and solution. Seidel’s analysis is extended to include the phase of solution diffusion. Nuvolari’s (2001) analysis complements Seidel’s work in this respect.
The need for an adequate power source became especially pressing in coal mines as the demand for coal increased. The difficulty of pumping water effectively from mine shafts made it impossible to increase coal production. Steam power, based on Newcomen’s earlier inventions, was used to pump water; however, it had a major shortcoming – high fuel consumption. This was because of the cylinder needed to be heated and cooled alternately in each operating cycle.

In mining areas such as the copper and tin mines of Cornwall, where coal had to be imported from Wales by sea, fuel inefficiency did not permit a widespread diffusion of the Newcomen engine. In these mining areas, then, there was a need for a more efficient means to clear water from the mines.

In 1769 James Watt took out a patent for an alteration to the basic design of Newcomen’s engine. His specific solution was to introduce a separate condenser which allowed for a drastic reduction in coal consumption. Such an economy in fuel made the use of the steam engines in the mines situated in areas where coal was expensive profitable (Nuvolari 2001: 4–5; Seidel 1976: 108–112). While often seen as purely ‘practical’, the inventions of Newcomen and Watt were also based on developments in earlier scientific developments in the area of mechanics and pneumatics (Kerker 1961).

Watt had to find sufficient financial resources to be able to develop his invention further and disseminate it to potential clients. In 1776, he received money from the entrepreneur Boulton, but had to give 2/3 of the benefits from the patent to him (Seidel 1976: 88–89). The context in which Watt created the innovative solution was mining (Seidel 1976: 118), and the first important market for Boulton and Watt was the Cornish copper and tin mining industry. In Cornwall, Boulton and Watt’s production-enhancing engines immediately became popular. Between 1777 and 1801 the pair constructed 49 pumping engines in the Cornish mines. The typical agreement proposed by Boulton and Watt to the mine owners of Cornwall was that they would provide the drawings of the steam engine and supervise the construction works. They also provided some of the particularly important components of the engine (such as valves). These expenditures were part of the total fixed cost associated with the adoption of steam power (not including profits for Boulton and Watt). Further parts of the fixed costs for clients were associated with the purchase of other components for engines not directly supplied by the two partners.

Boulton and Watt’s profits, then, were not generated from selling parts or from building steam engines. Instead, the partners charged an annual premium equal to one-third of the gains achieved by the Watt engine as compared with the Newcomen engine.

At the beginning, this type of agreement was accepted by the ‘mine adventurers’. The level of acceptance declined, however as further improvements in steam technology were blocked by Boulton and Watt on the basis of their patent. The result was that after the expiration of Watt’s patent in 1800, steam engine orders to Boulton and Watt in Cornish mines ceased completely.

Nuvolari (2001: 5–7) describes how Cornish mine entrepreneurs established a network of knowledge exchange vis-à-vis improvements that led to a steady development in the efficiency of steam engines in their mines. They commenced pub-
lication of a monthly journal reporting salient technical characteristics, operating procedures and the performance of each of their improved engines. The result was a marked acceleration in the rate of technical change in steam engines operating in Cornish mines.

The use of steam engines in Cornish mines was only the beginning of the diffusion of steam technology. Watt not only invented a more efficient means for pumping water, but rather a general independent steam power machine that could be also used in other activities. In later periods steam technology was not only used in locomotives and ships, but also evolved in qualitative terms, involving related inventions such as steam turbines. It also led to theoretical elaborations such as thermodynamics (Freeman and Louçã 2001; Bernal 1953; Hughes 1983).

4.4 A model of the process and structure of problem-solving as a historically grounded unit of analysis

Some important conclusions can be drawn from the case of steam engine, capturing potentially important characteristics of the societal problem-solving process, and characteristics of associated actors and activities.28 Those conclusions will be integrated and theoretically elaborated towards a unit of analysis of forms of conducting interventions

4.4.1 Life-cycle of a societal problem as a main process model within the unit of analysis

As a problem becomes more general in a society there are an increasing number of different local instances of the problem. There is, therefore, an increasing probability of a specific context where an invention could be developed. However, the process is not a smooth one, as Seidel concludes in his historical analysis of Watt’s case.

A contradiction arose between the more developed mechanized machine tools and the underdeveloped power machines that made use of water and wind. Newcomen used a steam engine to pump water out of mines. In this respect, he developed an instance of an improved power machine. However, there was an obstacle to the use of steam engines in Newcomen’s form: they were too cost-intensive and therefore had limited applicability. In principle, the main contribution of Watt began at this point. He attempted to design a steam engine that allowed for a significant increase in efficiency, and he was successful in so far as he overcame the technical obstacles associated with designing an adequate condenser.29

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28 Conclusions are based partly on Seidel’s theory (highlighted when appropriate), and partly on contributions by the author of this study.
29 Seidel (1976) describes how this development went further – incorporating new steps of negotiating obstacles and redefining the problem – to become increasingly concerned with the details associated with the technical construction of steam engine.
According to Seidel (1976: 117–119), in the process of moving from a complex societal problem to an innovative solution there is no direct path from problem to solution. Instead, there is a trajectory full of obstacles, moving from the more general stage of the problem towards a more specific stage, until finally a specific problem can be solved. Seidel further concludes that complementary to this ‘forward’ process – the movement from a complex societal problem towards a solution – there is a corresponding ‘backward’ process – from a solution to diffusion/dissemination – which exhibits a trajectory from a specific to a more general stage. The ‘backward’ process in the steam engine case can be described as follows:

The invention of the separate condenser was the basis for the design of a new, more efficient model of steam engine. This new model was used as a more flexible power source for mine pumps, but was also applicable in other work activities. With the establishment of steam engine as a more flexible power supply, more flexible production forms that used mechanized machines more independently of the local/environmental context, conditions and resources became possible.

Seidel’s reflections on the case of the steam engine are elaborated and set out in the following model (figure 4.2).

Figure 4.2: Trajectory from the emergence of a problem towards the dissemination of a solution
According to Seidel, an important aspect of the ‘forward’ problem solution process and the ‘backward’ solution diffusion/dissemination processes is the changing means-ends relationship. During the initial stage of the problem-solving process, the societal problem moves ‘forward’ in a means-ends hierarchy. What is a means in solving the basic problem becomes an end of development on a more specific level of the problem-solving process, until the ‘core’ of the problem has been reached and a solution found. In the second part of the process, the focus of problem-solving moves ‘backward’ in the means-ends hierarchy – the core solution becomes a means to deal with a more general end (Seidel 1976: 117–119). In this sense, the core of the innovation becomes – in terms of Ilyenkov’s method of ascending from the abstract to the concrete – a germ cell of a new system that spreads and evolves, becoming at the same time more varied and complex.

In the backward process, when the innovative solution is used as a means in different contexts, development continues as a process of decontextualizations and generalization. If the problem is complex (as in the case of the use of steam engine), then a precondition for the diffusion of the solution is that the ‘material embodiment’ of the solution is transferred to a conceptual form. An example of the conceptualization of a solution taken from the case of the steam engine is the drawings of the steam engine provided by Boulton and Watt to the Cornish ‘mine adventurers’. This part of the process can be seen as a separate element or own phase of the problem-solving process (see figure 4.2). 30

Processes of generalization can take different forms. In respect of the case of steam engine technology, one form was experimentation and modification of the solution to match the requirements of different contexts (e.g., the use steam engine in locomotives and ships). Another was the theoretical crystallization of the core principle of the solution (thermodynamics evolved as a science to understand and optimize steam engine technology).

Whether an innovative solution is diffused or disseminated widely is contingent on the degree to which the corresponding societal need is general in society (Seidel 1976: 118).

On the basis of the preceding analysis, the process of societal problem-solving can be divided into four phases: emergence-innovative solution-conceptualized solution-diffusion/dissemination. Those four phases can be used to capture the dynamic of a societal problem with roots in radical change processes. The 4-phase cycle can be seen as a ‘life-cycle’ of a societal problem and its solution (figure 4.3).

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30 This chapter does not maintain that theoretical reflection always follows practical invention. The relations between theoretical work and practical application are non-linear and manifold.
From an activity-theoretical point of view, the societal problem can be understood as a dynamic object, a ‘moving target’ that contains a changing inner contradiction. While the trajectory of the societal problem was described as moving from a general stage to specific stage and back to a general stage, this does not mean that there will always be explicit formulations of the problem in all these stages, nor specific actors and activities representing such formulations. On the contrary, actors might become conscious of a problem only after having seen the solution.

The relationship between ‘problem’ and ‘solution’ is dialectical, with each defining the other. The dialectical relationship between problem and solution is given within each state of the dynamic object of the problem-solving process – even in the earliest phase or latest phase of the problem-solving process. At the ‘beginning’ of the process, as the problem is partially identified, the context of the problem as well as an early context of the solution is defined. The specific contradiction in the specific state of a societal problem characterizes the concrete substance of this dialectical relationship. At the ‘end’ of the problem-solving process, when the solution is diffused throughout a society, the solution can serve as a means to define the problem (‘the steam engine problem’). From the perspective of the whole problem-solving process, one could say that the solution presupposes the problem. But solutions also generate new problems: e.g., by presenting new possibilities.

31 In this sense the terms ‘problem emergence’ or ‘innovative solution’ should rather be understood as ‘initial problem-solving state’ or ‘problem-solving state where the innovation is created’.
The emergence of the societal problem in the use of steam power had its roots in fundamental (technological) changes in Britain in the early industrial era. Such fundamental changes in societies began to emerge recurrently in the industrial era, in the course of industrial revolutions and connected techno-economic waves (Freeman and Louçã 2001; Perez 2002).

Thomas Hughes, who studies the history of innovations, uses the term ‘reverse salient’ to describe recurrently emerging societal needs for new solutions. A reverse salient can be roughly understood as a ‘bottleneck’, a component in an expanding system of innovations that has fallen behind other elements of the system and hinders further development. A metaphorical example for a reverse salient would be a protrusion in a line of battle (1987: 73).

The strength of Seidel’s concept of a societal problem and Hughes’s theory of technical innovations is that they do not only capture problem-solving processes in the context of an organization – as, for instance, Kline and Rosenberg (1986) and Nonaka & Takeuchi (1995).

By using the life-cycle model – based on Seidel’s concept of a societal problem – it becomes possible to analyze broader societal problem-solving processes, in which a wider variety of societal actors and activities is involved. Consequently, the model of a life-cycle of a societal problem constitutes the process dimension within the unit of analysis of this study. It is, however, not a structural model that captures how different kind of actors and activities are engaged in the problem-solving process. Therefore, in the following section, the characteristic of actors and activities addressing the societal problem-solving process are described and captured conceptually.

4.4.2 A dynamic problem-solving formation as a structural model within the unit of analysis

Earlier in this section the societal problem in its life-cycle development was described as a moving target, a dynamic object. The next task is to consider what kind of actors and activities took part in the object-forming process – that is, the societal problem-solving process.

A greater number of work activities existed within which the societal problem emerged (mines and later other early industrial activities such as locomotive production systems). These required a means of dealing with the societal problem. Innovators such as Newcomen, Watt or the actors in the Cornwall collective invention systems, were mechanics and mechanical engineers. Furthermore, in the dissemination phase, financiers such as Boulton were also actively engaged in shaping the problem-solving process.

While in the pre-industrial era, problem-solving processes were conducted within ‘islands’ of societal knowledge that were only loosely interconnected, if at all, by the time of the early industrial era the situation began to change. No genuine mutual interaction existed between important actors such as Newcomen and Watt. It became, however, increasingly possible to build on previous societal knowledge. This also occurred in the case of the actors from the Cornwall collec-
tive invention system, who relied on previous knowledge from Watt (see figure 4.4).

All the described actors and activities in the case of the steam engine can be understood as having contributed to moving the societal problem towards a solution. The pattern of actors and activities who contributed to the problem-solving process was not stable but dynamic. It is important to capture this dynamic aspect within a structural model of the problem-solving process.

Correspondingly, the societal problem in its life-cycle dynamic can be described as a ‘virtually shared object’ addressed by a dynamic formation of different actors and activities. Figure 4.4 depicts the societal problem-solving process and formation in the case of the steam engine.32

![Figure 4.4: Societal problem-solving process and formation in the case of the steam engine, as well as identified specialized activities](image)

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32 The grey rectangles stand for the different stages of the dynamic object of the problem-solving process, as described in detail in figure 4.2. The specific influence of main actors and activities (Newcomen, Watt, Boulton and Watt) on the dynamic of the object in the different phases of the problem-solving process is sketched. Although Boulton and Watt historically preceded the Cornwall collective invention system, they focus on a logically later phase of the problem-solving process. The two triangles depict the different focuses of the specialized activities of Boulton and Watt and the Cornwall collective invention system, addressed in detail in the next subsection.
A variety of different actors and activities might be engaged in influencing a societal problem-solving process and in addressing and forming the societal problem during its trajectory towards a general solution and dissemination in society. Von Hippel (1988) describes how suppliers, manufacturers and users can all assume the role of innovators.

The generation of innovative solutions by suppliers, manufacturers and users in the early industrial period had often taken place in work and organizational practice. There is, however, another variant: innovative solutions derived by theoretical thinking, e.g., from scientific activities (Seidel 1976: 66–67, 77–79).

Kerker (1961) has argued that Watt’s innovative solution is an example of combining both theoretical thinking and creating innovative solutions in practice.

The understanding of a dynamic variety of activities addressing a ‘virtually shared object’ might be enhanced through reference to Foucault’s notion of discourse. For Foucault, discourse represents a system that is responsible for determining ‘reality’ and ‘truth’ within a certain context and period of time (Foucault 1982). Foucault’s discourse appears to be an activity-like formation that addresses a common object:

‘My intention was not to deal with the problem of truth, but with the problem of the truth-teller or truth-telling as an activity’ (Foucault 1982).

A key difference between Foucault’s understanding and an activity-theoretical understanding seems to be Foucault’s emphasis on ‘communication’ instead of on ‘action’. From an activity-theoretical point of view, a dynamic formation of actors and activities addressing an object would be associated with actions that not only communicate material reality, but address and shape it.

Nevertheless, Foucault’s concept can be used to highlight the dynamic and interactive characteristics of a formation of actors and activities that address a ‘virtually shared object’. Engeström (1987: 327) seems to have this meaning in mind when he uses the term ‘social discourse’. A contribution to the understanding of the dynamic and dialogical construction of material reality was also made by Markova (2003), who elaborated the concept of social representation.

In the present study, the model of a dynamic problem-solving formation constitutes the structural dimension within the unit of analysis.

4.4.3 Specialized activities embedded in the dynamic problem-solving formation

It now needs to be determined whether – and in what manner – the dynamic problem-solving formation captures new forms of specialized problem-solving activities. This is essential for its use as a unit of analysis to identify and study forms of conducting interventions.

In the previous section, two new forms of specialized problem-solving activities were identified, both embedded in the dynamic problem-solving formation: Boulton and Watt’s form and that of the Cornwall collective invention system. Both made use of societal knowledge to support work activities in negotiating problems. As Watt was engaged from very early on in the problem-solving pro-
cess he was in an ideal position to make use of all the knowledge acquired in that process. Watt realized this opportunity together with Boulton. Boulton and Watt’s system was based on the solution created and conceptualized earlier by Watt in the form of a prototype steam engine model. The solution was disseminated by selling the patented prototype to work activities such as the Cornwall mines. Boulton and Watt’s focus was on exploiting this earlier solution (see figure 4.4 in the previous subsection).

The Cornwall collective invention system acquired an important segment of knowledge related to the dynamic problem-solving formation – knowledge of Watt’s prototype solution – and was in a good position to make use of it and to support the Cornwall mines in dealing with the societal problem. The Cornwall system was based on the recurrent creation and application of modified prototypes of the steam engine, financed by miners, conducted by engineers and used as shared mutual inspiration for further improvement by all participating groups. The Cornwall collective invention system did not simply conduct actions to create new artifacts (new models of steam engine) as a way of dealing with the societal problem encountered in the Cornwall mines. The system united Watt’s solution with their own knowledge, establishing a separate activity for collective invention. Their focus was not on exploiting the solution, as was the case with Boulton and Watt, but on developing further improvements to solutions.

What are the preconditions for the emergence of these specialized activities?

As previously described, the formation of an object of an activity takes place when cultural knowledge (e.g., in form of a mediating artifact) is used to pursue the meeting of a human need (Leontjev 1978: 54; Foot 2002: 134; see subsection 2.1.1).

The need in the case discussed above can be described as the need of mines to find an efficient way of using steam engines to pump water from mines (a specific formulation of the problem), or as the more general need of work activities to use steam engines as a flexible power source. Both Boulton and Watt’s system, as well as the Cornwall collective invention system, addressed these needs.

Core elements of the two specialized problem-solving activities can be interpreted as having their roots in the societal problem-solving process and formation. In the early part of this process, the two specialized activities had not existed. However, the initial phases of the process led to a specific problem formulation and a correspondingly specific solution that could be picked up by the emerging new forms of problem-solving activity. The development of a specific problem formulation and a specific solution in the problem-solving process could thus be understood as the stepwise development of object and main instruments of the new forms of problem-solving activity.

In the later phases of the problem-solving process, these basic elements – object and instruments – became constituting parts of the two new forms of activity. The objects of these new forms overlap with the ‘virtually shared object’ of the overall dynamic formation of actors and activities addressing the problem.
Both Boulton and Watt’s system and the Cornwall collective invention system were part of the dynamic problem-solving formation on the one hand, and on the other separate specialized activities for supporting work activities that dealt with the societal problem. Figure 4.4 highlights this aspect, depicting both forms within the problem-solving formation, and separately.

Even within the same context (as in the case of the steam engine) different conceptual models of specialized problem-solving activities emerged – one system with a logic that was more oriented towards exploiting given solutions (Boulton’s and Watt’s system), and one that was more oriented towards improving given solutions (the Collective invention system). The contrast between a focus on further development of the innovative solution and a focus on licensing and exploiting intellectual property can also be regarded as a specific form of the contradiction between the use value and the exchange value of problem-solving activities.

The methodological relevance of the dynamic problem-solving process and formation as a unit of analysis lies in its ability to make it possible to locate the roots of specialized problem-solving activities. Correspondingly, the unit of analysis could be used to study whether and how, in the course of the life-cycle of later emerging societal problems, the formation of main elements of forms of conducting interventions took place.

4.5 Summary and conclusions

The research question in this chapter was:

*What were the preconditions of the emergence of forms of conducting interventions, and how can the context of the emergence be captured as a unit of analysis for the further study of forms of conducting interventions?*

Following the emergence of the hypothetical object as a constituent element of forms of conducting interventions – general social and organizational problems in work activities having their roots in radical transformations – problem-solving processes in the early industrial era were analyzed.

In the early phase of industrial development there was a relatively low degree of exchange and utilization of knowledge about problem-solving. At the beginning of the industrial era, there was an increase in this regard. The concept of ‘societal problem’ in Seidel’s terms was taken as a starting point in capturing developments in problem-solving processes in the early industrial era.

With regard to the problem of using the steam engine as a power machine (which took place during a period of radical changes in the Mechanization waves), four phases of the problem-solving process were identified: (1) ‘problem emergence’, (2) ‘innovative solution’, (3) ‘conceptualized solution’ and (4) ‘diffusion/dissemination’.

This ‘life-cycle of a societal problem’ consists of a trajectory that moved from a more general stage of the problem towards a more specific stage (means becoming
ends), until a specific problem could be solved. The specific solution (Watt’s model of the steam engine) represents the core of the innovation, and is the basis for the development of more varied and complex solutions associated with conceptualization, generalization and diffusion processes (ends becoming means).

Actors or activities such as James Watt were identified as addressing the ‘societal problem’ in the course of this ‘life-cycle’. These actors and activities (termed a ‘societal problem-solving formation’) can be understood as containing the cultural-historical knowledge that would enable work activities to deal with the societal problem they encountered. The need among work activities for addressing the problem of how to utilize steam engine as a flexible power machine was general enough to create a market for specialized activities that would address this need. The two forms of specialized problem-solving activities identified – that of the Cornwall collective invention system and Boulton’s and Watt’s – relied in principle on the same solution (Watt’s model of the steam engine), but exhibited a different focus on, respectively, further development of the innovative solution and licensing and exploiting intellectual property. The contrast between the two forms of activity can also be seen as a specific form of the contradiction between use value and exchange value in problem-solving activities.

Activities that addressed technical problems and developed and diffused technical solutions (such as the lathe and the milling machine) had an important role in industrial development. In the second half of 19th century, these activities evolved towards a whole industry – the machine tool industry (Rosenberg 1963: 423–432):

The machine tool industry may be regarded as a center for the acquisition and diffusion of new sills and techniques in a machinofacture type of economy. (Rosenberg 1963: 425)

However, the machine tool industry is not the consultancy industry, and the problem-solving process in the case of Watt is characterized by addressing technical problems and to a lower degree social and organizational problems. The main solution – a new model of steam engine – represents a technical solution.

Later problem-solving processes, however, were more related to organizational issues (Freeman and Louçã 2001: 147–148; Hughes 1987: 73–74). Correspondingly, main solutions in subsequently emerging problem-solving processes are hypothesized to be related to organizational issues, and the main specialized problem-solving activities are hypothesized to be related to (or to consist of) forms of conducting interventions.

The analysis thus far has not led to the discovery of the origin of forms of conducting intervention, but it has provided a model and a unit for further analysis. The notion of the societal problem in its life-cycle dynamic, from the emergence of the problem to the creation, conceptualization and diffusion/dissemination of solutions, was elaborated as a central concept.

The dynamic formation of actors and activities, that address the societal problem and develop it towards a general solution that can be diffused in society, was
proposed as a unit of analysis for capturing specialized problem-solving activities.

This study has suggested that the proposed unit of analysis can be deployed as a means of identifying and analyzing more complex, specialized problem-solving activities such as forms of conducting interventions. In the next chapter, this claim will be tested.
5 Forms of conducting intervention in the Electrification wave

5.1 Introduction and procedure

The previous chapter addressed an early period in the industrial era (the Mechanization waves), and analyzed the emergence of specialized problem-solving activities (Boulton’s and Watt’s system, as well as the Cornwall collective invention system). These activities represent part of a ‘dynamic problem-solving formation’, which was then taken as a unit of analysis to be used in the historical-genetic reconstruction of the dynamic and diversity of forms of conducting interventions.

While problem-solving formations and specialized activities considered hitherto were oriented predominantly to a technical object (such as the use of steam engine), the following sections ask whether this orientation changed in the Electrification wave. They also consider whether any conclusions can be drawn about the emergence of forms of conducting interventions. Correspondingly, this chapter also analyzes main societal problem-solving processes and formations in the Electrification wave (see figure 5.1).

![Figure 5.1: Focus of analysis in this chapter](image)

The research question for this chapter is:

*What were main forms of conducting interventions in the Electrification wave, and what were main characteristics of these forms?*
The ‘overview model’ (see table 3.7 in section 3.5) serves as an orientation for the ‘main’ societal problem-solving processes. It suggests that societal problems in the Electrification wave have been related to ‘Scientific Management’ as well as to ‘Human Relations’. These components of knowledge represent starting points only. In the following discussion, the previously derived unit of analysis will be applied by examining the phases suggested by the life-cycle model (societal problem, innovative solution, conceptualized solution and diffusion/dissemination), and additionally by analyzing the dynamic formation of actors and activities that address the societal problem as a dynamic object. The main sources are primary and secondary texts from and about different actors and activities, along with further overview material. Applying the previously developed conceptual unit of analysis by leaving the result open renders it possible to identify specialized forms of conducting interventions that were not understood until now as being significant forms.

In the following sections, a ‘life-cycle’ analysis of the societal problem associated with Scientific Management (section 5.2) and a ‘life-cycle’ analysis of the societal problem associated with Human Relations (section 5.3) will be undertaken.

5.2 Life-cycle analysis of the societal problem-solving process related to Scientific Management

5.2.1 The societal problem

In the 3rd Kondratiev wave (approx. 1870s–1940s), significant changes occurred in the form of a revolution in the steel industry and in the rapid rise of the electricity industry. Inventions resulting in several new manufacturing processes precipitated enormous developments in the steel industry, making it possible to supply cheap, high quality steel on a vast scale, and also to broaden the range of steel applications. Examples of highly visible and influential technological innovations – generating a technological ‘big bang’ effect, in Carlota Perez’s terms (2002) – were Carnegie’s Bessemer steel rail plant (1875) and Edison’s electric power station in New York (1882). Electric power had an expansionary effect on the whole economy, not merely due to its superiority in energy saving as compared to steam engines, but also because of the flexible use of energy within the production process. The rapid rise of the electricity industry and the revolution in the steel industry had a significant effect on the whole economy, resulting in an entirely new ‘paradigm’ or ‘production and design philosophy’ (Freeman and Louçã 2001: 220–231):

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33 The entire life-cycle of a techno-economic wave can last for a long time, and there is no consensus from scholars either about beginnings and ends, or the terminology of the main periods. The approximation above starts with the ‘technological big bang’ and ends with the economic downswing of the wave, covering the main periods analyzed by Freeman and Louçã (2001) and also by Perez (2002) (see section 3.4.3).
This involved the re-design of machine tools, handling equipment, and much other production equipment. It also involved the relocation of many plants and industries, based on the new freedom conferred by electric power transmissions and local generating capacity. (Freeman and Louçã 2001: 230–231)

The emergence and diffusion of this new constellation of technical and organizational innovations in the Electrification wave offered exceptional super-profits for innovative entrepreneurship. Together with factors such as the emerging mass market (Chandler 1990: 52–53, 90–91), increasing competition and governmental regulation (Fligstein 1990), this led to the rise of giant firms with increasing quantity and speed of production.

But this process did not occur in a smooth fashion. Rapid changes in companies also entailed confusion, duplication of efforts and an unmanageable multiplicity of products, parts and designs (Guillén 1994: 37). The full exploitation of some new inventions, such as ‘high speed steel’ (from Taylor himself, see 5.1.2), was constrained by the old system of work organization (Aitken 1960: 32).

The dominant system of work organization during the first part of the Electrification wave was the decentralized management system, in which foremen controlled a group of workers who conducted a certain part of the production process. Still dependent on a craft-based work method, the workers in such groups used skills they had gained through experience to carry out tasks in individually different ways (Nelson 1980: 9).

The limitations of the old system of work organization became an increasingly disruptive element in the utilization of new technological instruments, which by contrast offered possibilities for accelerating production and producing higher quantities (Aitken 1960:32). There was an urge for the factory owners to replace elements of craft-based production, moving step-by-step towards a new form of production (which would later be seen as part of the development towards mass production). However, the movement towards a new form of production also made it necessary to determine how to put the new technology to optimal use, and how to address the relation of machine operation to manual operations. In respect of the latter, powerful foremen used ‘rule-of-thumb’ methods to set rates for piece work.

The combined effect of difficult working conditions in the heat-using industries, the ‘driving’ method in the mechanical industries, and the favoritism, physical abuse, and insecurity everywhere associated with the foreman’s control of the labor force was a more or less permanent state of antagonism and strife. [...] The most obvious manifestations of the ‘labor problem’, as contemporaries referred to the situation, were strikes and violence, the classic hallmarks of discontent. But there was another dimension to the labor problem, less dramatic, but not less important. This was covert resistance expressed in various forms of noncooperation or outright sabotage. Most prevalent was artificially restricted production, the result of informal collusion among the workers. (Nelson 1980: 9)
This artificially restricted production was called ‘soldiering’, and it often occurred when manufacturers cut wage rates (Nelson 1980: 9).

On the one hand, it can be concluded that there were clear opportunities for accelerating production and producing higher quantities based on the utilization of the new possibilities of the Electrification wave. On the other, however, ‘obstacles’ to industrial production remained. These were typically associated with instruments (unsynchronized procedures in using new technology), division of labor (unsynchronized relation between new machine work and human work) and rules (potentially conflict-generating social rules of workers), which had their roots in the limitations of the old craft production system. The obstacles were so serious that they were even perceived as threatening to outweigh the technological and economical opportunities offered by the Electrification wave (Nelson 1980: 10).

5.2.2 Taylor’s innovative solution

One important group that tried to negotiate these obstacles was the mechanical engineers.

To them contemporary shop management was like some ingenious mid-nineteenth century machine, an ad hoc reaction to the needs of the moment rather than the result of careful design and systematic application of science to utilitarian ends. Their answer to this apparent defect was what might be called the ‘machine model’. If shop management were undertaken with the same knowledge and forethought as the building of a complicated machine, the plant would run with similar efficiency. Because of their positivistic outlook and their background in the relatively trouble-free machinery industry, engineers tended to downplay the severity of labor unrest and to see public outcries as the result of the naive or self-serving efforts of professional social reformers and trade unionists. To them the most important and immediate problem was restricted output, a problem they attributed largely to the haphazard leadership of the overworked and underqualified foreman. (Nelson 1980: 12)

The main forum of the mechanical engineers became the American Society of Mechanical Engineers (ASME). One of the most prominent members (and later president) of the ASME was Frederick Winslow Taylor. Between 1878 and 1889, he worked at the Midvale Steel Company, advancing from subforeman to foreman, master mechanic and chief engineer (Nelson 1980: 29–35). During this period, he conducted a series of experiments, developing different inventions, techniques and methods that can be seen as an innovative solution for the societal problem as previously described. Together with his experiments at the Bethlehem Iron Company from 1898–1901, the experiments at Midvale can be considered as Taylor’s most important. After Taylor’s time in Bethlehem, his system remained basically constant (Nelson 1980: 101–102).

Taylor started his innovative solutions at Midvale with the investigation of the ‘art of cutting metals’ at the beginning of the 1880s (Nelson 1980: 37–39).
The primary object of Taylor’s endeavors was to find a means of determining the rate at which work should be done. Every factor which could influence the pace of work had to be brought under control and standardized at the optimum level of efficiency. In the machine shops where Taylor did most of his early work, a factor of obviously crucial importance was the speed at which the machine tools were run. Taylor was therefore confronted with the problem of determining the proper speed at which any given metal cutting tool should be operated. This was a problem which, up to that time, no one had tackled systematically. (Aitken 1960: 29)

His most important outcome concerning the art of cutting metals was the later discovery of ‘high speed steel’ at the Bethlehem Iron Company.

What Taylor was after was not a new tool steel; he was concerned rather to find out which of the tool steels then available was the best, in order that he might take it as his standard. The crucial series of experiments were run by Taylor and his colleague Maunsel White, a metallurgist, at the Bethlehem Iron Company in 1898. Experimenting with different methods of heat treatment, Taylor and White discovered that cutting tools made of steel containing 7.7 per cent tungsten and 1.8 per cent chromium (high-speed steel, as it was called) attained their optimum cutting efficiency at temperatures just below the melting point of the steel. A cutting tool made of high-speed steel operated at maximum efficiency when run at the highest speed possible without melting the steel. [...] What Taylor and White had done was to show how the new alloy steels could be used to cut metal at rates several hundred per cent faster than had been possible before; they had opened the way to a revolution in machine-shop practice. (Aitken 1960: 30)

Already at Midvale Taylor was able to improve machine performance. The successful improvement of machine performance – and the demands of his employers for cost reduction – led him to broaden his efficiency campaign. His idea was that the quality of the management and the workers’ efforts could be improved similar to machine performance: by careful study, reorganization, and innovation (Nelson 1980: 39).

To achieve this boost in output, Taylor had to deal with the manual tasks of the workers. He challenged the ‘rule-of-thumb’ methods by which the foremen organized workers’ pace and wages by using a time and motion study. He divided the work into basic steps or elements, each of which he timed separately. He then combined his data to determine the amount of time necessary to complete the entire job. In this way, he could calculate how much the workers could produce in a working day, if they worked with optimal efficiency (Nelson 1980: 41).

Taylor (1895) gives an example of these time and motion studies at Midvale in his book ‘A Piece Rate System’:
Suppose the work to be planing a surface on a piece of cast iron. [...] Such analysis as the following would be made:

<table>
<thead>
<tr>
<th>Work done by Man</th>
<th>Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to lift piece from floor to planer-table</td>
<td>–</td>
</tr>
<tr>
<td>Time to level and set work true on table</td>
<td>–</td>
</tr>
<tr>
<td>Time to put on stops and bolts</td>
<td>–</td>
</tr>
<tr>
<td>Time to remove stops and bolts</td>
<td>–</td>
</tr>
<tr>
<td>Time to remove piece to floor</td>
<td>–</td>
</tr>
<tr>
<td>Time to clean machine</td>
<td>–</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work done by Machine</th>
<th>Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to rough off cut 1/4 in. thick, 4 ft. long, 2 1/2 ins. wide</td>
<td>–</td>
</tr>
<tr>
<td>Time to rough off cut 1/8 in. thick, 3 ft. long, 12 ins. wide, etc.</td>
<td>–</td>
</tr>
<tr>
<td>Time to finish cut 4 ft. long, 2 1/2 ins. wide</td>
<td>–</td>
</tr>
<tr>
<td>Time to finish cut 3 ft. long, 12 ins. wide, etc.</td>
<td>–</td>
</tr>
<tr>
<td>Total</td>
<td>–</td>
</tr>
<tr>
<td>Add – per cent. for unavoidable delays</td>
<td>–</td>
</tr>
</tbody>
</table>

It is evident that this job consists of a combination of elementary operations, the time required to do each of which can be readily determined by observation. (Taylor 1895/2000: 60–61)

According to Taylor’s own account, it took several years of experimentation before the full benefits of the system were felt. It took time to calculate the best methods of making and recording time observations, as well as of determining the maximum capacity of each of the machines, and also of constructing Working-Tables and Time-Tables (Taylor 1895/2000: 58).

Having discovered the standard for performing manual tasks by experiments with time and motion studies, Taylor needed a method that would enforce this standard against the workers’ habit of ‘soldiering’ (Taylor 1895/2000: 60–63). That method was to be his ‘differential piece rate’:

In 1884 Taylor applied his differential piece rate to part of the work in the machine shop. […] Taylor set a high bonus rate for workers who completed their assignment in the allotted time and a low penalty rate for all others. Thus the Midvale machinists earned either a high wage or a very low wage, one designed to discourage even an inferior man. On one job, for example, the machinist had received a rate of 50¢ per piece and usually turned out four or five finished pieces per day. After time studies Taylor concluded that the man should produce ten pieces per day. He set a new rate of 35¢ per piece if the machinist finished ten acceptable pieces per day (or a wage of $3.50 rather than $2.00 to $2.50 per day), and 25¢ if he completed nine or fewer pieces (or a maximum of $2.25 per day). Taylor claimed that he established his high or bonus rate by adjusting the piece rate upward until the men agreed to cooperate.
In reality he was probably somewhat less gentle. According to George F. Steele, a
close friend and associate, he fired several machinists who refused to increase their
pace. Between 1884 and 1889 Taylor supposedly extended the differential piece rate
to many, perhaps most, of the Midvale workers. (Nelson 1980: 42)

Another initiative to gain better control over the work was the introduction of
functional foremen, separating the former foremen’s tasks so that they no longer
supervised the entire process of work in their department, but rather individual el-
ements such as speed, the correct use of tools, and so on. Furthermore, Taylor initi-
ated a central planning office to coordinate the work of the different departments.
Clerks passed information and orders from the planning office to departments,
states which work should be done and how it should be done. Departments later
fed back to the office what had actually been done (Nelson 1980: 40–41).

5.2.3 Conceptualization of Taylor’s solution

The methods that Taylor used to develop innovative solutions at Midvale and
Bethlehem were unified and decontextualised in his methodology of Scientific
Management’, Taylor recommended to managers the following principles, which
he described as the ‘essence’ of Scientific Management:

First. They develop a science for each element of a man’s work, which replaces the
old rule-of-thumb method.

Second. They scientifically select and then train, teach, and develop the workman,
whereas in the past he chose his own work and trained himself as best he could.

Third. They heartily cooperate with the men so as to insure all of the work being
done in accordance with the principles of the science which has been developed.

Fourth. There is an almost equal division of the work and the responsibility be-
tween the management and the workmen. The management takes over all work
for which they are better fitted than the workmen, while in the past almost all of
the work and the greater part of the responsibility were thrown upon the men.
(Taylor 1911/1998: 27)

These principles remain on a quite general level. As Daniel Nelson convincingly
argues, Taylor’s often-cited principles could be seen as part of a ‘tactical adjust-
ment’, due to increasing criticism directed at such methods as time study and in-
centive wage from unions like the International Association of Machinists and the

In a later section of his book, Taylor lists ‘elements of the mechanism’ of Scien-
tific Management, warning that these should be used in the spirit of the principles
(Taylor 1911/1998:112–114). Here the elements are grouped into five broad cat-
egories, following a scheme from Nelson (1980: 102–103):
(1) Preliminary measures: purchase and store methods, tool standardization and tool room reorganization, machine layout and design, accounting methods etc.

(2) A production control system based on a specific planning department, detailed instruction cards, use of slide-rules and etc.

(3) Functional foremanship

(4) Time study, with the implements and methods for properly making it.

(5) The incentive wage plans, with the differential piece rate and the task and bonus system.

Taylor describes his method of time study and the standardization for each class of work in more detail:

First. Find, say, 10 or 15 different men (preferably in as many separate establishments and different parts of the country) who are especially skilful in doing the particular work to be analyzed.

Second. Study the exact series of elementary operations or motions which each of these men uses in doing the work which is being investigated, as well as the implements each man uses.

Third. Study with a stop-watch the time required to make each of these elementary movements and then select the quickest way of doing each element of the work.

Fourth. Eliminate all false movements, slow movements, and useless movements.

Fifth. After doing away with all unnecessary movements, collect into one series the quickest and best movements as well as the best implements.

This one new method, involving that series of motions which can be made quickest and best, is then substituted in place of the ten or fifteen inferior series which were formerly in use. This best method becomes standard, and remains standard, to be taught first to the teachers (or functional foremen) and by them to every workman in the establishment until it is superseded by a quicker and better series of movements. In this simple way one element after another of the science is developed. In the same way each type of implement used in a trade is studied (Taylor 1911/1998: 102).

Nelson (1980: 102–103) found that Taylor’s conceptualized solution, his methodology of Scientific Management, remained very near to his experiments. The most developed version of Taylor’s methodology still consisted of a generalization of methods and techniques derived from his experiments.

5.2.4 Diffusion/dissemination of Scientific Management associated with Taylor

After his work at the Bethlehem Iron Company, Taylor did not conduct the reorganization of companies on his own, but instead supervised his disciples (Nelson 1980: 142). Among his most important followers were Carl G. Barth, Henry
L. Gantt and Dwight V. Merrick (Nelson 1980: 120-121). Though their personal styles influenced the form of their implementation of Scientific Management in different organizations, individual deviations appear less important than the underlying similarities (Nelson 1980: 142).

The plants of the army ordnance department were an important industry interested in using Scientific Management in the last phase of Taylor's career. Their plants were responsible for manufacturing weapons and ammunition. Taylor had a personal contact with General William Crozier, head of the department between 1901 and 1917 (with the exception of one year, 1912–1913). Crozier became interested in using Scientific Management to reorganize different army plants along more efficient lines (Nelson 1980: 161). The first plant to be reorganized was the ‘Watertown Arsenal’. Taylor’s disciple Barth undertook the task of reorganizing it, later assisted by Dwight Merrick. Taylor himself devoted considerable time and resources to this project. Reorganization took about four years (Aitken 1960: 65; Nelson 1980: 162).

The Watertown Arsenal was a manufacturing plant, whose production processes did not differ greatly from those in the earlier assignments completed by Taylor and his disciples. Being a publicly owned plant, however, the context was essentially different in comparison with private companies such as Midvale and Bethlehem:

The head of Watertown Arsenal was an army officer, who held his position not by ownership rights but by right of appointment and rank. The heads of the army plants were not motivated directly by pecuniary gain, but depended very much on recognition from their peers and superiors, and from such institutions as Congress (Aitken 1960: 61, 66). Jobs in the arsenal were more pleasant (less working hours per day with more holidays), and more secure (workers in the public sphere were protected by law) than jobs in private industry (Aitken 1960: 54–55). Through their relation to unions and congressmen, workers at Watertown Arsenal had an effective and institutionalized means of defending themselves against any changes in conditions of work that they regarded as unfavorable (Aitken 1960: 67).

According to Aitken (1960: 52), the deeper rationale for General Crozier’s plan to reorganize the plants was to counter the prejudice of congressmen that the army’s arsenals were less efficiently managed than private firms. The commanding officer at Watertown drew up a list of problems, which he announced to the workers as compelling reasons for reorganization:

1. Frequent changes in management.
2. Absence of system and shop management.
3. The number of holidays and vacations with pay.
4. Lack of a proper system of supplies.
5. The conduct of work on the day wage system.
6. Restrictions imposed by laws and regulations, especially in regard to procurement of materials.
7. Lack of coordination of the work done in different shops.
8. Lack of sufficient tools of proper power.
10. Loss of time in looking for proper tools and fixtures.
11. Loss of time due to employees waiting at grinders and at the tool room.
12. Loss of time due to breakages or repairs of machines and belts.
13. Loss of time waiting for the next job.
14. Losses due to lack of proper instructions or to spoiled work.
15. Lack of proper tool room equipment.
16. Lack of proper transportation and lifting equipment in the shops.
17. Wastage and lack of economy in the operation of the power plant.
18. Lack of proper attention to costs of detailed operations.
19. Endeavors to make parts with poor facilities and at great expense which could be purchased more cheaply from outside suppliers.
20. Delays in getting materials when needed and consequent changes in plans.
21. Additional cost of transport service between shops under a system which permitted one helper to each teamster.
22. Excessive amounts of metal left on castings before machining.
23. The commencement of work before a sufficient supply of materials was on hand to finish the job.
24. Failure to take full advantage of the machines and tools provided and ignorance as to the best practices. (Aitken: 1960: 93–94)

Barth’s work began in the machine shop of Watertown Arsenal and was later extended to take in other parts of the organization such as the foundry. The plan was to conduct the project in 4 steps:

1. Reorganization of the storeroom and tool room
2. Creation of a planning room and establishment of a routing system
3. Respeeding and standardization of machine tools
4. Time study, task setting and installation of an incentive wage system (Aitken 1960: 91)

The plan was realized in the following manner:

Instruments of Scientific Management, such as store room tools, planning department tools, high speed steel, and so on, were used to complete the first three tasks listed above. Some modifications of single instruments were carried out. If necessary – as in the case of the use of high speed steel – experiments for adjusting these instruments were conducted (Aitken 1960: 95–105).

The last step in the machine shop was the reorganization of manual tasks. For Barth this last phase was the most important one, representing ‘the ultimate aim and most paying part of the whole Taylor System of Management’ (Aitken 1960: 91). Merrick was employed to assist Barth in this job. When he began to introduce time study in the machine shop, he encountered no major problems.

The reorganization of manual tasks using time study, task setting and the installation of an incentive wage system was a time-consuming procedure, and some of the plant officers became impatient with the speed of progress.
demanded the introduction of time study in other departments at Watertown, including the foundry, without the first 3 steps of the planned procedure being completed. Taylor and his disciples – apparently underestimating the possible reaction from the workers – acceded to these demands. At the time of commencing time studies at the foundry, Merrick’s knowledge of the foundry’s technical and manual task procedures was limited. His first time studies and propositions of standards and rates encountered concerted opposition from workers, who opposed his rates and finally the whole method of time study. As the commanding officer at Watertown did not stop the use of time study, conflict escalated and the foundry workers went on strike with far reaching consequences (Aitken 1960: 134–153).

The workers used their connections to unions and congressmen, which led to congressional legislative action that prohibited time studies at army plants in 1915 (Aitken 1960: 233).

Paradoxically, fall-out from the events at Watertown arsenal were limited (Nelson 1980:105). Barth and Merrick were able to proceed with their work without major consequences, until Scientific Management was instituted at the arsenal on a self-sustaining basis and external consultants no longer required (Aitken 1960: 119).

According to Nelson, one of the foundry workers explained this paradox: ‘our concern is not for the present. As things go now, here, nothing could be nicer; our concern is for the future’ (Nelson 1980: 106).

The conflict at the Watertown project foreshadowed two things: 1. management’s interest in using only selected techniques of Scientific Management, such as time studies and incentive wage systems for cost reduction; and 2. the potential of conflict with workers (as part of a new societal problem) as a result of deploying such techniques.

5.2.5 Dissemination of Scientific Management by Bedaux

While Taylor is the best-known figure in the dissemination of Scientific Management theory (through books and articles), it was neither he nor his disciples such as Gantt or Barth, who were the main disseminators of Scientific Management to a wider range of industries. A much more significant person was Harrington Emerson. At the beginning of his career, Emerson was on friendly terms with Taylor, but was later criticized by him due to his overriding interest in ‘making money’ (Nelson 1980: 130). The main disseminator, however, was French immigrant Charles Bedaux. In 1930, the Bedaux system was the most widely used methodology in the Scientific Management tradition in the United States (Kipping 2002: 30; Nelson 1992: 29). His was also the most successful of the early wave of American consultancies in terms of speed, scale and geographical scope of international expansion (Kipping 1999: 197).

It was not only his early death, or problems with the use of his system at army plants, that prevented Taylor and his most faithful disciples from becoming its principal disseminators. Taylor himself was not primarily interested in earning
money or in developing a business empire; rather, he directed his efforts towards the diffusion of the ideas of Scientific Management, and towards earning the recognition of his fellows and the general public. His interest in an academic career at Harvard Business School is an example of this goal (Nelson 1980: 122; 188–189).

Taylor acknowledged that it would take 2–3 years, and in some cases 4–5 years, to conduct a change process (1911/1998: 114–115). He often insisted that the system was ‘all of it or none’, and that the consultant should have absolute authority (Nelson 1980: 123).

Other consultants, by contrast, were faster, more flexible or ‘opportunistic’ than Taylor (Nelson 1980: 125). Emerson, for example, was able to use untrained and inexperienced assistants because he had no necessary sequence of operations, doing as much as the clients would finance. Though in practice he usually utilized time study and an incentive wage to improve workers’ ‘efficiency’, he had no particular area of specialization (Nelson 1980: 130).

Bedaux, in contrast to Taylor, was predominantly interested in business. He was a brilliant salesman, who possessed the gift to develop and maintain a network of business contacts in the USA and Europe, giving him an opportunity to expand his business rapidly. He also endeavored to protect himself from competition by making his employees sign an agreement which prohibited the use of Bedaux’s name and methods in the event that they left his firm (Kipping 1999: 199). Another key reason for his success was the Bedaux system itself (Kipping 1999: 198).

According to Fritz Stein, who in 1932 wrote a dissertation about the Bedaux system, in their projects ‘Bedaux engineers’ focused on changing the output of manual tasks. There was no focus on changing machine procedures, general work organization, or work tools (Stein 1932: 9). There was not even a momentum towards changing the movements of workers performing manual tasks. The emphasis was rather on the change of output per time of manual tasks, which – according to Stein – was one of the main differences between Taylor’s and Bedaux’s systems (Stein 1932: 35–35). A later analyst of the Bedaux system, Steven Kreis, mentions Bedaux projects in which more than merely manual task reorganization took place. Nevertheless, he also comments that Bedaux projects were not as comprehensive as Taylor’s, and that the most important indicators and instruments were related to manual tasks (1992: 162–163). Altogether, it seems that the dominant focus of Bedaux’s consultancy was on efficiency of conducting manual tasks.

Bedaux used existing knowledge about time and motion studies to produce a tool that described the relation between effort and relaxation in the conduct of manual tasks. In a Bedaux project, all tasks are assigned a specific ‘B’ rating, which represents a standard for how much of a specific work operation a worker should perform, and how much rest he should have, within a minute. A normal worker with a ‘normal speed’ would produce 60 B units in an hour; a faster one could achieve more (Kreis 1992: 162).

Stein describes an example thus: If a worker in an hour of ‘normal speed’ produces 4 work pieces, that would mean that 4 pieces correspond to 60 B units for this particular task. If the worker were faster – e.g., producing 5 pieces an hour, this would correspond to 75 B units, and he would earn a bonus. If there were a
delay in production that lay outside the worker’s responsibility – e.g., a shortage of important material – the worker would be compensated (Stein 1932: 18–19).

In order to achieve normal speed and output, time studies of the task components were conducted. According to Stein, stopwatch studies of 10 or more cycles of a single operation would be conducted. The sum of the average time necessary for conducting the operation, plus time for rest estimated on the basis of an ‘effort-rest-relation’ chart, would produce the B-unit standard (Stein 1932: 13–17).

The worker was paid a set normal wage for a specific task if he achieved a rate of 60B units or less. If he achieved more, he received a bonus related to the quantity of B units. The bonus was handed to the worker in a separate envelope as a means of motivating the worker (Stein 1932: 19–21).

Kreis describes the Bedaux system – as compared with other systems – as extremely rapid. Relying on data from the London Bedaux office, he explained that 46 % of a total of 606 British Bedaux projects between 1926 and 1946 were completed in 12 months or less (Kreis 1992: 164–165).

The analysis of the Bedaux consultancy system explains this relatively short project period. In contrast to Taylor, Bedaux focused on a narrower object and had less need for time-consuming analyses and experiments. With these less complex analyses, there was also the possibility for hiring younger and less-experienced engineers, and thus a greater experience-inexperience ratio was possible, keeping down the costs of a project. With the increase in the size of his company, Bedaux was also able to send more consultants into companies to conduct time studies of manual tasks. Consultants received training at the beginning of their work for Bedaux. Information gained in consultancy projects was sent to the central office (Kreis 1992: 160–163).

In these ways Bedaux had a competitive advantage with regard to the dissemination of Scientific Management.

Stein’s critical conclusion is that the Bedaux system represented a tool for raising workers’ performance that was even more one-sided than the Taylor system (1932: 112).

5.2.6 Conclusions

During the Electrification wave major changes took place in the dominant form of production of work activities. Prior to the Electrification wave, a workforce in companies consisted of an average of about 100 skilled workers, who used mechanical instruments to speed up production, but where many work processes were still dominated by elements of craft production. Within the Electrification wave, the dominant type of work activity moved to large or even ‘giant’ factories, advancing towards industrial production – an early form of mass production – from a today’s point of view.

The problem-solving process associated with Scientific Management began in an early stage of the Electrification wave. The development of the ‘virtually shared object’ of the dynamic problem-solving formation can be described with reference to the following problem-solving trajectory:
The utilization of new possibilities in the 3rd Kondratiev wave was constrained by elements of craft-based production. The development of a new production form entailing higher speed and quantity of output was constrained by remaining manual tasks and the system of a decentralized division of labor. No appropriate instruments for redesigning manual tasks, the division of labor and rules existed until Taylor – through his experiments at Midvale (and in part at Bethlehem) – developed a way of optimizing machine use, a means of deriving standards for manual tasks using time and motion studies, and a way of enforcing standards using his incentive wage system. These central organizational innovations became visible in the 1880s, about one decade after the technological ‘big bang’ (Carnegie’s Bessemer steel rail plant in 1875).

The conceptualized solution of time and motion studies and the incentive wage system were used as the main instruments of the integrated Scientific Management methodology, which was itself used to address obstacles to a new production system characterized by increased speed and quantity of output. With the establishment of industrial production as an early form of mass production, the technological possibilities of the Electrification wave became fully exploitable.

Main actors in the problem-solving process analyzed in this section were mechanical engineers. As heavy engineering and steel production represented leading branches of the Electrification wave, it is no surprise to find that mechanical engineers, from very early on in the wave, were engaged in formulating the emerging problem, experimenting to find partial solutions, and conceptualizing and disseminating these partial solutions through the publication of articles and books. The main forum of the mechanical engineers was the American Society of Mechanical Engineers (ASME).

While many mechanical engineers addressed the societal problem in the problem-solving process, Taylor’s problem definition, innovative and conceptualized solution was the one widely accepted as a ‘breakthrough’. From a very early stage, Taylor was already part of the formation of actors and activities that addressed the problem-solving process associated with Scientific Management. Working at Midvale Steel Company, the societal problem appeared to him as bringing order and system to manufacturing against the background of the new possibilities offered by the Electrification wave and the inner contradictions of the old craft production system. Through experimentation, he developed a series of innovations that he later developed into a system he termed Scientific Management. Scientific Management, as Taylor conceptualized it, was disseminated through his books and by conducting interventions in factories. Bedaux, on the other had, made his main contribution to the societal problem-solving process in the last phase, by which stage the societal problem was being described as the ‘efficiency problem’. He established a consultancy firm to disseminate his way of dealing with the problem (see figure 5.2).
Figure 5.2: Societal problem-solving process and formation related to Scientific Management, and identified forms of conducting interventions

Taylor’s and Bedaux’s systems were identified as two new forms of specialized activity embedded in the dynamic problem-solving formation. Taylor focused on a compact repetition of the process that had led to his innovative solution. Scientific Management, the key organizational innovation, was a compact system based on the methods and tools developed earlier by Taylor. Projects conducted by Taylor and his pupils were then conducted in a craft-like form addressing single factories such as the Watertown Arsenal. Bedaux, on the other hand, did not focus on repeating a process, but on applying a reduced variant of the Scientific Management solution that led relatively quickly to visible results, and which he and his employees were able to use simultaneously with a large number of clients. His consultancy operated an elaborated system of training new employees and fast completion of a project, enabling the Bedaux consultancy to conduct projects with many organizations from different industries (and later in different countries) that wanted to overcome obstacles to industrial production in the first half of the 20th century. Figure 5.2 provides an overview of the main actors and activities in the societal problem-solving process associated with Scientific Management.

What is the difference between Taylor’s and Bedaux’s activities, on the one hand, and Boulton’s and Watt’s (as well as the Cornwall collective invention system) on the other?
Unlike the steam engine problem-solving process, which was predominantly related to technical issues, the problem-solving process addressed to this point was also associated with issues of work organization. Taylor addressed and solved an organizational problem. His solution, Scientific Management, was an organizational innovation that suggested a new concept of management and organization. It constituted a system of logically interlinked smaller innovations. Introducing the new concepts of management and organization associated with Scientific Management required a lengthy process of transformation. It entailed a series of interlinked actions of analysis, evaluation and change, as well as the use of different instruments to support these actions. In this sense, the introduction of the new concept took the form of an activity, rather than of a number of actions. This activity can be viewed as an intervention activity or form of conducting intervention that supported work activities geared towards resolving social and organizational problems.

On the basis of this analysis, a preliminary statement can be made about certain essential characteristics with regard to forms of conducting interventions.

A first element is a historically evolved inner contradiction within the work activity that becomes the client activity of intervention calling for a new form of work organization within the client activity. This social or organizational problem has to constitute a need in client activities that is general enough and sufficiently long-standing to form the basis of an activity that would have the object of addressing and resolving the problem in work activities (i.e. to meet the need). A second central element is an adequate instrument that can be used to address the problem – that is, a model of a solution as well as the process of reaching it. A third element is a subject (one or more actors) capable of carrying out the intervention process collaboratively with the client. These three elements form the triangle of the concept and tool-mediated interaction between the subject and the object of the intervention activity. A fourth element is a community of actors collaborating in carrying out the intervention activity, as well as a community arrangement that makes the sustained activity possible.

All of the elements described previously are related to the problem-solving process and formation. The object of the form of conducting interventions overlaps with the ‘virtually shared object’ of the problem-solving formation. The instrument is a key artifact from the problem-solving formation. Subject and community have been part of, or have been related to, the actors and activities addressing the societal problem-solving process.

This description clarifies the qualitative difference between Taylor’s and Bedaux’s activities, on the one hand, and Boulton and Watt’s, as well as the Cornwall collective invention system, on the other. The qualitative difference in complexity of the two types of specialized activities is connected to the qualitative difference concerning the object (social/organizational vs. technical problem).

While Taylor’s and Bedaux’s forms address the same societal problem-solving process, important differences exist between the two forms.

Taylor addressed a larger part of the phases within the problem-solving process, treating each problem as a new problem where the whole system of Scientific
Management would be applied, also including experimental methods. He could, however, use this way of conducting interventions only for a limited number of work activities – focusing on early ‘users’ from the iron and steel industry. Bedaux oriented his consultancy firm towards only the last part of the problem-solving process (treating a problem as principally solved but requiring a solution to be appropriated), but he was, in contrast, able to address a mass market with a high number of users. While Taylor had an elaborated system of instruments for creating solutions and a relatively simple craft-like community, rules and division of labor, Bedaux’s instruments were routinized. In Bedaux’s system research was eliminated and the number of steps and methods of Scientific Management instruments reduced. His community system and rules and division of labor were elaborated in relation to Taylor with the aim of supporting the speedier conduct of a higher number of consultancy projects.

The previous discussion suggests a hypothesis about the nature of the contradiction between the use value and the exchange value of forms of conducting interventions.

An initial aspect of the contradiction is the focus on knowledge creation and knowledge application/exploitation. This aspect was observed also in the case of the steam engine. The Collective invention system focused on the creation of a solution, and Boulton and Watt on the solution’s exploitation.

The second aspect of the contradiction is related to a difference between the focus on the whole system (system of partial innovations innovation; orientation to a new concept of management and organization for client activities), and the narrower focus on a part (partial innovation; selection of certain key elements – manual tasks conducted by workers – of the client work activity).

It seems clear that Taylor’s form corresponds principally to the use value side of the contradiction (with its focus on the creation of a solution and on the whole system), while Bedaux’s form corresponds to the exchange value side (with its focus on application/exploitation and on a selected part only). It is, however, important to emphasize that both forms are complementary in their orientations, and that Bedaux was connected to – and was in a certain sense dependent on – Taylor’s earlier innovations.

5.3 Life-cycle analysis of the societal problem-solving process related to Human Relations

5.3.1 The societal problem

From the 1910s onwards, the labor movement in the US developed into a powerful industrial and political force (Gillespie 1991: 16). In many cases following a Scientific Management-related intervention, relations between workers and management did not improve – as Taylor hoped they would – but in fact declined further. That decline manifested itself in symptoms of ‘social disease’ such as industrial conflict, lack of cooperation, imperfect adaptation of work (Guillén 1994: 59). Another manifestation was the high percentage of labor turnover, which in
many factories exceeded 300 % per annum, which was extraordinarily wasteful for companies (Gillespie 1991: 17).

After the First World War in the United States (and later in other countries), critics of Scientific Management increased; even original followers of Taylor, such as Gantt began to pay more attention to ‘human’ factors (Barley and Kunda 1992: 371–372). An interesting example is early criticism from the young Kurt Lewin in 1920 (then living in Germany) that Taylorism represented a ruthless exploitation of the individual in the service of production [...] corresponding to the calculation of wear and amortization of machines (Lewin 1920: 17).

Altogether it can be concluded that there was, on the one hand, the increasing reality of industrial production, and on the other, an acknowledgement of the remaining or even intensifying ‘resistance’ or threat to industrial production coming from both informal and formal workers’ non-collaboration, and from high costs due to labor turnover and absenteeism.

The societal problem described here was addressed by different groups. Most prominent were the group centered around Mayo and Roethlisberger at Hawthorne (whose trajectory is analyzed in subsections 5.3.2–5.3.4), as well as the group focused around Kurt Lewin (whose trajectory is analyzed in subsections 5.3.5–5.3.7).

5.3.2 Innovative solution at Hawthorne

As the power of US unions and the possibility of labor unrest increased, and as costs caused by labor turnover became an increasing factor of concern, the societal problem became more demanding. Large US corporations began to expend considerable amounts of time and energy on improving the motivation and loyalty of their workers.

American Telephone and Telegraph Company (AT&T) was one of the companies that invested the most effort. They implemented welfare plans such as pension schemes, stock purchase plans, and also introduced personnel managers with related organizational units as personnel departments. Another measure was to introduce employee representation bodies that were independent of unions (Gillespie 1991: 16–27).

A central role in addressing the societal problem was played by social scientists. In 1920, AT&T had the largest industrial research program in the United States. Social scientists became increasingly important within this structure. Part of this program included research studies conducted between 1924 and 1933 at the Hawthorne plant of the Western Electric Company, the manufacturing subsidiary of AT&T (Gillespie 1991: 27–36). The group involved in these studies was from the Harvard Business School – the same institution where Taylor had lectured; after they established what became known as the ‘Hawthorne effect’, they became the most prominent group within the Human Relation movement.
Four of the most important groups of studies conducted in the Hawthorne research were the illumination experiments, the Relay Assembly Test Room Study, the interview program and the Bank Wiring Observation Room Study. The first study was conducted by researchers from Western Electric. The latter three were conducted collaboratively by researchers from Western Electric and a group from Harvard Business School, with Mayo and Roethlisberger as the most prominent members (Roethlisberger and Dickson 1939: 14–18; 19–127; 189–205; 379–408; Dickson and Roethlisberger 1966: 20–31).

According to Roethlisberger and Dickson, the illumination experiments, which addressed the relation between illumination and worker’s productivity, delivered inconclusive results concerning the influence of illumination on productivity, but ‘contributed to the steadily growing realization that more knowledge concerning human factors was essential.’ As a ‘result’ the Relay Assembly Test Room Study was initiated (1939: 14–18).

In the Relay Assembly Test Room Study five women who were assembling telephone relays agreed to be placed in a separate room and submitted to different conditions of work, e.g., introduction of rest pauses of varying frequency and duration, and changes in the length of the working day and week. The time it took each woman to assemble a telephone relay under the different conditions was carefully measured (1939: 19–24). The experiments showed an improved output of the workers, which could not be attributed to single changes in the physical circumstances of the subjects. According to Roethlisberger and Dickson, a careful statement about the attitudes seemed a matter of great urgency (1939: 127). After some additional experiments, the Hawthorne management — advised by the researchers — decided that ‘everything pointed to the need for more research on employee attitudes and the factors to which they could be related’ (1939: 186).

Growing interest in attitudes and the reflection and discussion of existing supervisory methods led directly to the interview program. The central idea was to ask employees from different departments to express in frank terms their likes and dislikes about their working environment. The outcomes were to be used as the basis for improving supervisory training (Roethlisberger and Dickson 1939: 189–191). Two important results of the interview program were as follows:

(1) The complaints of interviewed workers were an important, but still not sufficient step, for understanding the workers’ attitudes and related factors. This led to the conclusion that more research about the social organization of workers was necessary; such research was conducted in the Bank wiring experiments (1939: 376–379).

(2) There was a growing awareness on the part of researchers that the interview method itself could serve as a social technique (1939: 204).

In the final phase of the research program, the Bank Wiring Observation Room Study was conducted. The social scientists took the role of field researchers, observing the activities and interactions of the workers as well as listening to their feelings. It became clear that the company consisted not only of formal organizational
structures but also of informal social structures that both played a part in keeping the people working in the organization satisfied (Dickson and Roethlisberger 1966: 30–31). Major problems emerged when formal and informal structures were not in equilibrium. The boundaries of human collaboration were far more limited by the informal organization within the plant than by the formal (Roethlisberger and Dickson 1939: 567–568).

A reader of Mayo’s and Roethlisberger and Dickson’s books receives the distinct impression that the Hawthorne studies followed a logic of discovery in which one part of the experiments led ‘logically’ to the next part of the experiments. Gillespie (1991), however, offers a convincing critical analysis of the Hawthorne experiments. In it, he states that Mayo, Roethlisberger and Dickson ‘stylized’ their central descriptions of the Hawthorne studies. The studies as summarized above were in reality part of a dynamic and highly interpretative research process. Gillespie notes that Roethlisberger and Dickson (1939) constructed an unfolding chronology of discovery in which the results from one section of the experiments produced insights that pushed the researchers ‘logically’ along a new path. By the terms of this construction, a generation of social scientists was misled (Gillespie 1991: 198). A more adequate description of the process would be a dialectal relationship between Mayo’s social and political ideology and his description of the experiments (Gillespie 1991: 190). Gillespie concludes that the ‘Hawthorne effect’ was not ‘discovered’ by the Hawthorne experiments, but that the experiments were rather one of the resources used to establish the ‘Hawthorne effect’ (1991: 364–366).

For the purpose of this study, it is important to recognize that during the experiments certain instruments were developed that could be, and indeed were, used as innovative solutions to existing problems with workers. The interview program led to the development of a concrete social technique – personnel counseling – which was later regarded as one of the main instruments resulting from the Hawthorne experiments (Gillespie 1991: 211; Dickson and Roethlisberger 1966: 3, 36–37).

The development of personnel counseling occurred in two steps. The first step was the development of an interview method within the program described previously (1928-1931). The second step – addressed in the next subsection – consisted of a personnel counseling program that explicitly focused on the elaboration and application of the social technique (1936–1956).

Within the frame of the interview program, the central idea was to ask employees from different departments to express openly their likes and dislikes on themes including supervision, working conditions and the job as a whole. Questions were initially more ‘direct’: e.g., did the employee like or dislike his/her supervision. That was changed from mid-1929 onwards, after which time interviews were conducted in a more ‘indirect’ fashion, with the employee choosing topics and the interviewers encouraging the employee to keep talking (Roethlisberger and Dickson 1939: 201–203).

Interviewers formulated five rules for the conduct of interviews, which they tried to adhere to fairly closely. These were:
1. The interviewer should listen to the speaker in a patient and friendly, but intelligently critical, manner.
2. The interviewer should not display any kind of authority.
3. The interviewer should not give advice or moral admonition.
4. The interviewer should not argue with the speaker.
5. The interviewer should talk or ask questions only under certain conditions:
   a. To help the person talk.
   b. To relieve any fears or anxieties on the part of the speaker which may be affecting his relation to the interviewer.
   c. To praise the interviewee for reporting his thoughts and feelings accurately.
   d. To veer the discussion to some topic which has been omitted or neglected.
   e. To discuss implicit assumptions, if this is advisable. (Roethlisberger and Dickson 1939: 286)

There were some ‘unexpected outcomes’ from the interview program, relating, among others, to the effect on supervisors and interviewers. The most unexpected effect, however, was observed in the employees interviewed. According to Roethlisberger and Dickson, the employees appreciated being recognized as people with valuable comments to make. Furthermore, psychological benefits often accrued to the person being interviewed: ‘many adverse attitudes’ were improved ‘by emotional abreactions’ (1939: 226–228).

5.3.3 Conceptualization of the Hawthorne solution

Within the personnel counseling program – the second step of the development of the social technique – the ‘unexpected outcomes’ of the interview program became the main frame of focus. Units of Western Electric consisting of about 300 employees were assigned to one counselor, whose task it was to become familiar with the supervisors and workers, as well as with the kind of work being done and any existing problems. Interviews and observations were used to study the social situation of the workgroup, and also to aid individual workers to adjust to the industrial structures. Through adjustments of this kind, the aim was to influence communication positively, and to improve general social situation. Information obtained in the counseling, later anonymized, could also be used for supervisory training and as a general feedback for management (e.g., for information concerning workers’ morale) (Roethlisberger and Dickson 1939: 590–604).

Gillespie states that while researchers may have set out with ‘honorable’ intentions, from the point of view of Western Electric Management personnel counseling was – at a time of explosive industrial relations and union activity – a social technique for improving workers’ relations with management by adjusting individual workers to the work organization and to managerial imperatives: in short, a means of persuading workers to submit to managerial authority (Gillespie 1991: 212–218).

According to Dickson and Roethlisberger (1966: 3; 36–37; 43) and Gillespie (1991: 211), personnel counseling emerged as the main conceptualized outcome of the Hawthorne studies for changing management-worker relations.
There was an expectation that the use of personnel counseling could reduce existing human problems (complaints or grievances, labor turnover, absenteeism, lowered productivity, low morale), and might also increase desirable outcomes such as high production output, low costs and high levels of satisfaction (Dickson and Roethlisberger 1966: 36–40).

Within the personnel counseling program, the behavior of the counselor was guided by a prescribed role model consisting of two main components: an observer-researcher-diagnostic component, and a listening-helping-communicating component.

The observer-researcher-diagnostic component addressed topics such as neutrality and responsibility, as well as some general guidelines for diagnosis (Dickson and Roethlisberger 1966: 40–42).

Listening-helping-communicating role prescriptions were:

1. *Listen*-don’t talk.
2. Never argue; never give advice
3. Listen to
   a. What the person wants to say.
   b. What he does not want to say.
   c. What he cannot say without help.
4. Become sensitive to the expression of feelings. Learn to recognize and reflect them.
5. Help the person to clarify and accept his own feelings. Do this by summarizing from time to time what has been said (e.g., `Is this the way you are feeling?’). Always do this with great caution, that is, clarify but do not add or twist.
6. Help the person to make his own decisions; do not make them for him.
7. Try to understand the person from his point of view; do not put yourself in his shoes. Put him in his own shoes.
8. Never forget that you are involved in the situations you are observing. Learn to recognize and accept your own feelings. Don’t try to escape from them-learn to accept them and deal with them through skill and understanding.
   a. Take it easy.
   b. Stay loose.
   c. Be flexible.
   d. Internalize these role prescriptions so that they become congruent with yourself. Don’t be a copy cat. Be true to yourself.
   e. Be natural. (Dickson and Roethlisberger 1966: 42)

Dickson and Roethlisberger describe the organizational objectives as follows:

(a) to aid in the processes of individual adjustment.
(b) to improve supervisor-employee relations
(c) to improve managements understanding of the human problems existing at the work level
(d) to conduct research on problems encountered in the course of achieving these objectives
(e) to develop a more stable and responsible work force, a more cooperative spirit, etc. (Dickson and Roethlisberger 1966: 406)

Gillespie states that the adjustment of individual workers to the work organization and managerial imperative emerges as the most important function (Gillespie 1991: 218).

5.3.4 Diffusion/dissemination of the Hawthorne solution

Personnel counseling as a ‘social technique’ was developed at the Hawthorne plant of Western Electric, the manufacturing subsidiary of AT&T. During the personnel counseling program, the technique was spread into other parts of Western Electric and AT&T (Dickson and Roethlisberger 1966: 6–7). Even though personnel counseling became widespread within Western Electric and AT&T, the most extensive example of its dissemination almost certainly occurred elsewhere: in the Training Within Industry (TWI) program.

As the Second World War began, the demand for war products increased in the United States – this was the case even prior to the US’s own entry into the war – due to the need to supply Allied Forces from other countries. ‘Resistance’ to increasing industrial production was due primarily to a lack of skilled workers: e.g., a shortage of lens grinders at government arsenals and navy yards. The difficulty within the war context was that the craft of lens grinding took five years to master under normal circumstances – which was far too long. Other potential ‘resistance’ arose from the non-optimal use of manpower, machines and materials, as well as from the ‘human situation’ concerning the degree of employee cooperation (Robinson and Schroeder 1993: 37–42).

The TWI program dealt with these problems. TWI had a head office in Washington staffed with experienced personnel managers. C. R. Dooley, an industrial relations manager from Socony-Vacuum, was the director of TWI and J. W. Dietz of the Western Electric Company was its associate director. TWI was an decentralized organization, with 22 district offices around the country; each office had a district director, four members of an advisory panel (two from management and two from labor organizations), and a panel of ten or more part-time training consultants from local industries, selected by the district director on the basis of expertise in apprentice training, industrial relations and personnel. The organization was management-oriented, but with a strong emphasis on union involvement (Breen 2002: 238–243).

At the core of TWI were three standardized training courses for supervisors and foremen. The first – Job Instruction Training (JIT) – taught supervisors the importance of training their workers properly and supplied advice on how to provide this training. It was aimed at helping companies to deal with the shortage of skilled workers. The second – Job Methods Training (JMT) – focused on how to generate and implement methods for improved use of manpower, machines and

The training was considered as the standard method for training people who would themselves train other people, leading to a multiplier effect. The courses were offered for companies in a wide variety of industries. To ensure the programs’ effectiveness in every possible circumstance, TWI rigorously field-tested each new course before it was released nationally. Trainers were required to adhere strictly to lesson plans, which were outlined in detail in manuals. The manuals instructed trainers exactly what to write on the board, and when to write it (Robinson and Schroeder 1993: 38).

Job Relation Training (JRT) can be seen as a direct outgrowth of the Hawthorne experiments. Dietz from the TWI head office had worked at Western Electrics and was already committed to the Human Relation approach (Gillespie 1991: 235). He invited Roethlisberger to develop JRT, and together with J. B. Fox, the two were responsible for developing the main elements of the course (Breen 2002: 250–261).

JRT was structured along similar lines to the other two courses: five two-hour sessions with 10–12 participating supervisors. In the first session of each course, known as the ‘Famous First’, a real-world problem was presented and an unsatisfactory solution supplied, carefully designed to make supervisors recognize it as something that they might have come up with themselves (Robinson and Schroeder 1993: 39).

The JRT instructor opened the ‘Famous First’ session by informing supervisors:

When a machine is installed in a department, a hand-book comes with it – or there may be a mechanic specially qualified in how that particular piece of machinery works, and directions on how to keep it in good operating condition, or what to do when it breaks down.

Supervisors get new people all the time, but instruction books don’t come with them. Yet a worker is much more complicated than any piece of machinery in your department or shop.

How are you going to keep that new person in top form? What will you do if he fails?

Employees will tend to judge the whole plant in terms of the treatment they receive from their immediate boss. (Robinson and Schroeder 1993: 43)

The instructor then related the story of the difficult relationship between a supervisor and Joe, one of his best workers. Robinson and Schroeder describe the story thus:

Joe often didn’t show up on the job because he could make enough money working only some days a week. His absenteeism had become a source of friction with his supervisor, who couldn’t get Joe to work a full schedule. Then Joe got married, and for a few months he came into work every day, since he now needed the extra money. One Monday, after a substantial company-wide pay increase, Joe failed to
show up for work. It seemed that he could again afford to take a day off each week, and had reverted to his old ways. The supervisor decided to teach him a lesson, and suspended him for one week without pay. Usually, a good number of supervisors in the JRT class would agree with this course of action. But then, a few days later, a colleague remarked to the supervisor that he’d heard the supervisor had been very tough on Joe, whose father had been hurt in an automobile accident on Sunday night. Joe had asked his neighbor to get word to the supervisor but his neighbor had forgotten to do this. Joe’s supervisor saw his mistake, but it was too late, for he had already caused problems with those he supervised, and therefore with production. (Robinson and Schroeder 1993: 43)

At this point, the instructor presented the TWI ‘4-step method’, demonstrating how it enabled a much better supervisory action (see figure 5.3: front of the instruction card). The course then discussed ways of preventing such problems from arising in the first place: (see figure 5.3: back of the instruction card)

After the first session or two, which were devoted to learning methods, the remaining time was spent on problems brought in by each supervisor for analysis and solution using the TWI method. TWI referred to this aspect of the course as ‘learning by doing’. On completing the JRT course, each supervisor was given a wallet-sized card summarizing the appropriate TWI 4-step method (figure 5.3), which could be consulted as a reminder of how to proceed in a particular situation (Robinson and Schroeder 1993: 39; 42–43).
JRT helped supervisors to develop a mode of behavior that could be used to support the adjustment of individual workers to the work organization. While JRT was used in a different kind of activity system, as far as its content and organizational objectives are concerned it remains similar to the technique of personnel counseling developed at Hawthorne.

The results of TWI were impressive. By the time TWI was deactivated in the fall of 1945, 1,750,650 certificates had been issued to supervisors from 16,511 plants, who had participated in 1 or more courses. Most were JIT certificates, followed by JRT and JMT certificates. 571,640 government supervisors, and even some German prisoners of war, also received TWI training and certification. TWI monitored 600 of its client companies throughout the war. Robinson and Schroeder describe how a majority of these client companies reported a significant increase in production as well as significant improvements concerning training time, labor hours, scrap and grievances (1993: 44).
5.3.5 Innovative solution developed by Lewin

Another group that addressed questions of remaining or even intensified ‘resistance’ or danger to mass production characterized as problems of ‘Human Relations’ were Kurt Lewin and his colleagues and students. Lewin was a scientist with broad interests and contributions. His biographer Marrow describes a variety of studies in which Lewin conducted laboratory and field experiments that led to various kinds of innovative solutions.

One series of experiments, conducted under laboratory conditions between 1937 and 1938, were related to the influence of ‘democratic’ and ‘authoritarian’ leadership on group behavior. Lewin Lippitt and White constructed increasingly sophisticated experimental designs with groups of children who joined after-schools clubs for arts and crafts, with adult leaders who played different leadership roles (Marrow 1969: 123–128).

In a famous study in 1938, groups of children were kept as stable as possible, but leadership styles varied from autocratic, democratic and ‘laissez-faire’. The autocratic leader determined all policies, methods and activities and criticized results in personal terms. The democratic leader facilitated discussion and group decisions about policies, methods and activities and criticized results on a fact-related basis. The ‘laissez-faire’ leader did not participate in discussion nor decision of policies, methods and activities and tried not to comment at all on results (Lewin, Lippitt and White 1939: 271–274).

The researchers compared levels of intermember aggression across the same groups of boys with democratic, autocratic and ‘laissez-faire’ leaders. They found that the average level of intermember aggression in groups with autocratic leaders was either very high or very low, which was interpreted in terms of aggressive autocracy or apathic autocracy. In the groups with a democratic leader, intermember aggression was at a medium level. In the groups with ‘laissez-faire’ leader, aggression was high (Lewin, Lippitt and White 1939: 278–280).

Lewin concluded that the differences in behavior in autocratic and democratic situations were not results of differences in the individuals but of the leadership styles (Marrow 1969: 126–127). The studies can be seen as a starting point for further development of innovative solutions. Lewin and Bavelas came to the idea of experimenting with leadership training (Marrow 1969: 127). From 1939 onward Lewin became increasingly interested in group dynamics (Marrow 1969: 168–169).

Another series of experiments was conducted under field conditions at the Harwood Manufacturing plant, a sewing plant that opened in Virginia, USA in 1939. From 1939/1940 to Lewin’s death in 1947 there was an active collaboration between the plant management and Lewin and his colleagues. Lewin actively encouraged management to embark on a program of research and also to employ Alex Bavelas (who was later succeeded by John R.P. French) to conduct a series of field studies on human factors in management (1969: 141–143). Following the argument that ‘in every industrial organization a main goal is to improve the rate of production’ (Marrow 1969: 146), studies were conducted into the influence of
Human Relation methods (such as group decisions, self-management and leadership training) on production levels (Marrow 1969: 144–146).

Bavelas conducted an experiment into group decision-making at Harwood. He began his experiment by holding meetings, each lasting for about thirty minutes, several times a week with a small group of highly-productive operators. Everyone was encouraged to discuss any difficulties encountered when the group tried to increase daily production. The discussion revealed that people carrying out the same job used different methods. Advantages and disadvantages of the different methods were analyzed. When the group suggested ways of overcoming anticipated difficulties, management agreed to help implement the recommended changes. The group was then asked to vote on the issue of increasing its own daily output. Each worker could decide for him or herself, but always in the context of the group setting. The group decided to raise output from the previous high ceiling of 75 units to 87 and later 90 units, levels that had never before been attained. They achieved both targets. Indeed, the group maintained a level of 90 units for five months, during which time other groups in the plant showed no significant increase.

Lewin’s hypothesis was that the act of deciding had the effect of linking motivation to action. The decision seemed to have a ‘freezing’ effect, which was partly due to the individual’s tendency to ‘stick to his decision’ and partly to the ‘commitment to a group’. Lewin stated that a discussion would have a different outcome than a decision. To test this hypothesis, Bavelas held separate meetings with two other groups of skilled operators; their agenda consisted solely of discussions about how to raise production. These groups showed only a slight increase in production levels (Marrow 1969: 144).

Another study – probably conducted in Harwood by Bavelas – is described by Lewin as an example of a solution to a ‘chronic conflict in industry’ (1944). In a production section of an industrial organization, severe conflict between employees had persisted. A ‘fighting triangle’ had arisen, consisting of a mechanic, an equally ranked supervisor of operators, and the operators. The mechanic had the task of repairing the operators’ machines; however, because he was called too often by the operators to address minor problems, more important machines were sometimes not repaired quickly enough. The mechanic had not been conscious of this problem, although the supervisor was and – being of equal status – she occasionally had to resort to ‘tricks’ to induce the mechanic to repair a particularly important machine. The situation escalated when the supervisor tried such a trick, telling the mechanic that an operator had reported that he had ‘refused’ to repair her machine and that he had to do the repair. The mechanic became angry and confronted the operator, who accused the supervisor of ‘lying’. Both supervisor and the mechanic considered quitting because of ‘loosing face’.

Bavelas was called to deescalate and resolve the conflict. He conducted interviews, first with the supervisor, with the mechanic and then with individual operators. The interviews had a ‘fact-finding’ and an ‘action’ character. On the one hand, they aimed at identifying the objectively existing problem; on the other, they intervened in the sense that the interviewees were first calmed down, and then reoriented from a destructive focus on who was ‘right or wrong’ towards a focus on solving the underly-
ing production problem. Bavelas invited operators to a group discussion about the problem. A solution was found by proposing a rule stating that important machines should be repaired first. Later, a decision was made that the supervisor should assume responsibility for deciding which machine was most important. After further dialogues both with mechanic and supervisor, all parties agreed to the solution and the conflict was resolved. The solution led to a remarkable improvement in relations between mechanic, supervisor and operators. In addition, it led to an unexpected diminishing of repairs in the factory (Lewin 1944: 125–137).

Lewin analyzed the work of Bavelas by singling out the basic principles which guided his actions:

‘The realistic demands of production have to be satisfied in a way which conforms with the nature of group dynamics’ (Lewin 1944: 137). To increase production one could try increasing ‘driving forces’ using higher incentives or pressure, or try weakening those forces that keep production down. According to Lewin, Bavelas’ procedure followed the latter course, attempting to eliminate certain conflicts within the group as well as certain psychological forces acting on key individuals (in this case, the mechanic), which undermined his efforts. The conflict arose out of an aspect of production where overlapping authorities existed in a cognitively unclear situation. To bring about a permanent solution, it was necessary to consider production and the problem of social relations in an equal degree. Even the best plan of reorganization would have been worthless if it had not been tailored to the human beings who had to live and react in that setting. Every step of Bavelas’ procedure was therefore heavily influenced by a consideration of group dynamics. Lewin states that the psychologist was meticulous in involving them actively in the total scheme of fact-finding and planning (Lewin 1944: 137–141).

The series of experiments discussed in this subsection can be viewed as steps towards an innovative way of dealing with the ‘resistance’ or danger to industrial production arising from Human Relations’ problems.

The laboratory experiments of Lewin and his colleagues into leadership and group atmosphere provided the group with early versions of concepts and instruments. In the context of field studies in the industrial setting, Lewin related to the societal problem by discussing how production is influenced and could be further changed by altering group dynamics.

Both series of experiments can be seen as important steps towards ‘what came to be called action research’ (Marrow 1969: 127–128) – Lewin’s method of combining action in change projects and research.

5.3.6 Conceptualization of Lewin’s solution

The experiments described in the previous section were conducted in specific contexts. Later, Lewin generalized some of these findings and integrated them into a unifying system of theory and methodology (Lewin 1947a, 1947b).

Lewin saw in the social group a particularly important scientific entity. In his opinion, experiments with groups had the potential to lead towards a natural integration of the social sciences. Group behavior, according to Lewin, was influenced
by both the individual and social situation, and he invited both psychologists and sociologists to analyze it. Altogether, the group can be seen as Lewin’s main unit of analysis (Lewin 1947a: 8–11).

Furthermore, the group should not be studied as a static entity, but in the context of experimental variations in the group’s constituency (Lewin 1947a: 9). Lewin expresses in the following famous statement the general character of his research methodology:

The research needed for social practice can best be characterized as research for social management or social engineering. It is a type of action research, a comparative research on the conditions and effects of various forms of social action, and research leading to social action. Research that produces nothing but books will not suffice. (Lewin 1947b: 150)

In figure 5.4 Lewin’s Action Research methodology is visualized.

![Figure 5.4: Lewin’s Action Research methodology (Lewin 1947b: 149)](image)

Action Research starts with a vague ‘idea’. To be able to steer action, the vague idea has to be developed towards a ‘general plan’. To accomplish this:

(a) the goal related to the idea has to be clarified;
(b) the path to the goal and the available means, which may used to reach the goal, have to be determined;
(c) a strategy of action has to be developed.

The material that is required by such a proposed general plan comes from ‘diagnosis’ (other terms used are ‘fact-finding’ or ‘reconnaissance’) of the ‘field’ that embeds goal, path and means. Such a general plan acts as a blueprint for action, but should be determining only with regard to the first step of action. After the first step of action is carried out, the issue of whether the effect of the first action was actually what was expected should be investigated. The result of this second fact-
finding step after the first step of action might necessitate altering the general plan. Furthermore, the basis is given for a final decision as to the second step of action. After the second step of action, fact-finding again follows, leading once more to an alteration of the general plan and a decision on the next step of action. Action Research proceeds in further circles of planning, step of action, and fact-finding (Lewin 1947b: 147–148).

In the description of this methodology, Lewin refers to certain instruments of analysis and facilitating change. A basic concept for the analysis of groups is the ‘social field’. What happens in a social field depends on the distribution of ‘forces’ within the field. The dynamic of a key variable related to a specific group such as the level of production (for work groups in production) or aggressive actions (in groups of children) can be analyzed through identifying specific forces that influence the variable. According to Lewin, such forces are often directed towards increasing the value of the variable (upwards directed forces), and towards decreasing the value of the variable (downwards directed forces). In many aspects of social life, such forces hold the value of variables in quasi stationary equilibria (e.g., a relatively constant level of production). A successful change of such an equilibrium (e.g., moving towards a higher level of production), may be seen as being composed of three aspects: unfreezing, moving and freezing of a level. To arrive at a permanent change of such an equilibrium, it is necessary to understand the total social field: the groups and subgroups involved, their relation, their value systems, and so on. Therefore, a sufficient conceptual analysis is a prerequisite to the identification, measurement and changing of such forces (Lewin 1947a: 13–39).

Within a framework featuring the elements described previously (orientation on group dynamics, Action Research, force field analysis, the change model of unfreezing-moving-freezing), Lewin deployed more specific instruments of analysis and for facilitating change. He emphasized the importance of instruments of analysis such as sociometric techniques, group observation, interviews, and so forth, for gathering group data (Lewin 1947a: 8).

An important instrument for facilitating changes (from unfreezing, over moving and to freezing) was group decision-making (Lewin 1947a: 35–38). Other important instruments of facilitating change such as leadership training, sensitivity training programs and the survey feedback technique were greatly influenced by Lewin, and elaborated after Lewin’s unexpected death in 1947 (Marrow 1969: 146, 212–214; French and Bell 1973).

5.3.7 Diffusion/dissemination of Lewin’s solution

As Lewin made increasing progress in the use of the concept of Action Research, he became skeptical about remaining in a conventional academic setting. As a consequence, he pursued the idea of establishing an autonomous institute, loosely attached to a university (Marrow 1969: 159). With the establishment of the Research Center for Group Dynamics at MIT (transferred after Lewin’s death to Michigan University) Lewin realized his idea.
At the research center it was possible to follow Lewin’s idea of not only studying groups but changing groups. In fulfilling a practical need, Lewin, his colleagues and students were prepared to use ‘whatever qualitative or quantitative psychological, sociological, or anthropological methods are needed for investigation’. From the perspective of students, it was possible to be involved in a Ph.D. program in group psychology, with the opportunity of conducting field research in industry-community relations, and other settings. There were close relationships to organizations that offered further possibilities for research. The center also assisted in training practitioners (Lewin 1945).

MIT provided the Research center with administrative support, making possible the organization of research projects involving large numbers of people. The Centre received financial support from organizations as the National Institute of Mental Health, the US Air Force, as well as from the Field, Rockefeller, and Carnegie foundations. Nevertheless financial support always remained a problem (Marrow 1969: 183).

A classical research-oriented change project was the study of John R.P. French and Lester Coch at Harwood Manufacturing Corporation. The Harwood plant was located at Marion, Virginia, USA and produced pajamas. It had about 600 employees, mostly women (Coch and French 1948: 512). Lewin influenced the earlier work at Harwood (Marrow 1969: 150–152). French was a member of the faculty at the Research Centre for Group Dynamics at MIT (Marrow 1969: 182), while Coch was personnel manager at Harwood (Marrow 1969: 150).

An example of how the societal problem appeared in the Harwood study was the resistance of production workers to changes in methods and jobs. Resistance was manifest in grievances about piece rates that accompanied the new methods, high turnover, very low efficiency, restriction of output, and marked resentment of management (Coch and French 1948: 512).

Ideas of monetary allowances for transfers and enlisting the aid of the union, as well as making layoffs on the basis of efficiency, failed. In the Harwood study, researchers wanted to understand why the workers resisted so strongly, and sought to find ways of changing this. The study was guided by an Action Research methodology (Coch and French: 532). Researchers had a preliminary analysis/theory, planned a change experiment, conducted the change experiment and reformulated their analysis/theory.

The instruments used in the analysis were:

(a) Data from earlier experiments of Alex Bavelas – another member of Lewin’s group
(b) Data from questionnaires of different groups of workers about the fairness of the companies efficiency rating (60 units per hour), and
(c) Interview data of workers concerning what happened when they were forced to change their work task.
The data was used for a first analysis of the forces influencing the level of production and worker frustration. Production levels were influenced by forces pushing production in a upward direction as well as by forces pushing in a downward direction. Normally, in a stable situation, upward-directed forces (such as the need to achieve the goal of 60 unit standard), and downward forces (such as the avoidance of strain imposed by the difficulty of the task), were in a quasi-stationary equilibrium (Coch and French 1948: 516–517; Marrow 1969: 151). Frustration was high if the absolute value of both opposing forces was high, which tended to increase the probability of employee turnover (Coch and French 1948: 517). But that reading was not consistent with all data. Some data suggested that – especially in situations of change – the work group could influence production levels by setting a group standard, with the possibility of this becoming a strong upward or downward force.

On the basis of that first analysis it was concluded that the most appropriate system for influencing production levels and worker frustration was the group system. That conclusion was drawn using an experiment that introduced required modifications of tasks to groups of workers in three different ways, each involving a different degree of collaboration with employees. All groups had a similar pre-experiment level of production, which was slightly higher than the standard 60 units.

The first (control) group consisted of 18 hand pressers, with no degree of participation. The workers were informed in a meeting that the production department had to modify the job because of competitive conditions and that a new piece rate was being set.

The second (experimental) group consisted of 13 pajama folders who had participation via representatives. They held a meeting where management proposed the following plan, duly accepted by the workers:

1. Make a check study of the job as it was being done.
2. Eliminate all unnecessary work.
3. Train several operators in the correct methods.
4. Set the piece rate by time studies on these specially trained operators.
5. Explain the new job and rate to all the operators.
6. Train all operators in the new method so they can reach a high rate of production within a short time. (Coch and French 1948: 521)

While there is no reference to an earlier Bedaux intervention in Harwood, the Harwood standard of 60 units corresponds with the 60B standard of the Bedaux system (see subsection 5.2.5). The coincidence of the number 60 seems too specific to be pure chance, leading to the hypothesis that the Human Relations project was taking place on a ground perhaps influenced by the prior use of techniques from Scientific Management.
The third (experimental) group consisted of two subgroups of 7 and 8 pajama examiners, with the highest degree of participation. The change process was similar to the first 4 steps of the process of the second group; however, no representatives were chosen, since all workers were participating (Coch and French 1948: 520–522).

Results showed differences in the 3 groups concerning both production level and aggressive behavior:

The first (control) dropped in output and did not even attain prior levels of production. 17 per cent quit in the first 40 days and there were repeated incidents of aggressive behavior as an expression of hostility against the supervisor. The second group, which elected representatives, after just 14 days achieved a production level of 60 units. The group had no employees quitting, only one act of aggression, and a generally cooperative relationship with management. The last ‘full participation’ group reached the 60 unit standard within 2 days, showing sustained progress thereafter to a level that was 14% higher than their pre-change output. No employees quit, there was no aggression, and there was a generally cooperative relationship with management (Coch and French 1948: 522–524).

In a second force field analysis based on the data provided by the experiments, Coch and French concluded that level of participation influenced workers’ acceptance or rejection of imposed changes. That resulted in different changes concerning the forces operating in the control and experimental groups. While in the experimental groups the acceptance of changes led to stronger upward-related forces, in the control group, rejection led to higher downward forces – e.g., a group standard below the 60 unit standard.

The study conducted by Coch and French exists as an example of how the group centered around Lewin conducted change projects by relying on an Action Research methodology and concepts from group dynamics.

Students of Lewin such as Lippitt, Benne and Bradford also established other forms of addressing Human Relations problems. One of these was the National Training Laboratories (NTL), which operated a less research-oriented focus. Within the NTL, group dynamic training was conducted with a higher number of clients (Cummings and Worley 2001: 6–7).

5.3.8 Conclusions

The societal problem-solving process associated with Human Relations began in a later period of the Electrification wave. The following problem-solving process describes the development of the ‘virtually shared object’ within the dynamic problem-solving formation. The process captures both the trajectory of Lewin’s work as well as the trajectory related to Hawthorne, Mayo/Roethlisberger and TWI.

The life-cycle of the societal problem as related to Human Relations commences with the discussion of dysfunctional side-effects of the dissemination of Scientific Management solutions. In this sense, the problem-solving process associated with Scientific Management, as it is described in the previous section, constitutes a fundamental part of the Human Relations related problem-solving
process. The integrated Scientific Management methodology was used to negotiate obstacles in the way of a new production system characterized by increased speed and quantity of output (industrial production). However, while Scientific Management was employed to deal with particular obstacles on the path towards the realization of industrial production, its use entailed an increase in conflicts between managers and workers manifesting itself in both informal and formal workers’ non-collaboration, as well as in high costs due to staff turnover and absenteeism (see figure 5.5).

There were no effective ways of dealing with the societal problem until Mayo and Roethlisberger, and later Lewin, developed key techniques and methodologies. The conceptualized solution of Human Relations techniques (such as personnel counseling or Action Research and group dynamics) were utilized as the main instruments of the Human Relations movement, which was used as the means of establishing a ‘softer’ system of industrial production, and later of mass production.

Main actors in the societal problem-solving process were psychologists and social scientists such as Mayo, Roethlisberger, Lewin and French, as well as personnel managers such as Dickson and Coch. Two leading generations of social scientists were distinguished. The first was related to the Hawthorne studies and to the work of Mayo and Roethlisberger. The second generation was related to Lewin.

Many different social scientists and personnel managers were engaged in defining and addressing the societal problem (e.g., Lewin, Mayo, and Roethlisberger).
The young Kurt Lewin, for instance, observed a ‘ruthless exploitation’ of employees through Scientific Management.

The earlier generation of actors associated with the Hawthorne studies was led, during the phases of innovative solution and conceptualized solution, by actors such as Mayo, Roethlisberger and Dickson. Mayo, Roethlisberger and members of Western Electrics (AT&T) developed and conceptualized the solution of ‘personnel counseling’ (see figure 5.6). This solution consisted of a method as to how supervisors might influence individual workers to find a higher degree of ‘harmony’ within the company. Roethlisberger used personnel counseling as an individual interventionist. Personnel counseling was already a reduced part of the larger innovative solution, and was then further processed and objectified as a training concept. The last stage was conducted in the context of the state organized system of Training Within Industry (TWI). The TWI system abstracted from the creation process and disseminated training to a large number of US factories. In this last stage, the societal problem was addressed as the problem of ‘Human Relations’ between ‘manager and worker’.

Figure 5.6: Trajectory of societal problem-solving process related to Mayo’s and Roethlisberger’s generation of Human Relations, as well as identified forms of conducting interventions
Another way of dealing with the societal problem of Human Relations was developed by Lewin, who integrated the creation, conceptualization and application of new solutions by using Action Research as a methodology and a variety of group dynamic concepts. Based at his research center, Lewin and his students conducted change projects in factories using an integrated system of methodology and theory to generate enhanced forms of group dynamics (see figure 5.7).

![Diagram](image)

Figure 5.7: Trajectory of societal problem-solving process related to Lewin’s generation of Human Relations, as well as identified forms of conducting interventions

The TWI system and Lewin’s activity were identified as two new types of problem-solving activity being embedded in the dynamic problem-solving formation.

TWI was a non-profit oriented form that brought together a large number of actors and activities (among others, personnel managers, scientists, unions and company representatives) to distribute knowledge in training form to US organizations. The goal was primarily to improve production capacities during the Second World War. The TWI system focused on applying and disseminating the ‘personnel counseling’ solution in crystallized form to a wide range of industries. TWI had an extremely elaborated community system with a high degree of collaboration between very diverse actors and activities, united in the aim of helping the country in an emergency situation.
Lewin elaborated his creation and conceptualization related instruments (Action Research and group dynamic concepts) in such a way that in his research center each problem could be addressed as a new problem. Grounded on the rules and division of labor pertaining to a research community, financed by outside (state and other non-profit) sources, Lewin and his students conducted Action Research projects to create ‘more harmonic’ forms of group dynamics.

In this chapter’s analysis of the problem-solving process and forms of conducting interventions, it has been argued that the qualitative difference between earlier specialized activities (Boulton and Watt’s) and Taylor’s and Bedaux’s forms, was connected to the type of problem (technical problems vs. social/organizational ones). Following this distinction, all the specialized activities analyzed in this section can be interpreted as forms of conducting interventions. At first sight, this claim may appear as a rather astonishing interpretation of the TWI system, since it does not appear to be of a form practised by individual interventionists such as Taylor or Roethlisberger, or by large consultancies such as Bedaux’s.

On the other hand, it is plausible as the pattern in the early period of the Electrification wave seems to exhibit the same functional differentiation as that found in the later period.

Lewin (like Taylor) addressed a larger portion of the phases of the problem-solving process, treating each problem as a new problem in which the whole system of Action Research and group dynamic concepts could be applied (also including experimental methods). Lewin, his co-workers and students in the research center, however, could use this form of conducting interventions only for a limited number of work activities. The focus on addressing a larger section of the phases of problem-solving can also be observed in the case of Roethlisberger (although to a smaller degree than in either Lewin’s or Taylor’s case).

The state-organized TWI system, on the other hand, was oriented primarily towards the last stage of the problem-solving process. The societal problem was treated as clearly defined and principally solved; only the solution had to be diffused. Because of this narrow focus, TWI was able to address a large number of users simultaneously. While Lewin developed an elaborate system of instruments for creating solutions, and his community of researchers established rules and a division of labor to support the knowledge creation-oriented way of conducting interventions, TWI instruments were condensed and routinized to the maximum degree. The TWI community system, rules and division of labor were elaborated in such a way as to support the faster conduct of a large number of training events throughout the US.35

35 While not analyzed in detail, the system of National Training Laboratories, as established by students of Lewin, appears to be another example of a Human Relations related, dissemination-oriented form of conducting interventions. A further example might be consultancies that operated in the Human Relations field emerging in the 1940s. A more prominent instance of these consultancies is the Hay group, now a large international consulting company with offices in more then 40 countries, specializing in human resources (Morris 2001).
To sum up, Lewin’s form, Roethlisberger’s form and the TWI system addressed a societal problem which emergence/aggravation was the side-effect of the diffusion of Scientific Management. Forms identified in the Scientific Management related problem-solving process (Taylor’s and Bedaux’s form) and those forms identified in the Human Relations related problem-solving process deal with opposing problems. At the same time, these opposing forms exhibited a common pattern, being oriented either to the creation and conceptualization of solutions, or to the dissemination of solutions.

These conclusions make it possible to use a condensed schema to summarize the answers to this chapter’s research question, which addressed the main forms of conducting interventions in the Electrification wave, as well as the principal characteristics of these forms (see figure 5.8).

![Figure 5.8: Overview of analyzed forms of conducting interventions in the Electrification wave](image-url)
6 Forms of conducting interventions in the Motorization wave

6.1 Introduction and procedure

In the Electrification wave, a qualitative change concerning specialized problem-solving activities was observed. These activities addressed social and organizational problems and developed into more complex patterns. Several examples of such forms of conducting interventions were identified, including Taylor’s and Bedaux’s, Roethlisberger’s and Lewin’s, and that associated with Training Within Industry. These forms were not competitive, but rather were complementary in their orientation.

The historical-genetic (re)construction of a comprehension of the dynamic and diversity of forms of conducting interventions will be continued with a study of the main societal problem-solving processes in the Motorization wave (see figure 6.1).

The research question for this chapter is:

What were main forms of conducting interventions in the Motorization wave, and what were main characteristics of these forms?
The 'overview model' (see table 3.7 in section 3.5) again serves as an orientation. Main societal problems in the Electrification wave have been related to ‘strategy and structure’, and also to ‘organizational culture, learning and quality’. As in the last chapter, the described elements of knowledge serve as a starting point only. In the following sections a ‘life-cycle’ analysis of the societal problem related to ‘strategy and structure’ (section 6.2), as well as to ‘organizational culture, learning and quality’ (section 6.3), will be undertaken. The main sources will be primary and secondary texts associated with the different forms, and additional overview material.

6.2 Life-cycle analysis of the societal problem-solving process related to strategy and structure

6.2.1 The societal problem

While production processes within companies gradually stabilized, and further necessary changes were institutionalized, turbulence in the environment emerged as a factor for consideration, resulting in an entirely new societal problem during the first decades of the Motorization wave (approx. 1910s–1990s). These first decades represent an ‘age of extremes’, characterized by the great depression and the Second World War. Turbulence was also generated by the rapid rise of the automobile industry, the rise of oil as a core input, networks of motor highways as part of the new transport infrastructure, and the triumph of mass production and consumption. An example of highly visible and influential technological innovations – those creating a technological ‘big bang’ effect in Carlota Perez’s terms (2002) – is Ford’s Highland Park assembly line after 1913 (Freeman and Louçã 2001: 141, 257–258).

The developments in this age of extremes led to the gradual demise of what Fligstein (1990: 116–119) terms the ‘manufacturing conception of control’. Before the great depression, in many organizational fields it was possible for a small number of vertically integrated large firms to stabilize prices by making their prices public and encouraging competitors to do the same. In this way, companies could concentrate on questions of more efficient mass production, and had little incentive to introduce new products.

The ‘age of extremes’ implied new opportunities, as well as new needs for companies: With the increasing demand of consumers, and with the triumph of mass consumption within the United States and – especially after the second world war – also in Europe and other parts of the world, there were exceptional possibilities for company growth (Freeman and Louçã 2001: 288-289). Simultaneously, however, due to emerging turbulence, markets could change, differentiate or even collapse quite rapidly. On the one hand, therefore, there were possibilities for profits through growing and emerging markets; on the other, there was a risk of suffering heavy losses if markets changed rapidly (Fligstein 1990: 117–118).

The danger of suffering heavy losses had its roots not only in environmental turbulence but also in limitations of the early form of mass production. This early
form was based on the manufacturing concept of control – with Ford as a paradigmatic example – and oriented to relatively stable markets. As the stability of markets declined sharply, the early form of mass production – oriented to large scale production only – showed its limitations. The goal of maintaining a stable market strategy and a centralized organization structure – favored in many work activities in the Electrification wave – became increasingly difficult to combine with an orientation towards product development, and manufacturing and marketing on a world scale. There was a need for a new form of mass production that was geared towards changing markets.

To sum up, in the Motorization wave a new societal problem emerged that was associated with the desire to utilize new possibilities and opportunities of the Motorization wave (e.g., potential for exceptional profits due to growing and emerging markets), on the one hand, and the limitations of the early mass production form oriented around stable markets on the other.

6.2.2 Innovative solution at General Motors

A famous early example of aggravation of the societal problem and of the development of a key organizational innovation is the case of General Motors. Various authors have detailed the rise of General Motors (and often related it to the decline of Ford). General Motors was led until 1920 by the founder and longtime president, William Durant. He championed a strategy of expansion through combining within a single holding company, many scattered facilities and plants for making and selling automobiles, parts and accessories. Many of these facilities and plants were former independent companies acquired by Durant. Under Durant, by 1919 General Motors became the fifth largest of all industrial enterprises in the United States (Chandler 1962: 115).

Throughout his expansion Durant showed almost no concern for organization structure. General Motors was, in administrative terms, a loosely knit federation of many operating divisions, with a low degree of coordination and supervision. Major decisions such as plant expansions, capital investment, output and prices were sometimes decided by Durant and the heads of the operating divisions, sometimes by Durant with no consultation, and at other times by division managers after only the most casual reference or contact with Durant’s office (Chandler 1962: 125).

1919 was a year of massive expansion. Older plants were enlarged and new ones set up in different parts of the country. Other investments to control other companies were carried out. Until March of 1920, demand and prices were still rising. However, with the sharp depression of 1920, this demand collapsed. Division managers – having full control of the funds in their divisions – reacted very slowly to these changes, and by November of 1920, General Motor was near bankruptcy (Chandler 1962: 124–130).

The consequence was that Durant resigned, the Du Ponts bought Durant’s share of General Motors and Pierre Du Pont took over the presidency of the company. Du Pont chose Alfred Sloan as his most important assistant, and it was Sloan
who played a decisive role in the generation of innovative solutions at General Motors (Fligstein 1990: 131).

Sloan was a MIT graduate who had built up his own company, bought in 1916 by General Motors. Sloan became head of the parts and accessories subsidiary of General Motors, which sold to nearly all of the General Motors’ assembling divisions, as well as to the industry at large. While he was acting in this function, Sloan came to acquire a more comprehensive overview of the situation at General Motors than any other executive, with the possible exception of Durant himself. He had become increasingly concerned with the lack of structure and system in General Motors’ overall organization. In 1919, as a result, he conducted an ‘organization study’ in which he proposed a wide-reaching reorganization of the company (Chandler 1962: 130–132).

His ideas, however, did not come to fruition until Pierre Du Pont became president. As Sloan described in his memories, General Motors had to deal with a range of difficult problems: environmental dilemmas associated with the depression and decrease of income, and problems within the company itself due to lack of information and coordination, and a weak overall strategy (1964: 41–45).

In his study, Sloan proposed a new organization structure and strategy (1964: 46–52). He begins by describing his larger goal:

The object of this study is to suggest an organization for the General Motors Corporation which will definitely place the line of authority throughout its extensive operations as well as to co-ordinate each branch of its service, at the same time destroying none of the effectiveness with which its work has hitherto been conducted. (Sloan 1964: 53)

Sloan then explains two basic principles that guide his rationale for reorganization:

(1) The responsibility attached to the chief executive of each operation was to be in no way limited. Each such organization headed by its chief executive was to be complete in every necessary function and enabled to exercise its full initiative and logical development.

(2) Certain central organization functions were to be absolutely essential to the logical development and proper control of the Corporation’s activities (Sloan 1964: 53).

Sloan planned to achieve his goals of reorganization by four routes. First, he would regroup the operating divisions. Divisions that prior to the reorganization offered various products were to focus on one of four product groups (Car, Accessory, Parts and Miscellaneous), although they were to retain functions such as purchasing, manufacturing and sales. Secondly, he included in the general office a number of executives to administer the activities of different groups of divisions. Thirdly he expanded staff functions in the general office, uniting offices carrying out these
functions into a single Advisory Staff. Finally, he enlarged the activities of the financial and accounting units (Chandler 1962: 134–135).

Figure 6.2: New structure of General Motors (Chandler 1962: 159)

By 1925, the structure – although slightly different than Sloan had initially designed – was overwhelmingly implemented, assuring effective administration of the many and varied industrial resources assembled by Durant (see figure 6.2). The various divisions at General Motors had now been placed in logical relation to each another. Importantly, a large overall administrative office with general executives assisted by staff specialists was established to coordinate, appraise and set policies for the multifunctional autonomous operating divisions. Clear lines of authority and communication between the general office and each division were carefully defined, then supplemented with the formation of Interdivisional Relations Committees. A mass of accurate data, relating both to internal performance and external conditions, flowed through these communication channels. Such data was compiled regularly by the divisions and then checked and supplemented at the general office. Nearly all activities of General Motors were keyed in to forecasted market demand and estimated financial and economic conditions (Chandler 1962: 158).
The new structure was combined with innovative product development, marketing and sales strategies (Fligstein 1990: 133).

Sloan observed that in 1921 there was no established policy in General Motors vis-à-vis the car lines as a whole. For example, there was no car in the low price area that could compete with Ford, then the market leader, in either price or quality. The fact that General Motors produced mainly middle- and high-price cars was not a deliberate policy, but simply happened. In this price bracket, cars from different divisions landed up in identical price positions without any meaningful relationship to the interest of the enterprise as a whole. Sloan argued that General Motors needed a wider strategy for penetrating the low-price field, as well as other fields. Furthermore, a research, development and sales policy was urgently needed to support such a strategy.

The idea emerged of producing a line of cars in each price area, from the lowest- to highest-grade quantity production car. Individual price steps should be significant enough to keep the number of lines sufficiently small to retain the advantage of quantity production. There was to be no duplication by the corporation in terms of price fields or steps. The firm then formulated a marketing policy to price their products at the upper end of any given price category, justifying such raised prices through offering higher quality cars with extra amenities (Sloan 1964: 58–69).

The new organizational structure and strategy served General Motors well. Between 1924 and 1927, the Corporation’s share of the motor vehicle market rose from 18.8 per cent to 43.3 per cent. In the following year, its profits stood at $276,468,000. By 1929, General Motors overtook Ford and has from that point on remained the world’s biggest car maker.36 A clearly and rationally defined structure became increasingly valuable as the demand for automobiles leveled off and competition intensified. With the great depression, the call for new cars declined rapidly. While the saturation of the market had relatively little impact on General Motors’ profits, it proved disastrous for Ford, who in his later years rarely thought in terms of structure or even strategy. Ford’s share of the market fell from 55.5 per cent in 1921 to 18.9 per cent in 1940, when his sales were far behind General Motors’ 47.5 per cent of the market (Chandler 1962: 158–160).

6.2.3 Conceptualization of the solution by Drucker

Several scholars have described the innovative solution at General Motors and drawn conclusions out of the experience. Concepts that are applicable to other contexts were developed. One of the most influential within the strategy and structure tradition was Peter Drucker (Guillén 1994: 85–86; Barley and Kunda 1992: 377). Drucker had close contacts with a principal disseminator of strategy and structure-related knowledge – McKinsey; he acted as a trainer for their new staff.

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36 Only recently is Toyota expected to overtake General Motors as the world’s biggest carmaker.
In his book ‘Concept of Corporation’ (1946), Drucker discusses the strategy and structure of corporations. His primary example is the decentralization of General Motors. He argues that decentralization can be used as a model for other corporations.

In his later book ‘The Practice of Management’ (1954), he elaborates the concept of decentralization and relates it to other concepts of management. At the beginning of this book, he refers to the societal problem by explaining that today’s managers have to adapt to economic changes rapidly, intelligently and rationally. This approach goes far beyond passive reaction and adaptation:

Management is not just a creature of the economy; it is a creator as well. And only to the extent to which it masters the economic circumstances, and alters them by conscious, directed action, does it really manage. (Drucker 1954: 12)

Drucker’s concepts, serving as instruments to master the economic circumstances, may be grouped into the following three areas: strategy, structure and management by objectives.

First, there has to be a corporate strategy, comparable to a ship’s compass bearing. Disturbances may influence the day-to-day course, but the company needs to have a long-term strategy.

Drucker distinguished eight areas of strategy, in which goals of performance and results were sharply defined: market standing; innovation, productivity, physical and financial resources; manager performance and development; worker performance and attitude; and public responsibility. Adequate concepts of setting goals and measuring their accomplishment in these eight areas had, according to Drucker, still to be elaborated (Drucker 1954: 60–63). As an example, in the following passage Drucker’s suggestion for goal-setting in the area of market standing and marketing is described. He emphasizes that General Motors possessed an exceptionally well-elaborated strategy concerning the area of market standing and marketing. Suggested goals are:

1. The desired standing of existing products in their present market, expressed in dollars as well as in percentage of the market, measured against both direct and indirect competition.
2. The desired standing of existing products in new markets set both in dollars and percentage points, and measured against direct and indirect competition.
3. The existing products that should be abandoned – for technological reasons, because of market trend, to improve product mix or as a result of management’s decision concerning what its business should be.
4. The new products needed in existing markets – the number of products, their properties, the dollar volume and the market share they should gain for themselves.
5. The new markets that new products should develop – in dollars and in percentage points.
6. The distributive organization needed to accomplish the marketing goals and the pricing policy appropriate to them.
7. A service objective measuring how well the customer should be supplied with what he considers value by the company, its products, its sales and service organization. (Drucker 1954: 67–68)

A corporation’s overall strategy should contain goals in market standing and marketing, as well as in the other seven previously described areas. However, while Drucker suggests certain goals, at the same time he emphasized that such goal-setting remained to be implemented by the management of each corporation. To fulfill this task successfully, management needed to be oriented towards future developments. Drucker offered three modes of analysis that could be helpful in supporting this kind of future-oriented goal-setting:

(1) Identifying the range of fluctuations. Business goals or decisions could be tested against the worst possible setbacks (such as depressions), indicating the extremes of cyclical risk.

(2) Determining economic ‘bedrocks’. ‘Bedrock’ factors that influence economic conditions (e.g. population structure) should be isolated and their influence on the company analyzed.

(3) Trend analysis. Specific trends relating to such bedrock factors should be analyzed with ‘How likely’ or ‘How fast’ type of questions (Drucker 1954: 88–93).

Besides the importance of defining a corporate strategy, Drucker emphasized the importance of defining an appropriate organization structure:

Good organization structure does not by itself produce good performance [...] But a poor organization structure makes good performance impossible, no matter how good the individual managers may be.(Drucker 1954: 225–226).

According to Drucker’s precepts, organization is not an end in itself but rather a means to an end of business performance and results. Organizational structure is an indispensable means – the wrong structure will seriously impair business performance, and may even destroy it (Drucker 1954: 194).

Organizational structure must be designed in such a way that makes possible the attainment of business goals for five, ten, or even fifteen years hence. To determine what kind of structure a specific enterprise needs, Drucker considers as a necessary task three forms of analysis: activities, decision and relations analysis.

(1) Activities Analysis.
An average manufacturing business will typically use functions such as manufacturing, marketing, engineering, accounting, purchasing and personnel. However, an individual manufacturing business may not need all of them, or conversely may need additional functions. For this reason, it is necessary to identify the activities
necessary to attain a company’s goals, and also to find out which functions are appropriate for a specific business, and which can be categorized as major and minor.

(2) Decision Analysis.
The second form of analysis is a ‘decision analysis’, which is guided by the following questions:

- What kind of decisions are needed to obtain the performance necessary to attain goals?
- On what level of the organization should they be made?
- What activities are involved in or affected by them?
- Which managers must therefore participate in the decisions – at least to the extent of being consulted beforehand?
- Which managers need to be informed after decisions have been made?

A decision should always be made at the lowest possible level, and as close to the scene of action as possible. Moreover, decisions should always be made at a level that ensures that all activities and objectives affected are fully considered. Analyzing the foreseeable decisions therefore shows both what structure of top management is required by the enterprise and what authority and responsibility different levels of operating management need to possess.

(3) Relations Analysis.
The final form of analysis as part of defining what kind of structure is needed is an analysis of relations. Guiding questions are:

- With whom will a manager in charge of an activity have to work?
- What contribution does he or she have to make to managers in charge of other activities, and
- What contribution do these managers, in turn, have to make to him or her?

The types of relation that need to be analyzed are downward, upward and sideways relations.

These three analyses – of activities, of decisions, of relations – should always be kept as simple and as brief as possible. In a small enterprise they can often be accomplished in a matter of hours and on a few pieces of paper. In a very large and complex enterprise such as General Electric or General Motors, the job may well require months of study and the application of highly advanced tools of logical analysis and synthesis. On the other hand, the importance of the analyses should not be underestimated. Only on their foundation can a functioning organization be built (Drucker 1954: 194–201).

After having carried out these kinds of analyses, it is, Drucker argues, then important to state 3 requirements that a structure has to satisfy:
(1) Organization structure must be directed towards performance, which means avoiding ‘over-bureaucracy’ (e.g. continuing to pay attention to old and easy, but tired, products); and also to strive for growth (e.g. to be oriented towards new, growing, though perhaps challenging, products).

(2) Organization structure should contain the least possible number of management levels, and forge the shortest possible chain of command.

(3) Organization structure must make possible the training and testing of tomorrow’s top managers (Drucker 1954: 202–205).

According to Drucker, in order to satisfy these requirements organization structure must apply to one or both of two principles: ‘federal’ or ‘functional decentralization’. Drucker refers here to his 1946 study of General Motors where he concluded that decentralization should be a central principle of organization. The principle of federal decentralization organizes activities into autonomous product businesses, each with its own market and product, and with its own profit and loss responsibility. Functional decentralization sets up integrated units with maximum responsibility for a major and distinct stage in the business process (Drucker 1954: 205–207).

Federal decentralization and functional decentralization are complementary rather than competitive. Both have to be used in almost all businesses. Federal decentralization is the more effective and more productive of the two. But the genuinely small business does not need it, since it is in its entirety an ‘autonomous product business.’ Nor can federalism be applied to the internal organization of management in every large business; in a railroad, for example, the nature of the business and its process rule it out. And in practically every business there is a point below which federal decentralization is no longer possible, below which there is no ‘autonomous product’ around which management can be organized. Federal decentralization while superior is thus limited. Functional decentralization is universally applicable to the organization of management. But it is a second choice for any but the small enterprise. It has to be used in all enterprises sooner or later, but the later it can be resorted to the stronger the organization. (Drucker 1954: 205)

Drucker describes the application of federal decentralization in more detail. Federal decentralization should always observe five rules essential to its successful implementation:

(1) Any federal organization requires both strong parts and a strong center. The term ‘decentralization’ is actually misleading. Federal decentralization requires strong guidance from the center through the setting of clear, meaningful and ambitious objectives for the whole. Such objectives must demand both a high degree of business performance and a high standard of conduct throughout the enterprise. Federal decentralization also requires control by
measurements. Available measurements must be sufficiently precise and pertinent for a manager’s performance to be reliably judged by them.

(2) The federally decentralized unit must be large enough to support the management it needs. The aim should be to have as many autonomous units as possible and to make them as small as possible; but this goal becomes absurd if the unit becomes too small to support management with the necessary number and quality of personnel. The appropriate size depends on the individual business.

(3) Each federally decentralized unit should have sufficient potential for growth. All of the company’s most stable lines should not be packed into one autonomous unit, with all of the promising or expanding ones into another.

(4) Managers should be given enough scope and challenge. They should, for instance, have responsibility for innovation – otherwise they may become set in a routine.

(5) Federal units should exist side by side, each with its own job, its own market or product. Where they touch it should be in competition with each other – as with the automobile divisions of General Motors. Their relation should be close and friendly, but nevertheless based strictly on business dealings rather than on the inability of individual units to stand alone (Drucker 1954: 214–216).

When Drucker refers to the concepts of ‘strategy’ and ‘structure’, it is nearly always related to his concept of doing ‘management by objectives’. In a broader sense, management by objectives could be seen as Drucker’s overall approach, and his concepts for strategy and structure viewed as a part of it. At the beginning of his book ‘Practice of Management’, he explains that ‘to manage a business means [...] to manage by objectives. Throughout this book this will be a keynote’ (Drucker 1954: 12). In a narrower sense, ‘management by objectives and self-control’ could be seen as technique to direct each manager’s job toward the objectives of the business as a whole, while at the same time giving full scope to individual strengths and responsibility.

Drucker states that a manager is responsible for the contribution that his component makes to the larger unit above him or her, and ultimately to the enterprise as a whole. Therefore, individual performance aims upwards rather than downwards. This means that the goals of each manager’s job must be defined by the contribution he or she makes to the success of the larger unit. But what he or she does to achieve these results is determined by managers at an autonomous level. It should be clearly understood which behavior and methods the company regards as unethical, unprofessional or unsound. But within these limits, every manager should be free to decide what is to be done. Only if he or she possesses all the information regarding operations can a manager be held fully accountable for results.
According to Drucker, possibly the greatest advantage of management by objectives is that this approach makes it possible for a manager to control his or her own performance. Self-control means stronger motivation: a desire to do one’s best rather than just enough. Every manager should be held strictly accountable for the results of their performance. Drucker maintained that management by objectives and self-control was a primary means of obtaining standards higher than those found in most other companies of his age (Drucker 1954: 121–136).

6.2.4 Dissemination by McKinsey

Drucker worked as an individual interventionist for a number of companies, as well as a teacher for other interventionists. It is interesting that he led elements of monthly training sessions for young consultants for McKinsey during an early phase of McKinsey’s development in the late 1940s and early 1950s (Edersheim 2004: 53).

McKinsey and similar companies such as the Boston Consulting Group became the main disseminators of innovative solutions related to strategy and structure. With their emergence and development, large international consulting companies became a whole new industry (McKenna 1995). McKinsey can be seen as the pre-eminent company among consultancy firms associated with strategy and structure (Kipping 2002). Detailed information about products and instruments utilized by McKinsey and other consulting companies are difficult to obtain. Consultancies very often describe general ideas relating to their practice in management bestsellers, but give relatively little away about their day-to-day practice (Fink and Knoblach 2003: 28–29).

The focus in this subsection is on McKinsey’s method of diffusion/dissemination of a solution that had its origin in General Motors and was then conceptualized by Drucker. Consequently, only the roots and early decades of McKinsey will be addressed here rather than the entire development of the firm.

McKinsey was founded in 1926 by James O. McKinsey. He developed the company’s first main instrument, the ‘General Survey Outline’. But perhaps the most influential figure in respect of McKinsey’s development as the world leading consultancy was Marvin Bower, in 1939 co-founder of the reorganized firm, and from 1950–1967 managing director of McKinsey and Company (Bhide 1996: 6–8; Edersheim 2004: 250–251). Bower had a vision of using McKinsey to establish a new profession called management consulting (see figure 6.3). The following section investigates how Bower and his colleagues were able to realize this vision over the period of Bower’s leadership.
For Bower, it was clear that the rate of environmental change was accelerating and creating major challenges for many businesses. He was convinced that the success of any enterprise was only possible if the company was effectively responsive to its environment (Edersheim 2004: 46). In order to serve CEOs most effectively, he believed it was necessary to develop a top management mindset that took account of critical external factors such as industry trends and competitive position, while simultaneously analyzing important information from within the organization (Edersheim 2004: 44).

Bower believed that an integrated top management approach was required to solve business problems created by an ever-increasing rate of external change. Such an integrated approach included an overall diagnosis of client companies before decisions were taken regarding specific problems to be solved. As a consequence, in the first decades of the company’s development, consultants at McKinsey were generalists. They all followed one common problem-solving approach. In this period, the primary instrument for applying the common problem-solving approach was the 'General Survey Outline', as developed by McKinsey himself (Edersheim 2004: 44–53).

The General Survey Outline was a checklist for drawing up a strategic general survey of a business, and functioned as a guide to the company’s thinking and problem-solving approach.

Each Section was divided into subjects: (a) Goals, (b) Policies, (c) Organization structure, (d) Facilities, (e) Capital, (f) Procedures, (g) Personnel.

The more general character of the General Survey Outline underscored the conviction of Bower and his colleagues that well-trained, highly intelligent generalists would be able to grasp the salient issues of a client’s problems quickly, and through disciplined analysis work towards a solution (Bartlett 2000: 2; Fink and Knoblach 2003: 85–86). In this first period, McKinsey did not seek to exploit a specific management technique, but rather positioned itself as a firm that would apply well-known existing techniques with superior judgment and diligence that did not rely on changes in specific strategy and structure-related techniques (Bhide 1996: 14).

A key example of the application of such familiar techniques was the dissemination of the concept of decentralization of corporations that originated in General Motors and was generalized by Drucker. McKinsey was a central player in recommending the implementation of the multidivisional structure to companies in the United States, Britain, France and Germany in the 1950s and 1960s (Kipping 2002: 32–33; Channon 1973: 110; 145; Dyas and Thanheiser 1976: 112, 247).

Given the orientation to relying on a general instrument it was of paramount importance to recruit and train highly intelligent generalists. Correspondingly, the recruiting, training and promotion practice in McKinsey assumed especial importance. A central role model for McKinsey in this regard was provided by prominent US law firms. Bower, who shaped the vision of McKinsey in these first decades, had himself worked for such a pre-eminent firm of lawyers. Recruiting practice after 1939 therefore followed the example set by law firms in selecting and training outstanding young people (Bhide 1996: 13). From 1953 onwards it was explicit policy to hire young MBAs, who often came from the Harvard Business School (Edersheim 2004: 80–81). These recruits received extensive training on the job, off the job, together with coaching by experienced McKinsey consultants, or even Bower himself (Edersheim 2004: 52–54.) Additionally there was an emphasis on codifying knowledge for future use (Bhide 1996: 9). In 1954, McKinsey adopted a rigorous up-or-out policy – similar to law firms, consultants not promoted within a certain time were fired (Bhide 1996: 19).

Consultants did not always leave the firm involuntarily. Quite often, clients invited them to take up managerial positions in client companies. Referring to examples of former consultants who made this move, Edersheim describes Marvin Bower as an educator of a generation of leaders (2004: 191–135). Other authors see McKinsey’s strategy as a way of creating a network of former McKinsey consultants in important positions in different companies all over the world, which would in turn lead to new assignments for McKinsey (O’Shea and Madigan 1997: 264–265).

McKinsey eventually succeeded in developing a system for working on important studies in large companies that could justify premium fees. By the same token, high rates allowed the firm to attract the best young MBAs, who were needed to serve prestigious clients on important projects. McKinsey actively invested in building a reputation for excellence (Bhide 1996: 29–31).
As McKinsey added offices, a high level of local autonomy was combined with what was termed a ‘one-firm’ policy. The manager of each office had broad operating responsibility and authority, but only within the confines of common firm principles, strategy and policies. The one-firm policy meant that all consultants were to be recruited and promoted by the firm, rather than by an office; profit shares of McKinsey partners were derived from a firm rather than an office pool; moreover, each client was to be treated as a client of the firm, not of a particular individual or office. Furthermore, the policy reassured clients of the uniform quality of McKinsey services (additionally symbolized by a common McKinsey dress code). It also increased the mobility of professionals needed to open new offices, and contributed to solidarity among firm members (Bhide 1996: 14).

By the end of the 1960s, McKinsey had established a dominant position in the US consulting market, both in terms of revenues and prestige (Keping 2002: 32–33). Having developed a system that made international expansion possible, McKinsey moved quickly and was particularly successful at exploiting opportunities. In 1959, the first international office was opened in London. By the end of the 1960s, more than one third of revenues was generated in Europe (Keping 2002: 33). Clients included prestigious international companies such as Shell and organizations such as the Bank of England (Edersheim 2004: 95–104).

While it was important to retain a reputation of excellence, there was pressure to take on as many assignments as possible and to conduct them as fast as possible. This situation led to an emphasis at McKinsey on reusing existing concepts and solutions (Bartlett 1996: 8–12). The reuse of concepts became a firm standard, which was supported in later decades by large data banks that served as knowledge management instruments. An often-quoted McKinsey proverb is: ‘Don’t reinvent the wheel’ (Rasiel 1999: 17).

After decades of success, the 1970s became a ‘decade of doubt’. The oil crisis, the decline in the use of the decentralization concept that had fuelled the European expansion, the growing sophistication of client management and the appearance of new, more specialized competitors such as the Boston Consulting Group all contributed to problems for McKinsey’s growth (Bartlett 1996: 2).

6.2.5 Conclusions

The Motorization wave was the period of time when the dominant type of work activity became corporations that began to rely on a form of mass production oriented around dynamically changing international markets. The problem-solving process concerning ‘strategy and structure’ commenced in an early period of this wave. The development of the ‘virtually shared object’ of the dynamic problem-solving formation could be described by the following problem-solving trajectory:

The full utilization of the new possibilities in the 4th Kondratiev wave was constrained by elements of the early form of mass production. Profits associated with a more dynamic market-oriented form of mass production were constrained by a strategy and structure of organizations oriented to stable markets. There were no appropriate instruments for redesigning the strategy and structure of corpora-
tions until Sloan’s organizational innovation at General Motors and other similar innovations. Sloan’s central organizational innovation became visible in the 1920s, about a decade after the technological ‘big bang’ (Ford’s Highland Park assembly line in 1913).

Drucker generalized and elaborated the innovative solutions developed by Sloan at General Motors, and as a result derived generally usable concepts (such as the decentralized structure) for redesigning the strategy and structure of corporations. These concepts were used as best practice examples and as the main elements of generalized principles that could be used by corporations to attain appropriate strategy and structure solutions. These principles were instrumental in establishing a more dynamic market-oriented form of mass production through which the technological possibilities of the Motorization wave became fully exploited.

Main actors in the problem-solving process examined previously, were managers, management scholars and management consultants. Managers such as Sloan encountered the emerging problem and developed solutions within their companies. Sloan’s own company, General Motors, was a prominent member of the carrier branch of the Motorization wave – the automobile industry. For Sloan, the societal problem appeared to be bound up with the chaotic accumulation of organizational units and products, set against the background of the limitations of the early form of mass production and new possibilities and threads of the Motorization wave. Management scholars such as Drucker generalized Sloan’s and other solutions, and captured them as models representing the solutions – in Drucker’s case, the decentralized, multidivisional form of organization. Drucker diffused his models through his publications and in practice as an individual interventionist. Management consultancies such as McKinsey developed a system to disseminate management models to client companies. For these figures, the societal problem was related to the ‘strategy and structure’ of organizations (figure 6.4).
McKinsey’s interventions address an organizational problem and can thus be understood as a form of conducting interventions. Consultancies such as McKinsey abstracted from the creation and conceptualization process of Sloan and Drucker and disseminated Drucker’s conceptualized solutions to a large number of work activities (corporations) that encountered the societal problem associated with strategy and structure, and wanted to adopt a solution. In this sense, McKinsey focused on the last phase of the problem-solving process.

While McKinsey mainly abstracted from the creation process of the solution to the societal problem (adhering to the maxim: ‘don’t reinvent the wheel’), its instruments and community (for dissemination) were highly elaborated. The General Survey Outline was deployed widely as an analytical tool. In the course of its development, McKinsey was able to rely on an increasing store of ‘best practice solutions’, which in later periods were supported by a powerful knowledge management instrument. The consultancy established a highly elaborated system of training new employees, an elaborated hierarchy of consultants and a network of clients that enabled it to conduct interventions in many organizations from different industries and subsequently from different countries. The interventions aimed to overcome obstacles related to the strategy and structure problem in the second half of the 20th century. McKinsey’s method of using different kinds of existing
best practice solutions enabled the ‘industrial production’ of conceptualized solutions for management problems in the Motorization wave.

The societal problems in the early period of the Electrification and the early period of the Motorization wave addressed entirely different areas of work activities (manufacturing/production and management/marketing). The pattern of forms of conducting interventions (Taylor-Bedaux and Drucker-McKinsey), however, exhibits remarkable parallels. Those actors dealing with innovative solutions or conceptualized solutions in the strategy and structure related process (Sloan and Drucker) were not the ones who played the greatest role in dissemination. Drucker, like Taylor, became a well-known scholar and interventionist. Nevertheless, companies such as McKinsey – in a similar manner to Bedaux – established the dominant form of conducting interventions related to problems of strategy and structure. They constructed their form of conducting interventions principally on the cultural-historical knowledge of existing solutions from earlier innovators and scholars, as well as by developing a form of activity that made a large number of parallel intervention projects possible.

A key difference between the societal problem-solving process associated with Scientific Management, on the one hand, and that associated with strategy and structure, on the other, was that the division of labor in the latter (Sloan-Drucker-McKinsey) became more elaborated than the division of labor in the former (Taylor-Bedaux).

6.3 Life-cycle analysis of the societal problem-solving processes related to organizational culture and quality

6.3.1 The societal problem

Until the 1970s, we can discern an overall emphasis on the concepts of strategy and structure in the reorganization of US companies. Companies were structured along principles geared towards finding an optimal position with regard to markets together with a corresponding structure. The ‘inner’ organization (manufacturing, relying on specialized and standardized operations), however, continued to be dominated by a quite traditional, if successful, form of the mass production paradigm (Dertouzos et al. 1989: 46-49). This system, which arose from a decades-old solutions to societal problems related to Scientific Management, Human Relations and strategy and structure, ‘marched from victory to victory’ (Womack et al. 1990: 43). The ‘inner’ effects of the implementations of strategy and structure concepts were, for the most part, not considered (Barley and Kunda 1992: 380). For a long period, the success of US companies in the world market – e.g. in the automobile industry – distracted attention from often sub-optimal effectiveness within companies themselves (Dertouzos et al. 1989: 46–49; Womack et al. 1990: 43–46; see Barley et al. 1988: 21).

Indicators of sub-optimal patterns within companies after the implementation of strategy and structure concepts were:
Quality of products and service were often poor (Wood 1989: 400; Dertouzos et al. 1989: 67–80);

The responsibility of workers was narrow, and demands for workers’ involvement, as well as the use and development of workers’ skills, were low (Wood 1989: 400; Dertouzos et al. 1989: 81–84);

Political games and individual careerism, together with generally weak cooperation between individuals and groups of organizations, were widespread, with often negative effects on organizations (Wood 1989: 385; Dertouzos et al. 1989: 94–107).

The aggravation of these problems can be regarded as associated with the dysfunctional side-effects of the diffusion of the strategy- and structure-oriented form of mass production (Dertouzos et al. 1989: 94–107). In this sense, the problems may be seen as having a common root.

Sub-optimal patterns within US companies became increasingly visible in the later part of the Motorization wave in the 1970s and 1980s. The oil crisis and — more importantly — increasing competition from other countries, especially Japan, shed light on the internal conditions of US companies. At last, it became necessary to deal with the unresolved problems (Dertouzos et al. 1989: 94–107).

Altogether, it can be concluded that there was, on the one hand, a widespread diffusion of the market-oriented form of mass production, and on the other, the aggravation of ‘inner problems’ such as the dysfunctional side-effects of this diffusion manifesting themselves in symptoms of poor quality and services, low worker involvement, lack of cooperation and political games.

Different and partially intertwined movements and traditions emerged, which addressed one or more of the problems described previously:

(1) A quality movement (e.g., Juran, Deming and Ishikawa);
(2) A ‘learning organization’ tradition (e.g., Argyris);
(3) An organizational culture tradition (e.g., Schein);
(4) A ‘systemic’ tradition (e.g., Luhmann), particularly active in German-speaking countries;

The second and third tradition will not be analyzed here in detail, since they can be viewed as elaborated variants of the Lewinian/Action Research tradition (Argyris and Schön 1989/2005: 137–138; Schein 1995/2005: 149–151; see subsection 3.2.4). Life-cycle analyses will therefore focus on the quality movement and the systemic tradition.

6.3.2 Roots of the quality movement – innovative solution at Toyota

The first movement or tradition analyzed here is the movement for quality improvement. The most significant roots of the US quality movement are found in the innovative solutions associated with the ‘flexible manufacturing system’ at Toyota, also called the ‘Toyota Production System’.
The phenomenon that hit (and inspired) US companies in the 1970s and 1980s in the form of possibly superior competition from Japanese companies that relied on the Toyota Production System can be regarded as a kind of ‘boomerang’. Before and after the Second World War, the Japanese automobile industry was inferior to the US industry. The Japanese gained a crucial advantage, however, by developing a new production system, gradually surpassing the US industry in the decades following the Second World War, during which time American companies were still using the same production system. By 1980, the US automobile industry was operating according to an inferior paradigm, and was hit hard by Japanese competition.

Directly after the Second World War, however, the future success in the Japanese automobile industry was by no means assured. Indeed, the situation in the industry was extremely difficult. Toyoda Kiichiro, then president of Toyota Motor Company, declared that the Japanese automobile industry had to catch up with the US industry within 3 years in order to survive (Ohno 1988: 3).

Problems in the Japanese industry included the following:

- The domestic market was tiny but demanded a wide range of vehicles.
- Workers demanded higher involvement.
- There was no capital to purchase most forms of modern technology.
- US car producers were dominating the international market and, moreover, were eager to enter Japan with what was for the period a very successful strategy- and structure-based form of mass production (Womack et al. 1990: 49–50).

There was, then, a pressing need for Toyota to prepare itself to cope with the US competition – but there was no clear idea for doing so. Applying mass production and focusing on strategy and structure would not have been viable due to the size and technological advantages of the US industry. Craft-based forms did not offer a solution, either (Womack et al. 1990: 50–51). Nevertheless, a solution had to be found for producing a high volume of different and competitive vehicles on the basis of the possibilities and constraints of Japanese car plants, which were equipped with comparatively old technology, little capital and workers with traditional, narrow task qualifications.

The solution was an innovative model that became a new, ‘internally’ flexible form of mass production in which the same production line was used for a number of different high-quality products, and where the traditional mass production ‘producer’-oriented, ‘push-type’ system associated with the order-delivery process was replaced by an innovative ‘user’-oriented, ‘pull-type’ system. In this new system, the user ‘pulls’ from the producer only what is needed. The system gradually emerged after the Second World War through a number of innovative solutions that were mostly developed by the Toyota production manager, Taiichi Ohno. Ohno explains that two main parts of the new production system are:
(1) To establish a production flow;
(2) To identify a way of maintaining a constant supply of raw material from outside for parts to be machined (Ohno 1988: 12, 128–129).

Establishing a production flow

According to Ohno, the first basic condition of the success of the Toyota Production System was to establish a flow (Ohno 1988: 33). In order to open the path for flexible production flow, some initial innovations had been crucial (Ohno 1988: time map in cover).

To achieve flexibility both with regard to the production of parts and to the production of whole products, it was necessary to change the use of instruments that were used to shape metal parts: the dies. Dies are hard pieces of metal formed in the precise shape that sheet metal will assume after beating. In traditional mass production, dies were seldom changed since it was difficult and time consuming. In the course of his Toyota innovations, Ohno developed simple die-change techniques, reducing the time it took to change them from one day to 3 minutes. The new techniques opened up possibilities for the more flexible and much quicker production of different parts and different models of cars (Womack et al. 1990: 50–51).

According to Womack et al., Ohno also discovered in this process that the production of small batches of parts meant less costs than enormous batches. Making a few parts before assembling them into a car entailed lower carrying costs and allowed stamping mistakes to show up almost instantly – the latter leading to enhanced awareness about the quality of parts (1990: 52–53).

Furthermore, there was a break with Tayloristic separation of operations and machines (e.g., to produce lathes in the lathe area, milling machines in a milling area). Machines were placed in L or U forms in the actual sequence of the manufacturing process (e.g. a lathe next to milling machine), and operations were unified and conducted by what were now multiskilled workers (Ohno 1988: 10–11, 128–129).

Maintaining a constant supply

One of the main ideas that led to the specific character of the Toyota production system was derived from a thought experiment using the metaphor of a supermarket. The conventional production flow – that is, the conventional way of supplying material from an earlier to a later process (the push system, as previously described) – was reversed. From now on, the later process went to an earlier process to pick up only the right part in the specific quantity needed at exactly the time it was needed. Against this background it was ‘logical’ for the earlier process to produce only the parts that would be needed. This model is similar to how a supermarket works: you ‘buy’ only that material in the amount and at the time it is needed (Ohno 1988: 5, 26–27).
From the initial innovative solutions of establishing a production flow and maintaining a constant supply, the system gradually evolved into the coherent Toyota production system. New problems were addressed as they emerged, and existing solutions were perfected, integrated and diffused. Ohno emphasizes that management commitment and support were essential during this transformational process (1988: 31).

Perfecting the pull system meant guaranteeing a constant supply of raw material from outside for parts to be machined. That perfect pull system manifested in the ‘just-in-time’ (JIT) system: parts were only produced at each previous step to supply the immediate demands of the next step (Womack et al. 1990: 62). The main instrument in achieving just-in-time was the installation of a system called kanban. In basic terms, a kanban (‘tag’) was a simple and direct form of communication that was always located at the point where it was needed, moving with the goods needed, and thus becoming a work order. In most cases, a kanban was a small piece of paper inserted in a rectangular envelope providing information about how many parts should be picked up or which part should be assembled just-in-time (Ohno 1988: 27–30, 41, 123–124).

The JIT-system was very difficult to implement in practice because it eliminated practically all inventories, which meant that when one small part of the vast production system failed, the whole system ground to a halt (Womack et al 1990: 62). That and the spread of the JIT system supported the elaboration of another core element of the Toyota system. According to Ohno, a business needs a ‘system of reflexes’ – a ‘nerve system’ – to respond instantly and smoothly to small changes without going to the ‘brain’. This system of autonomous and automatic reaction Ohno called ‘autonomation’ (Ohno 1988: 45–46).

The idea of autonomation led to a practice that was fundamentally different from the mass-production practice. In mass production, the practice of passing on errors to prevent the production line from stopping (considered very expensive) caused errors to multiply endlessly. Ohno wanted to stop that ‘waste’ (in Japanese muda). He placed a cord above every work station and instructed workers to stop the whole assembly line immediately if a problem emerged that they couldn’t fix. Then the whole team would come over to work on the problem (Womack et al. 1990: 62). The visual control instrument for this process was Andon, a line-stop indicator board that hung above production units. When operations were normal, the green light displayed on the control board. When a worker wanted to adjust something on a line and called for help, he or she turned on a yellow light. If a line stop was required to rectify a problem, the light was switched to red (Ohno 1988: 21, 121).

To eliminate waste as early and in as sustainable a manner as possible, workers were grouped into teams and given increasing additional tasks such as housekeeping, minor tool repair and quality control. Once the teams were running smoothly, Ohno set time aside periodically for the team collectively to suggest ways to improve the process. This collective process would later be called ‘quality circles.’ The continuous, incremental improvement process, kaizen in Japanese, took place in collaboration with the industrial engineers (Womack et al. 1990: 62).
Ohno instituted a system of problem-solving called 'the five why’s'. Production workers were taught to trace systematically every error back to its ultimate cause (by asking ‘why’ as each layer of the problem was uncovered), then to devise a fix to ensure that the problem did not occur again (Womack et al. 1990: 62).

The quality-improvement process was later supported by the quality expert Kaoru Ishikawa. He facilitated the use of both statistical and qualitative instruments: an excellent example of a qualitative instrument is Ishikawa’s fishbone method (Pihlaja 2005: 192–193). It was developed to represent graphically the relationship between a problem and its potential causes. Fishbone diagrams can help a group to examine thoroughly all possible causes of a quality problem and also to discern the relationships between them. Group members place the problem at the head of the fish. The ‘bones’ of the fish are lines on which members list potential causes, which could fall into categories such as people, tools, materials or methods. Members then collect data to assess the potency of each of these potential causes (Ishikawa 1985: 63–65).

Not surprisingly, at the beginning of Ohno experiments there were major disturbances. His production line stopped all the time, and workers easily became discouraged. However, as the work teams gained experience in identifying and tracing problems to their ultimate cause, the number of errors began to drop and the quality of the end product increased dramatically. It took Ohno and the management of Toyota more than 20 years fully to implement their system of innovative solutions. In the end, they achieved extraordinary success in terms of productivity, product quality and flexibility to changing market demands (Womack et al. 1990: 57, 62).

### 6.3.3 Deriving concepts for quality improvement

While the Toyota innovations influenced Japanese companies from the 1950s onwards, Toyota’s influence on US and other western companies occurred much later and was expressed in a different way. Correspondingly, the life-cycle analysis of the problem-solving process as related to the innovations at Toyota could be continued in two different ways. One could analyze how the Toyota solutions affected problem-solving processes in Japanese society. Another possibility would be to analyze how the Toyota solutions affected problem-solving processes in the US and other western societies. The second possibility has been chosen here but in the concluding subsection the Japanese perspective will be also taken into account.

As the Toyota Production System became increasingly adept, the Toyota Company (and other Japanese companies using a similar system) became increasing successful and visible in the US and other western societies. In the 1980s, the ‘secret’ of Japanese success became an important topic of discussion outside Japan (Dertouzos et al. 1989; Womack et al. 1990). The development of concepts capturing the ‘secret of the Japanese success’ within the US was a longer process, however, and led finally to the dominant focus on one facet of the Toyota production system: quality issues. The discussion about quality improvement evolved into a whole ‘quality movement’.
There appeared to be a reluctance in most large US manufacturing companies to learning from the Japanese. This began to change, though, when distinct ‘American’ models emerged. An (indirect) lesson from Japanese experiences was supported by the myth that the Japanese were only doing what they learned from US authors such as William Edwards Deming (Cole 1998), although it is clear that the revolutionary practice and intellectual foundations of quality improvement largely emanated from Japan (Winter 2000: 50).

In the conceptualization of experiences from Japan, the role of ‘quality gurus’ such as William Edwards Deming, Joseph Juran and Kaoru Ishikawa was important. Acting as bridges between Japan and the US, they became the primary authorities of Total Quality Management (TQM) – an elaborated set of principles and techniques for quality improvement (Hackman and Wageman 1995: 310). Despite differences in emphasis, Deming, Juran and Ishikawa have a common philosophical orientation and share a set of core assumptions and instruments geared towards achieving quality improvement (Hackman and Wageman 1995: 310–315). For this reason, their work will be summarized and analyzed jointly.

A fundamental premise of TQM is that the costs of poor quality (such as inspection, rework, lost customers, and so on) are far greater than the costs of developing processes that produce high-quality products and services. A second premise is that employees naturally care about the quality of work and will take initiatives to improve it – so long as they are provided with the tools and training needed for quality improvement, and so long as management pays attention to their ideas. A third premise is that organizations are systems of highly interdependent parts, and that the central quality problems faced by organizations cross traditional functional lines. A fourth premise is that quality is viewed as ultimately and inescapably the responsibility of top management, because senior managers create the organizational systems that determine how products and services are designed and produced (Hackman and Wageman 1995: 310–312).

Deming, Ishikawa, and Juran prescribe the use of instruments to realize quality improvement, which can be grouped into five sets. According to these figures, the five sets define the core of TQM.

1. Explicit identification and measurement of customer requirements.
2. Creation of supplier partnerships.
3. Use of cross-functional teams to identify and solve quality problems.
4. Use of scientific methods to monitor performance and identify points of high leverage for performance improvement.
5. Use of process-management heuristics to enhance team effectiveness.

These five sets can be explained in greater detail:

1. To improve quality, Deming, Ishikawa and Juran all emphasize the importance of knowledge about customer requirements. It is essential to know exactly what customers want and to provide products or services that meet their requirements. Therefore, it is necessary to assess consistent data about require-
ments such as durability, reliability and speed of service. Some customers are external to the organization; others are internal, such as when the output of one organization unit is passed on to another. The ‘customer’ for each process is defined as the next process down the line. With data about customer requirements in hand, quality improvement can focus specifically on those aspects of work processes that are most important for customer satisfaction.

(2) Deming, Ishikawa and Juran suggest that organizations should choose vendors on the basis of quality, rather than solely on price. Further they recommend that organizations work directly with raw material suppliers to ensure that their materials are of the highest quality possible.

(3) The main purpose of cross-functional teams seems to be to identify and analyze the ‘vital few’ problems of the organization. Such teams could be seen as the ‘steering arm’ of a quality effort. Other teams, also cross-functional, are created to diagnose the causes of problems that have been identified by the steering arm and to develop and test possible solutions to them. Part of such teams should be people who can provide access to the data necessary for testing potential solutions, and who are critical to implementing the solutions developed. Furthermore, department heads should be included as team members to ensure that important departments will cooperate when the time comes to implement the team’s recommendations.

(4) Deming, Ishikawa and Juran advocate the use of statistical tools to monitor and analyze work processes. Statistical tools are used to identify the points of highest leverage for quality improvement, to evaluate alternative solutions to identified problems and to document the results of process changes. Many of the tools involve applications of probability theory to generate findings that then can be summarized pictorially. Three most commonly used examples of the wide variety of available tools are control charts, cost-of-quality analysis and Pareto analysis. Pareto analysis (developed by Juran) is deployed as a means of identifying the major factors that contribute to a problem, and to distinguish the ‘vital few’ from the ‘trivial many’ causes. Pareto charts are used when each separate contributor to a problem can be quantified. An example is a group attempting to identify the vital few causes of high inventory costs. It would list each inventory item in order of total dollar value of materials kept in stock. Those materials that turn out to be major contributors to inventory costs are then addressed first.

(5) Deming, Ishikawa and Juran suggest several techniques to help quality teams use their collective knowledge effectively in identifying and analyzing opportunities to improve quality. Three of the most commonly used instruments are flowcharts, brainstorming and fishbone diagrams (Hackman and Wageman 1995: 312–315).
6.3.4 Diffusion/dissemination of quality improvement concepts

The new competitive reality – heavy competition from Japanese companies – became increasing apparent to U.S. companies, especially to manufacturing companies, from 1980 onwards (Dertouzos et al. 1989; Womack et al. 1990; Cole 1998). The reaction to this competition was an increasing demand on quality improvement issues, which opened the path for activities that specialized in dealing with this demand. The first main group of actors that addressed quality issues included gurus such as Juran, Deming and Ishikawa, who disseminated their ideas through books and offered their services as interventionists. A further primary group was the big strategy and structure consultancies, who were able to include total quality management in their product portfolios (Cole 1998).

From the late 1980s onwards, other forms of addressing quality problems became increasingly important. Non-commercial forms of intervention emerged that were established by professional associations, government sponsored organizations, industry-sponsored groups, community organizations, regional associations, universities and independent research organizations. One of these forms was, and still is, the ISO 9000 series created in 1987 by the International Organization for Standardization (ISO) in Geneva. The ISO 9000 standards were envisaged as an assessment for ensuring consistency in the production of a product or service (Cole 1998).

According to Cole (1998) and Garvin (1991), the main form for disseminating quality improvement concepts – even compared to the consultancy forms – became the Malcolm Baldrige National Quality Award, created in the US in 1987. The Baldrige system was established as a joint venture between the government and leading companies in industry.

The Baldrige system originated from the Malcolm Baldrige National Quality Improvement Act. That act, named after a former Secretary of Commerce, called for the creation of a national quality award, together with the development of guidelines and criteria that organizations could use to evaluate their quality improvement efforts. Awards were to be given in three categories – manufacturing, service and small business – with no more than two awards per category per year. The legislation gave favorable mention to a number of general principles, such as worker involvement, strategic quality planning, statistical process control, as well as management-led and customer-oriented programs.

However, the act said little about details. It was left to the National Bureau of Standards (known today as the National Institute of Standards and Technology – NIST) to work these out (Garvin 1991). The result of the NIST’s elaboration of details was the definition of criteria and subcategories of the Baldrige system. These categories were quite broad, and described important areas that functioned as frames to discuss and assess specific company practice. While it did not prescribe specific action, the Baldrige system nevertheless clearly mapped out the terrain that had to be traversed before quality improvement could take hold (Cole 1998). The early Baldrige award framework reflected the influence of the quality gurus mentioned earlier, but was not limited to one perspective or a single guru.
The Baldrige award framework, with its categories, sub-categories and criteria, evolved over time (Garvin 1991).

The Baldrige system invited US organizations to submit applications that described their quality practices and performance in each of seven categories (from the 1991 round): Leadership, Information and analysis, Strategic quality planning, Human resource utilization, Quality assurance of products and services, Quality results, and Customer satisfaction. Applications were then graded by teams of trained examiners, all of whom were recognized quality experts. These Baldrige judges were drawn from industry, academia and consulting firms (Garvin 1991).

Cole (1998) emphasizes that the Baldrige system offered not only a simple imitation of best practices, but an iterative process of learning, implementation and practice. According to Cole, the Baldrige system is essentially an audit framework for suggesting to companies where and in what ways they need to demonstrate proficiency to attain superior quality performance. By offering an audit framework, the Baldrige system was extraordinarily useful in motivating companies to develop or learn from best practice examples for quality improvement over a range of critical areas. The transparency of the Baldrige process and system meant that firms could carry out their own self-assessment to ascertain where they were falling short and to identify target areas for improvement. By the mid-1990s, over one million copies of the Baldrige protocol were distributed to potential users (the peak number distributed was 240,000 in 1991). Many firms used it to conduct diagnostic activities. In the early 1990s, it became normal for top management in large companies to use the Baldrige system to audit their company.

A further contribution of the Baldrige system was that a large number of Baldrige examiners increased their expertise with regard to quality issues. Companies routinely sent key quality personnel to be trained as Baldrige examiners. These employees returned to their firms with added expertise, and each year’s Baldrige examiner classes created important networks for the diffusion of best practice ideas.

Another effect came from the obligations of those who won the Baldrige award to publicize their quality activities. By 1996, the 24 winners had given more than 10,000 presentations about what they had accomplished and how they had achieved it. Still another effect of the Baldrige system was the creation of state and local awards modeled around its contours (Cole 1998).

Both David Garvin (1991) and Robert Cole (1998) maintain that the Baldrige system was a central part of the US infrastructure for identifying and disseminating best practice in quality (Cole 1998). As the societal problem-solving process of the quality tradition is almost completely different from the subsequent one (which relates to lack of cooperation addressed by systemic interventions), in the following subsection some initial conclusions concerning the trajectory of the quality movement are drawn.
6.3.5 Conclusions concerning the trajectory of the quality movement

The societal problem-solving-process associated with the quality movement began in a later period of the Motorization wave. The following problem-solving process delineates the development of the virtually shared object of the dynamic problem-solving formation with a focus on the impact of the process on US and other western societies.

The life-cycle of the societal problem as far as it relates to the quality movement starts with the discussion of dysfunctional side-effects of the dissemination of strategy and structure solutions. In this sense, the problem-solving process associated with strategy and structure represents a fundamental part of the problem-solving process associated with ‘quality’. While strategy and structure concepts suggested a way of dealing with changing markets, the focus on the ‘big’ strategic and structural questions overshadowed (and partially aggravated) ‘inside’ weaknesses such as problems concerning quality of products and services.

‘Quality gurus’ such as Deming, Juran and Ishikawa took up the experience from Japan (the Toyota production system) and developed concepts for quality improvement, finally leading to Total Quality Management (TQM) – an elaborated set of principles and techniques. The conceptualized quality solutions became main sources for developing and disseminating subsequently improved quality techniques and solutions (here the Baldrige system played a key role). With the dissemination of quality solutions, a more quality-responsive system of changing market-oriented mass production was established.

However, as Guillén (1994) has shown in his study, social and organizational innovations were used in different societies in different ways. In Japan, the Toyota production system was not only an inspiration to create quality concepts and improve the General Motors type of mass production by becoming more responsive to quality issues; the system also represented a new form of mass production, a flexible alternative to the General Motors paradigm. An interesting question for future studies would be to analyze how the problem-solving process in the context of the Toyota production system was pushed further within Japan, as well as whether and in what way forms of conducting interventions were involved.

When the problem-solving trajectory is interpreted from the perspective of its impact on US and other western societies, one is able to analyze the corresponding problem-solving formation. The main actors (Ohno, Deming, Juran, and Ishikawa) possessed engineering backgrounds. However, it could be argued that Deming, Juran, and Ishikawa were proponents of a new kind of profession or quasi-profession – quality experts. There is a certain parallel to the development of the profession of personnel managers in the context of the Human Relations movement.

Different scientist and practitioners in different places and periods (e.g., Ohno, Wood, Womack et al., or Dertouzos et al.) were engaged in defining and addressing the societal problem. Ohno criticized the practice of passing on errors to prevent the production line from stopping and the resulting ‘waste’ of resources. While Ohno addressed the topic of quality this was only a part of a complex system.
His innovative Toyota production system went far beyond the question of quality alone. The dominant theme for Juran, Deming and Ishikawa, on the other hand, was limited to quality. In this sense, as opposed to the broader experience at Toyota, only a selected part was taken up and conceptualized – i.e. those elements that were important for the problem of quality. While the complexity of quality concepts was much reduced in comparison to the multifaceted Toyota production system, guru concepts had a higher potential for generalization and immediate application. Quality concepts derived by the quality gurus served as the foundations for structuring best practice solutions within the Baldrige quality award system (see figure 6.5).

![Figure 6.5: Societal problem-solving process and formation related to quality movement, and identified forms of conducting interventions](image)

The state-organized Baldrige award system can be identified as a new type of problem-solving activity embedded in the dynamic problem-solving formation. While the system was separated from the creation process of the quality solutions (having no creation-oriented instruments), its instruments and community (for dissemination) were highly elaborated. A large number of actors and activities (interested US corporations and quality specialists from science) were motivated to participate in the system. It captured different areas of quality for different kind of organizations. The system made it possible to gather a large number of solutions,
to identify best practice solutions (by awarding them), and to make these solutions available to many US organizations. All in all, the Baldrige system was a non-profit-oriented form that allowed US organizations to improve the quality of products and services at a time when US industry came under intense pressure (associated with a previous lack of emphasis on quality) in the 1980s and 1990s.

Baldrige can be interpreted as an elaboration of the TWI system, although the problem addressed was completely different (i.e., quality instead of Human Relations). The Baldrige system had a similar ‘national emergency situation’ context (superior Japanese competition this time, rather than the Second World War), and the same non-profit and dissemination orientation. It did not, however, comprise a single standard solution, as did TWI, but instead included a series of best practice solutions that were identified and disseminated anew each year.

The quality problem as addressed by quality gurus and by the Baldrige system constituted an organizational problem. A parallel can be drawn between the forms of Roethlisberger, Drucker and the quality gurus who were inspired by innovations in practice and who developed and applied conceptualizations of these innovations – each acted as a bridge between industry and science.

The Baldrige system, then, can be considered as a state-organized form of conducting interventions that is radically different from all other forms with the exception of TWI. Its focus is on disseminating awarded quality solutions to other quality experts, who then make use of the best practice solutions to deal with quality issues in their own company.

6.3.6 ‘Systemic’ solutions for the problem of weak cooperation within corporations

The second movement or tradition analyzed in this section is the ‘systemic tradition’37, which entailed the emergence of systemic interventionists in German-speaking countries, and which addressed the problem of political games, individual careerism and generally weak cooperation in corporations.

The German branch of the systemic tradition has its origin in:

(1) Niklas Luhmann’s theory of social systems, the autopoietic concept of Maturana & Varela, cybernetics and constructivism, as well as
(2) Systemic family therapy (e.g., Gregory Bateson, Mara Selvini Palazzoli).

According to Groth (1999), an understanding of the character of systems and the difficulty of intervening in a system is often based on Luhmann’s theory of social systems. An important application of Luhmann’s concepts came from Luhmann’s

37 Midgley (2000) offers a comprehensive overview of the tradition of systemic interventions. In this study the focus will be predominantly on the well established German branch.
student Helmut Willke. Specific tools that were later applied in concrete interventions were mainly developed by the systemic family therapy part of the tradition (Groth 1999: 99–100).

In the following, a section of Luhmann's theory of social systems is first described in a simplified manner – concentrating on those concepts that are important for understanding the specifics of systemic interventions. Subsequently, the description of concrete systemic intervention tools will be presented, together with a discussion of ideas originating from the systemic family therapy tradition – primarily from Selvini Palazzoli and her colleagues. They can be seen as pioneers in the use of systemic ideas for intervention in organizations (Groth 1999: 37–38).

**Description of concepts from the tradition of Luhmann’s theory of social systems**

Niklas Luhmann applied Maturana’s and Varela’s concept of autopoiesis to social systems.

Autopoietic systems are understood as:

> Networks of productions of components that recursively, through their interactions, generate and realize the network that produces them and constitute, in the space in which they exist, the boundaries of the network as components that participate in the realization of the network. (Maturana 1981: 21)

Social systems and psychic system (individual actors) represent specific autopoietic systems with specific basic components. Luhmann does not take actors as the main components of social systems but ‘communications’. Communications are used by Luhmann in the sense of ‘social events’, as a unity of (1) information, (2) utterance (*Mitteilung*), and (3) understanding in order to generate meaning in a social system (Krause 2001).

Krause (2001) emphasizes the main characteristics of autopoietic systems as follows:

1. Autopoietic systems are operatively closed. These systems possess specific types of basic components. The system follows the logic (understands only the ‘language’) of its basic components. It is, in this sense, closed to other kinds of logics.

2. Autopoietic systems are cognitively open. An autopoietic system has mechanisms to take information from the environment of the system, e.g. via ‘coupling’ with other autopoietic system. Some information from the environment will be ‘translated’, possibly understood and will on some occasions lead to a change in the inner logic of the system.
Autopoietic systems are characterized by their history and environment. While different types of autopoietic systems are characterized by a different type of basic component, through their history each autopoietic system develops a very specific form of processes and structures. Important pieces of information are selected from the environment and can become part of the memory of the system, or ‘forgotten’ – depending on the system’s permanently self-re-producing processes and structures. In this sense social systems are adjusted to their environments.

Willke (1999) contributed to the development of a Luhmann based intervention theory. He argues that direct interventions are not possible since social systems are autopoietic systems that are operatively closed. The interventionist and the social system are separated and follow a different kind of logic. However, an interventionist can offer information to the social system that might, under certain circumstances, lead to a change of the system.

According to Willke (1999), successful interventions are only possible if there is adequate understanding of the complexity of the client system. The basis for such an understanding is observation. However, observations are determined through the observer him- or herself being an autopoietic system. Consequently, observations depend on the inner logic of the observer, i.e. on instruments and tools of observation such as cognitive models, technical instruments and so on. The observer cannot see what he or she cannot see. As a result, experience and elaborated instruments are necessary to develop an adequate understanding of the complexity of the client system.

When attempting to understand a social system it is important not to trivialize it as a simple system consisting of linear processes and structures. It is essential to assume that social systems show circular characteristic and then to attempt to reconstruct the basic inner logic of the systems. According to Luhmann, interesting objects of observation are not actors but rather the specific forms of communication with their inherent patterns and rules. It is also important to include the environment in the analysis of the system. Environments offer possibilities and restrictions, chances and risks to the social system. Furthermore, a social system includes special ‘buttons’, where the system is cognitively open and can be influenced. These buttons are objects of interest for the interventionist.

Willke proposes several questions to guide the interventionist through the analysis of a social system:

The first question relates to the main functional parts and processes of the system. The second question seeks to understand surface processes and to gain an understanding of what deeper structures and processes control them. The third question is geared towards the basic circular processes of the system: i.e. special

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38 A more traditional cohort of systemic scholars are of the opinion that interventions into a system are in principal impossible.
patterns of communication developed in the system. After attempting to understand the basic circular processes, the next question is directed at identifying alternatives to such circular processes.

Wilke’s final two guiding questions seek to discover what kind of relationships between the system and its environments pertain, and what an optimal form of these relationships might look like. The quality of the relationships between the social system and its relevant environments characterize how the system is able to survive in the future. The extent to which a system emphasizes or neglects one-sidedly the relationship with relevant environments determines its grade of ‘pathology’. Identified pathological patterns of the system subsequently become the object of interventions.

Wilke emphasizes that systems pathologies are not changed by ‘eliminating’ people from the system but by changing special forms of communications that have pathological characteristics. Prerequisites for successful interventions are relationships that make it possible to give information to the client system: i.e. some form of ‘coupling’ between the client system and the interventionist. Correspondingly, one of the interventionist’s central tasks is to build and maintain relationships to important actors of the client systems. Many interventions fail due to inadequate maintenance of these relationships.

Even if the interventionist has good relationships with important subjects in the client system, the information must be understandable and connectable to the logic of the client system. For this reason, the planning of the intervention must start from the point of view of the client system. Even then, interventions from outside the organization can only possess an indirect character, that is, a character of irritations. An intervention can attempt to start a development, but then the inner logic of the ‘client system’ takes over. The client system, however, cannot be fully comprehended, and not directly influenced. Correspondingly, particular developments cannot be foreseen and interventions are necessarily always attended by uncertainty.

Selvini-Pallazzoli’s innovative use of tools of the systemic tradition for intervention

In the 1970s and 1980s, major developments in systems thinking occurred in the context of systemic family therapy. Mara Selvini Palazzoli, the main proponent of the ‘Milano School’ of systemic family therapy not only developed key instruments for systemic family therapy, but also used them in the context of organizations. In this way, several innovative solutions for dealing with problems in organizations such as ‘political games’ and lack of cooperation were developed.

The primary guidelines for analysis in systemic family therapy are building hypotheses, circularity and neutrality (Selvini Palazzoli et al. 1980; see Selvini 1992).

On the basis of information acquired through interviews, a hypothesis is constructed about the connections between the family relations and the described symptoms that first brought the family to the therapist. The hypothesis then serves as a starting point for further inquiry, and will be replaced by a new hypothesis if new information suggests this is appropriate (Selvini Palazzoli et al. 1980).
To understand the circularity in a system is a further principal guideline. The basic issue is to concentrate less on gaining information about individuals and to focus more on gathering information about relations between subjects. For example, it is helpful to ask a son about relations between his mother and father, and the father about those between the mother and son. In this manner, the pattern of family relations (or basic communications, in the language of Luhmann and Willke), can be revealed (Selvini Palazzoli et al. 1980). This and similar forms of questioning – later called circular questioning – count among the main analytic instruments of systemic family therapy and intervention. These kinds of questions not only have an analytical but also an interventionist character.

The last guideline for analysis in systemic family therapy is neutrality. The therapist is, or at least seems to be, in coalition with each member of the family, and seeks to understand each individual member’s perspective on the problems. The approach leads to the outcome that the therapist gives the impression of being in coalition with everybody or, as Selvini Palazzoli puts it, is seen to be neutral.

Mara Selvini Palazzoli and her colleagues also developed a series of interventionist techniques to address pathologies in systems. The background of such techniques is that dysfunctional conditions of clients have their origins in often unconscious, paradoxical games within related family systems. To overcome such ‘family games’, ‘paradoxical interventions’ could be deployed. The strategy for countering paradoxes was to pass disturbing, often completely astonishing information to the family, which often led to clear and immediate effects. The effects were often visible in the reactions of the family after the intervention (Selvini 1992: 156–161).

Examples of such paradoxical interventions are positive connotations and prescription of symptoms. Positive connotations address the paradoxical behavior of the whole system. While direct intervention (‘you behave in this way and that is the reason why she or he is ill’), often cause immediate resistance, thus blocking development, positive connotation seeks to address the problematic issue – bringing it into consciousness – but describing it as positive. The desired result is a weakening of any feelings of guilt and resistance. Another example of paradoxical intervention might be the prescription of conducting specific paradoxical rituals (Selvini 1992: 139–146; 180–181).

In a similar manner to the double function of circular questioning (with its simultaneous analytical and interventionist function), the reactions to paradoxical interventions by family members often provide the therapist with important information.

Selvini Palazzoli and her team did not focus solely on therapy, but deployed instruments of systemic family therapy in an innovative way in an organizational context. There is a famous case of an Italian company where a member of Palazzoli’s team worked as a psychologist and conducted a successful paradoxical intervention to address a pathological circle that had previously given rise to a permanent coming and going of staff (Selvini Palazzoli et al. 1986: 4, 18–19).

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39 Prescriptions of symptoms were already used by Milton Erickson and Gregory Bateson. These figures, however, focused more on the individual patient.
6.3.7 Conceptualization of an integrated ‘Systemic Approach’ solution

In German-speaking countries, many social scientists and practitioners engaged in therapeutic and consulting work became interested in the new ideas generated by the discipline of social systems theory and systemic family therapy. A range of published contributions picked up the innovative ideas and elaborated them towards integrated intervention methodologies that could be applied as ‘systemic interventions’ in work and organization. Authors such as Fritz Simon and Helm Stierlin (1984) and Rudolf Wimmer (1992) were often affiliated with academic institutions, or engaged in practical therapeutic and consulting work. One of these contributions – often-cited and used as a basis for application – is a book about systemic interventions authored by Königswieser and Exner (2001). The key elements of this book will be described in what follows.

Königswieser and Exner (2001: 17–19) use Luhmann’s and Willke’s concepts to describe three social systems that are of signal importance for the intervention process: the client system (CLS), consultancy system (COS) and consulting system (CCS). The consulting system exists temporarily, jointly established and maintained by consultants and clients. The CLS, COS and CCS have the general characteristics of social systems as described above by Luhmann and Willke. As autopoietic systems they are operatively closed. No ‘direct’ intervention into a CLS is possible. The CCS stands for the new relationship between clients and consultants, and functions as a means to reach the client system (see figure 6.6).

Each of the three types of systems has its particular characteristics and inner logic. The specific inner logic pertaining to a client system will vary significantly from client organization to client organization. Non-profit organizations will frequently exhibit an inner logic that is influenced by political convictions and a moral framework. More often, companies possess an inner logic that is strongly influenced by costs and profits. The CLS treats the consulting system according to this specific inner logic.
In most cases, the COS consists of a team from a consultancy specializing in communication services. Its characteristics are considerably influenced by the characteristics of the individual participating consultants, and also by the common characteristics of the consultancy (its rules, ways of conducting interventions, etc.). Systemic consultants attempt to give impulses to the CLS through interventions, rather than proposing ready-made solutions. The specific theories, models and tools that are most often used by systemic CLS will be described subsequently.

The CCS represents the factual, temporal, social and spatial intersection of the CLS and COS. It is constrained by the duration of a project, the characteristic of participating actors, as well as by the specific type of problem to be solved. Within these constraints, the CCS is a frame (or space) to work on problems of the CLS, with the help of interventions conducted by the COS. This frame has to be actively maintained by the COS (Königswieser and Exner 2001: 19–28).

Being aware of the difficulties and constraints associated with interventions, the systemic COS nevertheless attempts to conduct them with a view to influencing the CLS. Königswieser and Exner (2001: 30) use a spiral model to describe the intervention process. The spiral includes recurrent steps of analysis (gathering information, hypothesis building), and of intervention (planning interventions and conducting interventions) (see figure 6.7).

The role of the change agent is first to observe and understand the CLS, in a bid to identify benign and ‘pathologic’ patterns, as well as buttons. Such buttons represent points where the system is sensitive and susceptible to react to the interventionist’s communication. The interventionist next has to plan and attempt interventions of different forms in order to disturb the CLS. The CLS will possibly respond by showing new patterns of behavior that go beyond earlier dysfunctional patterns. After that, a further phase of analysis begins, in turn followed by a further phase of intervention (Königswieser and Exner 2001: 18–30).
While the characteristics of systems and the possibilities and constraints of interventions are primarily based on concepts of Luhmann and Willke, concrete systemic tools are largely derived from the systemic family therapy tradition. Königswieser and Exner note that the manner of using concrete intervention techniques depends very much on the specific context of CLS, COS and CCS, and on the state of the intervention process. Correspondingly, they offer a ‘toolbox’ of different techniques that could be deployed in a different way, depending on the concrete intervention context.

Main groups of techniques include:

- Circular questioning,
- Paradoxical interventions, including prescribing symptoms, reframing, splitting and giving positive connotations to symptoms,
- ‘Analogue’ interventions, such as drawing pictures, narratives and scenic representations,
- Further ‘traditional’ instruments, such as interviews, writing memos and providing feedback (Königswieser and Exner 2001: 28; 35–41).

### 6.3.8 Dissemination/diffusion of concepts of the systemic tradition

Authors such as Königswieser and Exner, Wimmer and F. Simon do not only adopt and elaborate systemic concepts from social systems theory and systemic family therapy. They have also established, or became part of, small- to middle-sized sys-
temic consulting centers in Germany, Austria and Switzerland. Interventions conducted by these systemic consulting centers constitute the main way of applying and disseminating systemic concepts in these countries. While authors of systemic consulting books often describe and discuss possible methods of systemic interventions, little data exists about concrete projects that could provide more detailed information regarding intervention cases, interventionists and clients. An important exception, and therefore a primary data source, is a dissertation by Susanne Mingers (1996). Mingers acted as an ‘accompanying researcher’ within a project between the systemic consulting center ‘Conecta’ (based in Vienna) and a general store called ‘Jungberg’, a decentralized member of the ‘Buywell’ Group.40 The intervention took place between February and November 1994 (Mingers 1996: 125).

Jungberg was purchased by the Buywell group two years before the start of the project (Mingers 1996: 154–155). After the purchase, the top management of Buywell initiated a reorganization of Jungberg. Buywell wanted Jungberg to adopt the Buywell policy on customer orientation and decentralization. To achieve this goal, Buywell initiated and financed the intervention project described here. The specific focus of the project was on what was to that point an ‘unused recourse’ for customer orientation and decentralization: the management capabilities of assistant department heads in different departments at Jungberg (Mingers 1996: 162).

The specific situation of the assistant department heads before the intervention was characterized in the following way:

1. They had a great deal of ‘operative’ tasks such as controlling of goods and dealing with client reclamation.
2. They were to use their management function only with operators, the lowest level of the organization.
3. They were in a sandwich position between department heads and operators.
4. They only applied the limited management function if the department head was not there, only at that point filling his or her position. Otherwise they remained with operative tasks.
5. Assistant department heads did not work together well as a team (in contrast to department heads, who had frequent team meetings) (Mingers 1996: 162)

Other characteristics of the context that were important for the intervention project were:

1. Jungberg suffered economic losses from the time they were taken over by Buywell. The reasons for this situation, it was supposed, were ongoing problems associated with the reorganization and ongoing economic crisis. The CEO of Jungberg was particularly under pressure from Buywell due to the losses; however, the pressure was felt in the whole organization (Mingers 1996: 155–159).

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40 Both names were changed by Mingers to protect client anonymity.
Over the course of the project it became clear for the interventionists that there were many political games being played by the CEO, who blamed department heads for not being effective enough, and also by department heads, who not only blamed the CEO but also feared that the deputy department heads might become a threat to their own position (Mingers 1996: 174).

The top management at Buywell believed that they should use the potential of the assistant department heads to follow and react to the requirements of clients and product flow promptly and effectively, and on a day-to-day basis (Mingers 1996: 171–172). The main goal of the project was therefore described as shaping assistant department heads into a team that could be integrated into company processes and providing them with some management functions. Prior to the intervention, there were obstacles to realizing this goal, since the concrete tasks of assistant department heads were unclear. They had not functioned as a team, and the new role envisaged for them was not supported by the overall processes and structures at Jungberg. The intervention was intended to address these obstacles (Mingers 1996: 152–153).

The two interventionists were part of the ‘partner level’ of the systemic consulting company Conecta. Conecta’s system was to have interventionists work in changing teams as a means of guaranteeing different perspectives and at the same time of avoiding dysfunctional routinization (Mingers 1996: 133–135; 151). Conecta had a system of about 10 experienced partners, interventionist and a wider circle of interventionists with non-partner status (Conecta 2007). Buywell was a long-term client of the consulting company (Mingers 1996: 133–135).

The interventionists relied on some basic models together with a range of systemic instruments and techniques. By these means, they were able to shape their systemic intervention according to the client system, specific task and situation. One of their basic models described the interrelations between consultancy systems, client system and consulting system in a similar way to the model outlined in the last section (see figure 6.6). A further basic model described the intervention process as a spiral, similar to the illustration in the previous subsection (see figure 6.7). This latter model was called the ‘systemic loop’ (Mingers 1996: 176–177, 187).

Systemic instruments often used by the interventionists included:

1. Circular questioning;
2. Different reflection and feedback methods. An example is a method termed ‘inside circle/outside circle’, where one ‘outside’ interventionist sits separated from the inside circle, which consists of clients and the other interventionist. The ‘outside’ interventionist then gives feedback structured around how he or she perceives the ongoing communication processes.
3. Paradoxical interventions such as positive connotation and symptom prescription.
On top of that, traditional instruments such as more classic forms of questioning, theory inputs, role plays and discussions, were used (Mingers 1996: 185–206).

In the course of the intervention project, the ultimate goal of using the potential of deputy assistant heads to achieve Buywell’s policy of more customer orientation and cooperation at Jungberg was divided into three sub-goals:

(1) To clarify specific tasks of assistant department heads.
(2) To mould them into a team.
(3) To integrate them in the overall processes of the organization (Mingers 1996: 211).

After an introductory interview phase, three 3-day workshops were organized at CEO/management level, at department head level and at the assistant department level as participants. Not all groups took part in all three workshops.

To achieve the first intervention sub-goal, the tasks of assistant department heads were analyzed with a view to redefining them. Though the tasks were formally defined, in concrete practice their role had been unclear and fuzzy. To change this state of affairs, the interventionists asked assistant department heads to:

– Draw pictures of their actual situation;
– Describe in small groups their current situation, role and function;
– Analyze the situation;
– Elaborate in ‘implementation pairs’ how the situation could be improved;
– Discuss the situation with the CEO (later included in the discussion) and department heads, asking what could be improved (Mingers 1996: 212–216).

To achieve the second sub-goal and also to support team-building for assistant department heads, the interventionists asked these employees to reflect on their discussion with the CEO and to draw conclusions as to how they could have conducted the discussion in a better way. Furthermore, the assistant heads got a lecture about different concepts of communication and feedback, afterwards practicing giving each other feedback. As a feedback topic, their relation to department heads was selected. On top of that, the group was encouraged to initiate meetings to exchange experiences. The first group meeting was videotaped and subsequently analyzed as a way of helping participants become more self-conscious about their own behavior (Mingers 1996: 217–223).

The final sub-goal was to clarify the overall function of assistant department heads as a team, then relate this function to the other two hierarchical levels of management – to the CEO and department heads. The function of assistant heads needed to be more successfully integrated into the company’s structures and processes. All three hierarchical levels took part in this stage of the intervention project. Instruments took the form of drawing pictures, as well as inputs from the interventionists about different forms of leadership. Each of the three hierarchical groups was given the task of clarifying relations between the hierarchical levels. Furthermore, representatives of the three groups were elected and the role of these representatives was discussed (Mingers 1996: 223–234).
Mingers concludes that not all sub-goals of the projects were fully accomplished. The main outcome of the whole intervention project, however, was the successful establishment of the assistant department heads as a team with regular internal meetings as well as meetings with the other levels. These meetings provided the new team with mutual support and helped them to achieve a higher status within the company.

Nevertheless, the tasks of assistant heads remained with a few exceptions, overwhelmingly operational. Furthermore, the tasks of each assistant head continued to be very dependent upon the cooperation of their superiors. The overall function of the role of assistant department head in the company did not meet fully the vision of the Buywell top management (Mingers 1996: 253–270, 284–287).

An unexpected outcome of the project was the increasing visibility of conflict between the CEO and the department heads. A later development – probably related to the overall situation – was the appointment of a new CEO, apparently because of the poor performance of Jungberg after the acquisition by Buywell. The interventionists were informed of this move before the old CEO was released from his position. It remains unclear if they were asked for their advice on this action beforehand (Mingers 1996: 291–293).

6.3.9 Conclusions

The societal problem-solving process associated with the systemic tradition began in a later period of the Motorization wave. It partly overlaps with the problem-solving process within the quality movement: the life-cycle of the societal problem related to the systemic tradition also starts with a discussion of the dysfunctional side-effects of the dissemination of strategy and structure solutions. While the concepts of strategy and were deployed as a means of dealing with obstacles related to the challenge of changing markets, their use generated new obstacles in the form of political games and general weakness of cooperation. Dysfunctional side-effects of the strategy and structure solutions contributed to the emergence of at least two different societal problem-solving processes and formations: one was related to quality and the other to cooperation within organizations (see figure 6.8).41

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41 If the tradition of organizational culture (e.g., Schein) and learning (e.g., Argyris) were included in the frame of discussion, more than the two forms analyzed in this section might be discernible.
Examples of actors that focused on securing their power position within the decentralized organizational systems are described in Selvini Palazzoli’s case study of Italian cooperation, and also in Mingers’ case study of Jungberg and Buywell. Luhmann’s theory of social systems and also the concepts and techniques from systemic family therapy contributed to the development of a theoretical tradition that could be used to address the problem of political games and weak cooperation in an innovative manner.

Authors such as Königswieser and Exner wrote books where they adopted and elaborated these innovative ideas towards integrated intervention conceptualizations that could then be applied as ‘systemic interventions’ in work and organization. Integrated conceptualizations such as Königswieser’s and Exner’s became important sources for systemic interventionists that addressed the problem of political games and weak cooperation in many corporations in German-speaking countries. Systemic interventions contributed in this way to the spread in German-speaking countries of a form of market-oriented mass production with a higher degree of cooperation.

The main actors within the problem-solving formation possessed a background in social sciences, often in sociology or psychology. Such actors were often affiliated to academic institutions as well as engaged in practical therapeutic or consulting work. Many different scientist and practitioners in different places and periods of time were engaged in defining problems associated with the negative
side-effects of the General Motors style of mass production. Scholars from the systemic tradition often criticized the implementation of strategy and structure solutions (frequently conducted by consultancies such as McKinsey) for ignoring vital social processes within companies such as inter-department cooperation and blamed them for aggravating already existing problems (see Walger 1991). The fundamentals of the most innovative solutions in this context were developed by systems theory scientists such as Luhmann, and systemic therapists such as Selvini Palazzoli. Further actors in this tradition (such as Königswieser and Exner) elaborated these new ideas into integrated intervention conceptualizations for implementation as ‘systemic interventions’ in work and organizations. Systemic consulting companies such as Conecta relied on such integrated intervention conceptualizations to conduct projects in corporations that addressed the problem of poor cooperation or political games (figure 6.9).

Companies such as Conecta can be identified as a new form of activity embedded in the dynamic problem-solving formation. Such centers for systemic transformations address an organizational problem and can thus be understood as a form of conducting interventions.

While the systemic consulting companies describe themselves as consultancies, there is a significant contrast between them and big strategy consultancies such
as McKinsey. The difference is not only related to the focus (strategy and structure-related problems vs. inner dysfunctional patterns such as poor cooperation). The systemic consulting companies are much smaller in respect of the number of people and projects they conduct. While McKinsey has several thousand consultants in offices all over the world, systemic consultancies usually employ between 5 to 50 people. Furthermore, McKinsey’s focus was clearly on the dissemination of best practice solutions supported by guiding precepts (‘don’t reinvent the wheel’) and division of labor (a high number of inexperienced MBAs receiving training by senior consultants).

Systemic consulting companies, on the other hand, rely almost exclusively on experienced interventionists with a strong understanding of social systems theory. Many systemic interventionists have a connection to academia and contribute to the development of systemic intervention theory through publishing books and articles. The method of systemic consulting companies such as Conecta is not that different from that of Palazzoli’s team. Systemic consulting companies not only focus on disseminating solutions, but also on the integrated creation, conceptualization and application of solutions using concepts of system theory and systemic family therapy. It requires a great deal of experience to use the theoretically demanding concepts around social systems to conduct interventions. Correspondingly, it is almost impossible for systemic consulting companies to operate a system with a large number of young interventionists in the McKinsey mould.

From the point of view of the focus and inner logic of the system, the pattern of systemic consulting companies has more in common with the Lewinian research center than with McKinsey’s form of conducting interventions.

This chapter’s research question was directed at identifying the main forms of conducting interventions in the Motorization wave and the principal characteristics of these forms.

If the forms of conducting interventions analyzed in this chapter are viewed together, one discerns a pattern similar to that in the Electrification wave. An opposition becomes apparent between forms from the early period of the Motorization wave (Drucker and McKinsey) and forms from the later period of this wave (the quality gurus and Baldrige system, as well as systemic consultancies). While Drucker and McKinsey addressed the societal problem associated with strategy and structure, the quality gurus and the Baldrige system, together with the systemic consultancies, addressed problems associated with the dysfunctional side-effects of the implementation of strategy and structure solutions – quality problems, in addition to problems connected with the lack of cooperation and political games. In a sense, they balanced the diffusion of solutions from the early period of the Motorization wave.

As in the Electrification wave, a second pattern also becomes discernible. Drucker, the quality gurus and the systemic consulting companies oriented themselves more towards creating and conceptualizing solutions, while McKinsey and the Baldrige system oriented their efforts towards disseminating solutions.
These conclusions are presented in a condensed form in the following figure 6.10.

Figure 6.10: Overview of analyzed forms of conducting interventions in the Motorization wave
7 Forms of conducting interventions in the early part of the Computerization wave

7.1 Introduction and procedure

The previous analysis of forms of conducting interventions that emerged in the Motorization wave suggested that there were parallels between the forms observed in the Motorization wave and the forms observed in the Electrification wave. The forms were not exclusive or competing against each other; rather, they were related in a complementary manner. The historical-genetic reconstruction of a comprehension of the dynamic and diversity of forms of conducting interventions is continued in this chapter by studying a main societal problem-solving processes that emerged in the early part of the present Computerization wave (see figure 7.1).

Figure 7.1: Focus of analysis in this chapter

The research question in this chapter is:

What were forms of conducting interventions in the early part of the Computerization wave, and what were main characteristics of these forms?

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42 See for example Drucker and McKinsey, the quality gurus, the systemic interventionists and the Baldrige system.
The ‘overview model’ (see table 3.7 in section 3.5) provides an orientation for the selection of a main societal problem-solving process. The model suggests that the main societal problems in the early part of the Computerization wave were related to ‘IT-based networks’. Unlike the waves described in previous chapters, the Computerization wave is still continuing. In any empirically based attempt to forecast the development of future forms of conducting interventions, it would be important to include the current development of interventions in the subsequent analysis. Such a forecast naturally runs the risk of becoming outdated in a year or two. For this reason, this study relies on a historical-genetic procedure, which differs from an empirically based one. The idea of the historical-genetic procedure in this study is to contribute to the comprehension of the overall pattern of emergence and dynamic of forms of conducting interventions. This kind of comprehension is based on the analysis of main characteristics of ‘representative’ forms of intervention and on the analysis of how the main characteristics of representative forms have changed qualitatively in the course of the 20th century (see Chapter 8).

In the following, a ‘life-cycle’ analysis of the societal problem related to ‘IT-based networks’ will be carried out (section 7.2). The analysis will necessarily be limited by the fact that main developments in the Computerization wave are still unfolding. The main sources for the analysis will be primary and secondary texts associated with the forms described and analyzed as well as additional overview material.

A further substantive difficulty has to be addressed: namely, there is little relevant and reliable data to draw on for some aspects of the description and analysis of some elements of the selected problem-solving process. The principal sources in the previous chapters were primary and secondary texts, and additional overview material. However, in considering more recent developments, there are no secondary sources or overviews comparable to Nelson’s 1980 study of Taylor, or Gillespie’s 1991 work on the Hawthorne experiments. One reason for this is that historians need time and distance before they can comment on present phenomena. Another reason is that some authors, particularly those ‘gurus’ who are often the main beneficiaries from disseminated concepts, may not have much of an investment in writing about the contribution of other experts, such as practitioners.

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43 There are, of course, also risks and limitations of the historical-genetic procedure. The historical-genetic procedure had unavoidably to be based on a selection of main forms. Consequently, the danger exists that the selection of ‘representative’ forms of conducting interventions is not adequate. To develop a sufficiently ample overview of scientific knowledge about forms of conducting interventions was the main function of Chapter 3 (resulting in the ‘overview model’). The extended unit of analysis (societal problem-solving processes and formations) contributes on top of this that ‘unexpected’ forms of conducting interventions (such as Training Within Industry) would not be excluded from analysis. Nevertheless risks and limitations of the historical-genetic procedure remain (see Chapter 12).

44 Discussions of newest developments are included in some sections of the following chapters (e.g., section 8.4, section 12.2, and section 12.3).
who have developed innovative solutions from their practice. This seems to be the case with Business Process Reengineering (BPR), where innovative solutions were developed for the most part by practitioners, but the ‘honor’ (and royalties) went to Hammer, Champy and Davenport (Davenport et al. 2003: 162ff).

### 7.2 Life-cycle analysis of one of the societal problem-solving processes related to IT based networks

#### 7.2.1 The pattern of societal problems

The beginning of the Computerization wave in the 1970s,\(^45\) saw an entirely new pattern of societal problems emerge. The rapid rise of computers, software, microelectronics, the Internet and mobile telephone industries represent outstanding factors in this wave. Microelectronics, computers, telecommunications and the Internet provided opportunities for new industries (functioning as carrier branches), a new infrastructure of digital and wireless networks, and much wider and cheaper access to information and communication pathways. These developments challenge the techno-economic paradigm of the Motorization wave (Freeman and Louçã 2001: 301–314).

An example of a highly visible and influential technological innovation – showing a technological ‘big bang’ effect – was the development of the Intel microprocessor from 1972 (Freeman and Louçã 2001: 141). Freeman and Louçã describe the evolution of computer chips as the new core input, with capacity doubling every 1–2 years from the 1970s (2001: 303). One of the most influential inventions within the computer-related area was the development of Personal Computers (PCs) with an increasing universal availability – a stock of more than 100 million in the US and well over 50 million in the EU in 1997 (2001: 314). With the combination of computers and telecommunications through the internet, a whole new range of information services emerged and spread rapidly worldwide (Freeman and Louçã 2001: 321). A further characteristic of the Computerization wave is the rapid changes in product and process design and the increasing importance of innovation (Lash 1994: 119; Freeman and Louçã 2001: 324). A greater part of the production process is characterized by the knowledge-intensive design process and a smaller part by the material manufacturing process (Lash 1994: 119).

Institutional and social changes associated with the technological revolution are still unfolding, and indeed remain at a relatively early stage (Freeman and Louçã 2001: 303).

The present period is a time of high turbulence and uncertainty. Proponents of long wave theory argue that so far no new socio-institutional framework exists that would create the conditions for a more stable socio-economic development.

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\(^{45}\) According to Perez, the techno-economic wave starts with the ‘technological big bang’ (Perez 2002; see next chapter).
(Perez 2003: XVIII). Manuel Castells emphasizes that the outcome of the processes now underway depends not only on developments with regard to information and communication technology (ICT) but also on social, political and managerial change (Castells 1989). Carlota Perez puts it the following way:

Technology shapes the economy as well as society and these, in turn, are constantly shaping technology, guiding its development and selecting within the potential it offers. The space of technologically feasible will be filtered by the economically profitable and the socially and culturally acceptable as well as by market and policy developments (Perez 2005/2007: 4).

The technical, social and organizational changes now underway are not a smooth process, but rather a contradictory shift marked by obstacles and ‘resistance’. Zuboff’s (1988) sociological study of automation is an analysis of such obstacles at the level of work organization. Her study showed how traditional hierarchical power structures undermined the possibilities of utilizing new technology effectively.

An indicator of the current contradictory shift is the ‘productivity paradox’, which describes how despite the increasing investment in ICT from the 1970s until the 1990s, no major productivity gains have been achieved (Solow 1987: 36; Davenport and Short 1990: 12, Scott Morton 1991: V–VII). Robert Solow described in a famous statement that we ‘can see computer age everywhere but in the productivity statistics’ (1987: 36). To negotiate the ‘productivity paradox’ demands that firms question the old paradigm of production and organization (still dominated by a mature form of mass production), and also that they create qualitatively new forms for exploiting the new possibilities of the Computerization wave.

The ‘double nature’ of the present challenges can be exemplified by referring to the classic work of Jay Galbraith. Galbraith argued that organizations have two options for meeting the challenge of coordination arising from the growing complexity of work processes and business: either to decrease the need for cooperation by creating clear divisions of labor and semi-independent units, or to increase the capacity for coordination (Galbraith 1973: 9–21). During the Motorization wave, the dominant tendency has been to decrease the need for coordination by relying

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46 Lundvall’s research group found even a decrease of productivity in Danish industry in 1984–1986 that was related to the way of implementing ICT. Firms that introduced the new technology without combining it with investment in training employees and changing management and work organization got a negative effect on productivity growth that lasted several years (Lundvall 2001).

47 Critique on the mass production logic is often used as a starting point for formulating new principles (Heckscher and Adler 2006; Hamel 2007). Gary Hamel (2007: 151, see section 1.1) crystallizes the essence of the previous paradigm of management in five principles and maintains that these principles prevent the exploitation of the new possibilities associated with the ICT revolution.
on concepts such as the decentralized structure and management by objectives (see section 6.2.3). The new information and communication technology, however, expands dramatically the possibilities of coordination, making it possible to create forms of production and organization that are qualitatively different from the previous ones. The old mode of decreasing the need for coordination appears increasingly as inadequate.

The emergence and diffusion of the new constellation of technical and organizational innovations in the Computerization wave offered exceptional super-profits for innovative entrepreneurship. On the other hand, the ICT revolution and the interconnected process of globalization entailed not only the emergence of 'winners' but also the emergence of many 'losers'.

The opportunities and risks of the current technical, social and organizational developments are the subject of lively debate in various disciplines. Those debates reveal pessimistic and optimistic characterizations of the evolving new context. There is no consensus about the likely final outcome of the current processes. Critical observers such as Scott Lash or Ulrich Beck emphasize that there are negative effects of the present developments. They use terms such as 'risk society' (Beck 1994) or 'disorganized capitalism' (Lash and Urry 1987, Lash 1994) to characterize them. Beck (1994: 7) states that in the emerging risk society people are expected to live with a broad variety of global and personal risks. On the other hand, many authors highlight the new possibilities for broad participation and collective innovation (Chesbrough 2003, Benkler 2006. Leadbeater 2008) as well as the increasing importance of informal collaboration in the new knowledge economy (Powell 1990, Heckscher and Adler 2006). Long wave theorists such as Perez (2005/2007) argue even that a new institutional frame could enable an alternative globalization, fully compatible with the ICT paradigm and capable of unleashing a worldwide steady expansion of production, markets and well-being.

While there is no consensus about the likely outcomes of the current developments, many scholars would agree about the emergence of new types of actors and activities and an evolution towards more complexity of structures and of relations (Lash and Urry 1987, Beck 1994, Giddens 1994, Castells 2004).

Manuel Castells (2004: 3–7) argues that the new paradigmatic organizational form is the network. In contrast to the hierarchical and bureaucratic type of organization that was typical for the Motorization wave, networks show the ability to introduce new actors and new contents in the process of social organization. Networks are more effective in supporting the increasing focus on high technology, innovation and the knowledge-intensive design processes. The understanding of networks is changing rapidly. Some scholars argue that organizational patterns develop towards 'patchwork entities' (Lee and Roth 2003: 122), 'platform organizations' (Ciborra 1996) or 'knotworking activities' (Engeström et al. 1999).

Critical commentators emphasize that the development towards less bounded entities often goes with an ideology of 'market rationalization' that entails that organizational units and employees ('businesses within businesses') could be out-
sourced or outplaced as soon as the ‘logic of the market’ demands it (Kunda and Ailon-Souda 2005: 202–208).48

Against the background of the current contradictory shift from mass production to post-mass production, several significant problem-solving processes can be identified. An important early problem-solving process was that related to Business Process Reengineering (Hammer 1990, Davenport and Short 1990). Further examples of major problem-solving processes were related to Mass Customization (e.g., Pine 1992), Knowledge Management (e.g., Nonaka and Takeuchi 1995), or Co-Creation (e.g., Prahalad and Ramaswamy 2004).49

All these problem-solving processes can be related to the ‘struggle’ between the emergent new possibilities of the ICT revolution and the persistent dominance of the former paradigm. However, none of these problem-solving processes became as dominant as those related to Scientific Management (having contributed to the establishment of the factory system) or strategy and structure (having contributed to the establishment of multinational corporations).50 Business Process Reengineering (BPR) and the other newer concepts were, for the most part, popular for a certain period before being ‘replaced’ by the next popular concept. BPR was however, discussed with as much controversy as was Scientific Management. Some scholars argue that a shared characteristic of many of the contemporary management concepts is the ‘shareholder value’ logic which was often used as justification for downsizing (Ackroyd et al. 2005: 11).

In the following section, the earliest of the mentioned major problem-solving process, that is the problem-solving process related to Business Process Reengineering, will be analyzed (section 7.2).

7.2.2 Innovative solutions related to Business Process Reengineering

A number of efforts have been made to identify and understand the obstacles to a form that fully exploits the new technological possibilities and to find a solution that will deal with those obstacles. Important early examples comprise research projects MIT90 (Scott Morton 1991) at the MIT, as well as the PRISM project, a joint enterprise involving several consulting companies such as the Index Group (later the CSC Index) and Hammer and Company (Davenport and Short 1990: 11; Davenport et al. 2003: 162–163).

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48 This observation can be related to Beck’s (1994: 7) characterization of the risk society.

49 These are examples only. There have been several other significant problem-solving processes associated with new solutions and concepts. More recently, there have been further discussions of intriguing new organizational forms (Hamel 2007; Heckscher and Adler 2006; see also section 3.2).

50 One also has to consider that the apparent dominant role of Scientific Management may be more a function of our historical proximity to it. In 20–30 years we might be able to assess more clearly the longer-lasting influence of contemporary problem-solving processes and concepts.
Venkatraman, a member of the MIT90 research group, claims that effective exploitation of the power and capabilities offered by IT would mean going beyond the supportive role of IT at local levels as technical or administrative instruments. It should be imagined as a means of involving significant changes at ‘higher levels’ with consequences for organizational strategy, management structure, systems, and processes.

Within the MIT90 project, five levels of business reconfiguration associated with investment in information and communication technology were identified. These levels are represented in the scheme shown in figure 7.2. The scheme has two basic dimensions – the degree of business transformation and the range of potential benefits from IT (Venkatraman 1991: 122–128).

![Figure 7.2: Venkatraman's model of utilization of information and communication technology (1991)](image)

Level 1 is characterized by localized exploitation. In this stage, IT is exploited within existing, isolated business activities, normally within one function such as manufacturing or marketing. This involves the deployment of IT applications that improve task efficiency of operations.

Level 2 can be thought of as building the internal electronic infrastructure or platform that permits the integration of tasks, processes and functions in all possible business activities. It has the potential to enhance both efficiency and effectiveness. Level 2 is a necessary condition if investments in stage 1 are ever to be fully exploited. These two levels are viewed as evolutionary, requiring relatively incremental changes in the existing organizational processes. In contrast, the other
three levels are conceptualized as revolutionary, requiring fundamental changes in the nature of business processes. The combination of stages 1 and 2 represents the springboard for the remaining three stages. Without this base there is no evidence that an organization has the necessary foundation for the future. Stages 3, 4 and 5 are not sequential. Provided that stages 1 and 2 have been accomplished, organizations have the option of deciding among the remaining three options.

Level 3 is *business process redesign*, involving the reconfiguration of the business using IT as a central lever. Instead of treating the existing business processes as a constraint in the design of an optimum IT infrastructure, the business processes themselves are redesigned to exploit to maximum capacity the available IT capabilities. This reflects conscious efforts to create an alignment between the IT infrastructure and the business process, rather than simply superimposing the technology platform on the existing business processes and require a fundamental rethinking of the most effective way to conduct business.

Level 4 constitutes *business network redesign*, and is associated with the use of IT by an organization to include suppliers, customers and anyone else who is able to contribute to the firm’s effectiveness. Electronic integration across key partners in the changed business network thus becomes the dominant strategic management challenge. In a sense, one can track a move from traditional formal organization to ‘virtual’ or ‘networked’ organization that works together to accomplish a particular purpose.

Level 5 involves *business scope redefinition*. This is the case when an organization decides to break out and exploit the new technology in the marketplace or in products that pertain to possibilities for enlarging the business mission and scope (through related products and services), as well as shifting the business scope (through the substitution of traditional capabilities with IT-enabled skills) (Venkatraman 1991: 122–128).

A major challenge for organizations in the 1990s lay in achieving these levels in a manner that supported the degree of organizational change required to maintain effectiveness in the turbulent 1990s and beyond (Venkatraman 1991: 124).

MIT90 (Scott Morton 1991: IV–VII) and PRISM were collaborative projects between scholars and practitioners, with companies such as Hewlett-Packard, Mutual Benefit Life and American Express participating (Davenport et al. 2003: 162–163). The solution that later became famous as Business Process Reengineering or Business Process Redesign (popularized by Hammer and Davenport) goes back to concrete cases in the PRISM project. According to Davenport, the first significant cases were Hewlett Packard (HP) and Mutual Benefit Life Insurance (Davenport et al. 2003: 163–166).

While Hammer and Davenport received the credit and profited from book sales and world-wide popularity, Davenport states that the role of the practitioners who contributed mainly to the development of innovative solutions was often not sufficiently emphasized. These practitioners were, among others, Charles Sieloff from HP and Charles McCaig and Keith Glover from Mutual Benefit Life (Davenport et al. 2003: 166).
Innovative solution at Hewlett-Packard

The first case discussed is that of Hewlett-Packard (HP). According to Himanen and Castells, the founding of HP should be regarded as the beginning of Silicon Valley as the world’s premier milieu of technological and entrepreneurial innovation related to the ICT revolution (2004: 53–54). The history and context of HP is described in the following to the extent that it is necessary to foreshadow the emergence of the innovative solution.

By 1980, HP had generated $3 billion in revenue and had 57,000 employees. During the late 1970s and early 1980s, the company had moved from a heavy concentration on low-volume electronic test and measurement instruments into computer systems and support. In the 1980s and 1990s, there was increasing pressure in the highly competitive computer industry. The most growth was emerging from high volume, lower margin products like printers and PCs. Product life cycles were greatly compressed and profit margins were squeezed (Sieloff 1999: 47–53).

As one of the big early players in the computer industry, HP’s technology infrastructure reached Venkatraman’s level 1 and level 2 early, and provided universal connectivity for all employees. By the mid-1980s, email was pervasive. HP was one of the first businesses to adopt Internet protocols for its internal wide area network, and to insist that local LAN implementations should be seamlessly interconnected across the entire company. Before the term ‘Intranet’ was even coined, HP had shared document repositories, online reference databases, and automated software distribution and installation procedures that were available throughout the company (Sieloff 1999: 47–53). This infrastructure made it easier to go beyond the incremental use of information and communication technology. However, it was not a smooth process.

One of the core business elements of HP that had proved successful until the 1980s was the division in small, autonomous business units. As the company grew, it adopted a cellular model of growth, splitting the largest units into smaller autonomous units. Among the benefits of the decentralized structure were hands-on management, face-to-face relationships and physical co-location. Altogether it seemed to be a good basis for generating innovation (Sieloff 1999: 47–53). Each of more than 50 manufacturing units had its own separate purchasing department. Each unit made purchases according to own needs and processes. This arrangement provided excellent responsiveness and service to the plants (Hammer 1990: 110; Davenport et al. 2003: 164).

However, as the combined pressures of competition and globalization increased, the decentralized structure also came under pressure (Sieloff 1999: 47–53). An early example of a process/ system that experienced such pressure for change was the decentralized procurement process conducted by the decentralized purchasing departments. The lack of coordination in purchasing prevented HP from realizing the benefits of its scale, particularly with regard to quantity discounts. The redesign of the procurement process exists as an early example of an innovative solution where the ICT was used for reaching Venkatraman’s level 3 (Business Process Reengineering or Business Process Redesign) – one of the innovative solutions on
which Hammer’s and Davenport’s concepts of business process reengineering was based (Hammer 1990: 110; Davenport et al. 2003: 163–165).

There seemed to have been two key people who contributed to this innovative solution. One was Gordon Olson, a new executive, brought in from the automobile industry to serve as the head of corporate materials – a new position for HP that included logistics, distribution and procurement. The other was Charles Sieloff, then a senior IT manager at HP.

Their idea was to establish a new system and appropriately innovative process that would support a common procurement for all of HP’s business units, while still permitting business units to initiate purchases (Davenport et al. 2003: 163–165). Their goal was to preserve the decentralized purchasing organizations, while also introducing a corporate unit to coordinate them. Each local purchasing unit would have access to a shared database on vendors and their performance, and were still able to issue their own purchase orders. Corporate purchasing was supposed to maintain this database and use it to negotiate corporation contracts and monitor units (Hammer 1990: 110).

Elaborated IT systems were put in place to capture and consolidate company-wide information about vendor performance, quality, part usage, and manufacturing schedules as a means of managing vendor relationships (Sieloff 1999: 47–53). According to Hammer and Davenport, the new system and process were completely successful. The payoffs took the form of a 150% improvement in on-time deliveries, 50% reduction in lead times, 75% reduction in failure rates and a significantly lower cost of goods purchased (Hammer 1990: 110). Altogether, HP saved hundreds of millions of procurement dollars over the following ten year period (Davenport et al. 2003: 165).

Nevertheless, the project generated considerable political controversy, and Olson and Sieloff had to spend an enormous amount of time persuading business units to use the system (Davenport et al. 2003: 165–166). In the end, there was a reluctant acceptance of the new procurement process due to the large and easily documented savings (Sieloff 1999: 47–53).

An interesting detail of this innovation process is that for Charles Sieloff the innovation related to the business process reengineering solution was not the ‘final’ episode. In his contribution from 1999, he describes how after the procurement innovation associated with Business Process Reengineering there was a later period of innovation related to the question of Knowledge Management (1999: 47–53).

Innovative solution at Mutual Benefit Life (MBL)

The second case of an innovative solution connected with Business Process Reengineering was associated with Mutual Benefit Life (MBL), a mid-sized insurance company with headquarters in Kansas City and Newark, New Jersey (based in the shadow of New York City).

The company had used computer systems since the 1950s; however, its ICT was mainly used to support old business processes that had evolved over many years, and that merely reinforced the company’s bureaucracy and specialized division of
labor. In this sense, the company remained in this early period overwhelmingly at Venkatraman’s level 1, and only partially exhibiting signs of level 2.

During the 1970s and 1980s, the insurance industry witnessed an unprecedented set of challenges. Within a short period of time the business became ‘very rough’. As a consequence, a 40% gain in sales productivity with a 40% cut in home office costs was demanded from top management.

The path to achieving this goal was a reorganization that utilized the possibilities of the information and communication technology in a new manner. The logic of reorganization was no longer to focus on automating existing processes using computers, but rather to make use of already existing technology in a novel way (Berkley and Eccles 1991: 1–6).

Before reorganization, the administrative process of handling an insurance case was complicated and time-consuming. An insurance application would have to go through as many as 30 discrete steps (credit checking, quoting, rating, underwriting and so on), involving 5 departments and no less than 19 people. At the very best, MBL was able to process an application in 24 hours; but more typical turnarounds ranged from 5 to 25 days – most of the time being spent in passing information from one department to the next. MBL’s rigid, sequential, multi-step process led to many complications. For instance, when a customer wanted to cash in an existing policy and purchase a new one, the business department associated with the old policy first had to authorize the treasury department to issue a check. The check would then accompany the paperwork to the business department related to the new policy (Hammer1990: 106).

For an important new product – ‘universal life policies’ – a new process of case handling was developed. Main ideas for the innovative solution came from MBL’s IT managers such as Charles McCaig, as well as from younger line executives such as Keith Glover (Berkley and Eccles 1991: 4–9; Davenport et al. 2003: 163). A core idea was that shared databases and computer networks could make many different kinds of information available to a single agent, while such single agents could be supported by expert systems when they needed help to make difficult decisions. The application of these insights led to a new, radically better coordinated approach of the application-handling process; one with wide organizational implications and little resemblance to the old way of doing business.

Departmental barriers were lowered and a new position created: the ‘case manager’. Case managers had complete responsibility for an application from the time it was received to the point at which a policy was issued. They were able to perform all tasks associated with an insurance application because they were allowed to work autonomously and were supported by powerful PC-based workstations that connected them to necessary functions and knowledge. In particularly difficult cases, case managers could call for assistance from a senior underwriter or physician, but these specialists would work only as consultants and advisers to the case manager.

With this innovative solution an application could be completed in four hours, and average turnaround took two to five days. The company eliminated 100 field office positions, and case managers were able to handle more than twice the vol-
volume of new applications that the company could previously process (Hammer 1990: 106–107).

Nevertheless, there were associated dilemmas. The new case management jobs placed heavy demands on worker skills. Many of those employed during the old bureaucratic processes were not qualified to become case managers, and probably could never have qualified even with extensive training, since the firm had a long tradition of hiring and training less-educated workers from the local community. As workers were displaced they felt betrayed. Altogether the innovations were achieved at considerable cost to the company’s culture and employee morale (Davenport 1993: 107–108).

7.2.3 Conceptualized solution related to Business Process Reengineering

Hammer (1990), as well as Davenport and Short (1990), can be considered as the main actors, who conceptualized the innovative solutions described in the last subsection. After Hammer, Davenport and Short published these two important papers, a movement formed under the banner ‘Business Process Reengineering’ or ‘Business Process Redesign’ (BPR) (Knights and Willmott 2000: 3).

Although their conceptualizations seemed markedly different at first glance, Hammer and Davenport originally planned to publish a joint paper on the subject of BPR – but it was not accepted. The two shared a substantial consensus on several main ideas of BPR (Davenport et al. 2003: 156–163):

- The radical redesign and improvement of work
- The ‘attacking’ of broad, cross-functional business processes
- ‘Stretch’ goals of order-of-magnitude improvement
- The use of IT as an enabler of new ways of working (Davenport et al. 2003: 157)

Hammer – a member of the PRISM project – became the most popular guru (Davenport et al. 2003: 155–156). His conceptualization (Hammer 1990) is largely a set of principles that can be directly related to innovative solutions at one or more of the companies mentioned above. Davenport, also a member of the PRISM project, and Short, who was associated with the MIT90 project, proposed a slightly different conceptualization. On the basis of their experiences with the companies studied, they attempted to extract a generic five-step approach of redesigning business processes on the basis of ICT (1990: 11). Both conceptualizations are summarized in the following part of the subsection.

Hammer’s conceptualization

According to Hammer (1990), the typical problems of contemporary management are:

- In a time of rapidly changing technologies and ever-shorter product life cycles, product development often proceeds at a glacial pace.
In the age of the customer, order fulfillment has high error rates and customer inquiries go unanswered for weeks. In a period when asset utilization is critical, inventory levels exceed many months of demand.

Hammer states that information technology has great potential, but is not used appropriately. IT should not be deployed merely to automate an existing process, but to enable a new one: businesses processes should be ‘reengineered’. The power of modern IT should be used to redesign existing business processes in a radical manner in order to achieve dramatic improvements in performance. To achieve this goal, it is necessary to break with conventional wisdom and the constraints of organizational boundaries, in favor of a broad, cross-functional orientation.

Hammer summarized key principles that companies discovered while reengineering their business processes:

1. Organize around outcomes, not tasks.

This principle proposed that a single person performs all the steps in a process, and that the person’s job should be designed around an objective or outcome instead of around a single task. The redesign at Mutual Benefit Life, where individual case managers perform the entire application approval process, was used as an example of this principle.

2. Have those who use the output of the process perform the process.

In an effort to capitalize on the benefits of specialization and scale, many organizations established specific departments to handle specific processes. Each department does only one type of work and is a ‘customer’ of other groups’ processes. Though Hammer did not cite MBL explicitly, their former sequential process was a good example of this practice.

3. Subsume information-processing work into the real work that produces the information.

According to Hammer, in the past people did not have the time or were not trusted both to produce information and process it. Most companies established units that did nothing but collect and process information created by other departments. This arrangement reflected the old rule about specialized labor and the belief that people at lower organizational levels were incapable of acting on the information they generated.

With the help of new IT systems, departments that produced important information could process this information themselves, instead of sending it to an information processing department, thus utilizing the information in a better way to improve their response to the company’s imperatives.
(4) Treat geographically dispersed resources as though they were centralized.

With this principle, Hammer addressed the conflict between centralization and decentralization. Decentralizing a resource (whether people, equipment or inventory) could provide a better service to those who used it, but at the cost of redundancies, bureaucracy and missed economies of scale. Now companies no longer had to make such trade-offs; instead, they could use databases, telecommunications networks and standardized processing systems to receive the benefits of scale and coordination while maintaining the benefits of flexibility and service. Hewlett-Packard’s mix of decentralized and centralized purchasing is an example of this principle.

(5) Link parallel activities instead of integrating their results.

HP’s decentralized purchasing operations represent one kind of parallel processing in which separate units perform the same function.

(6) Position the decision point where the work is performed, and build control into the process.

As Hammer claimed, in most organizations those who did the work were distinguished from managers who monitored the work and made decisions about it. The tacit assumption was that the people actually doing the work possessed neither the time nor the inclination to monitor and control it; moreover, that they lacked the knowledge and scope to make decisions about it. According to Hammer, the entire hierarchical management structure was built on this assumption. The example of Mutual Benefit Life demonstrated that this arrangement was not in fact a necessity. Over the course of reengineering the insurance application process, the opportunity was taken to compress linear sequences and also to eliminate the need for layers of management.

(7) Capture information only once, and at the source.

The previous logic was that when information was difficult to transmit, it made sense to collect information repeatedly. Each person, department or unit had possessed its own requirements and forms. In contemporary work, however, when a piece of information is collected, it is stored in an on-line database for anyone who needs it. Bar coding, relational databases and electronic data interchange (EDI) makes it easy to collect, store and transmit information. Hammer described one example of a company whose application review process required that certain items be entered into ‘stovepipe’ computer systems as many as five times. By integrating and connecting these systems, the company was able to eliminate this redundant data entry along with the attendant checking functions and inevitable errors.
After presenting these principles, Hammer concluded by describing some general difficulties and opportunities linked to using reengineering in an intervention. Taking the inertia of old processes and structures into account, the strain of implementing a reengineering plan could hardly be overestimated. On the other hand, the opportunities – especially for established companies – were considerable. Large, traditional organizations were burdened with layers of unproductive overheads and armies of unproductive workers. To survive against ‘sleek start-ups’ or ‘streamlined Japanese companies’, U.S. firms needed fast and dramatic improvements. The possibilities offered by information technology, combined with the use of reengineering, offered a way of achieving such goals. He described possible outcomes of BPR such as removing 78 days from an 80-day turnaround period, cutting 75% of overheads and eliminating 80% of errors (Hammer 1990).

Davenport and Short’s conceptualization

Davenport and Short (1990) derived a second conceptualization from the experiences in the MIT90 and the PRISM research projects. They defined business processes as a set of logically related tasks, performed to achieve a defined business outcome. A set of processes constitutes a business system – the way in which one or more business units carry out their business. Processes have two important characteristics:

– They involve internal or external customers; that is, processes have defined business outcomes, and there are recipients of the outcomes.
– They cross organizational boundaries of subunits, and are generally independent of formal organizational structure.

Common examples of processes include:

– Developing new products;
– Ordering goods from a supplier;
– Creating a marketing plan;
– Processing and paying insurance claims;
– Writing proposals for government contracts.

Davenport and Short propose five major steps towards redesigning inefficient or ineffective processes: developing the business vision and processing objectives, identifying the processes to be redesigned, understanding and measuring existing processes, identifying IT levers, and designing and building a prototype of the new process.

Five Steps in Process Redesign

(1) Develop Business Vision and Process Objectives
– Prioritize objectives and set stretch targets
(2) Identify Processes to Be Redesigned
   – Identify critical or bottleneck processes

(3) Understand and Measure Existing Processes
   – Identify current problems and set baseline

(4) Identify IT Levers
   – Brainstorm new process approaches

(5) Design and Build a Prototype of the Process
   – Implement organizational and technical aspects

(Davenport and Short 1990: 14)

Each of the five steps is described in detail below.

(1) Develop Business Vision and Process Objectives:
Davenport and Short emphasize that rationalization is not an end in itself, and is thus insufficient as a process redesign objective. Instead of task rationalization, the redesign of entire processes should be undertaken with a specific business vision and related objectives in mind.

In most successful redesign examples studied by the authors, the company’s senior management had developed a broad strategic vision into which the process redesign agency fitted. Each of the visions implied specific objectives for process redesign. Such specific objectives could be related to cost reduction, time reduction, output quality and quality of work life/learning/empowerment. They hold that it is important to set specific (measurable) objectives that ‘stretch’ the organization as a means of providing inspiration and stimulating creative thinking.

(2) Identify Processes to Be Redesigned:
Even when total redesign was the ultimate objective, Davenport and Short proposed to select a few key processes as the focus of an initial effort. The reason for such selection was to reduce the amount of effort and, moreover, to include in a later phase a means of reinforcing commitment through being able to present some successful examples of IT-enhanced redesigned processes.

Davenport and Short discussed two major approaches to select key processes:
(a) the ‘exhaustive approach’ attempted to identify all processes within an organization and to prioritize them in the order in which they should be redesigned;
(b) the ‘big-impact approach’ attempted to identify only those processes that were crucial to the companies’ success, else those most in conflict with the business vision and process objectives.

(3) Understand and Measure Existing Processes:
Two primary reasons for understanding and measuring processes before redesigning them are:
(a) to understand problems in order to avoid their repetition, and
(b) to serve as a baseline for future improvements. Davenport and Short recommended that designers be informed of past processes, problems and errors, but
emphasized that they should work with a ‘clean slate’, since the previously defined ‘stretch’ goal was to create radical improvements.

(4) Identify IT Levers:
Davenport and Short highlighted the point that awareness of IT capabilities could and should influence process design, since IT was capable of creating new process design options. The role of IT in any process should be considered in the early stages of its redesign. This goal could be accomplished using brainstorming sessions, with the process redesign objectives and existing process measures in clear view. It would be also useful, they observed, to have a list of IT’s generic capabilities in the context of enhancing business processes, such as improving coordination and information access across organizational units.

(5) Design and Build a Prototype of the Process:
A key point for Davenport and Short was that the actual design – usually carried out by the same team that performed the previous steps – did not signal the end of the process. Rather, it should be viewed as a prototype, with successive iterations expected and managed. Key factors and tactics to be considered in process design and prototype creation might be:
(a) using IT applications as a design tool to facilitate the ‘process’ of prototype creation,
(b) understanding generic design criteria (the most important criterion is the likelihood of a design satisfying the chosen design objectives),
(c) creating organizational prototypes that are first implemented on a pilot basis, and later (after being examined) fully adopted.

When applying this 5-step guide of Business Process Redesign one should be aware of the specifics relating to the kind of process involved and the context for conducting redesign.

Business Process Redesign projects could vary considerably according to the type of processes under examination. Three major dimensions were available to classify these different types: organizational entities or subunits involved in the process (inter-organizational, inter-functional or inter-personal), the type of objects manipulated (physical or informational), and the hierarchal level of processes (operational or managerial) (Davenport and Short 1990)

In a later book, Davenport made clear that the sequence of the steps could be modified within certain limits. Among others, it was important that step 2 – identifying processes to be redesigned – should be carried out early in order to focus effort and resources (Davenport 1993: 25).

This subsection cannot end without acknowledging that BPR was the target of a harsh critique from scientists and practitioners (e.g., Grint and Case 2000, Knights and Willmott 2000). Grint and Case (2000: 27, 45) note that BPR frequently failed to deliver on its claimed promises. They maintain that the consequence of such failed project was often the loss of trust (built up over many years) inside companies, and in the environment of ‘reengineered’ organizations. Knights
and Willmott (2000: 9–10) argue that BPR programmes were often sold on the basis of claims about ridding organizations of bureaucracy and saving costs. While such programmes have led often to short-term rating gains in the capital market, long-term effects were frequently less positive and have entailed the loss of knowledge and other resources.

7.2.4 Dissemination by Andersen Consulting/Accenture

Both Hammer and Davenport worked as interventionists and conducted change projects to implement BPR. Besides himself and Hammer, Davenport identifies two main groups who profited from the BPR wave:

(1) Consultancies firms that offered reengineering interventions;
(2) Computer and software vendors who to convinced firms that their products were critical to successful reengineering (Davenport et al. 2003: 156).

The focus in this section will be on those consultancies that spread BPR.

Connections between Hammer or Davenport and large consultancies were close. Davenport worked for several large consultancies. Among others, he was employed as research director for Andersen Consulting, later ‘Accenture’. Accenture was one of the leading firms in the dissemination of BPR – with high profits (Valentine and Knights 1998: 78–80; Fink and Knoblach 2003: 324–325). The consultancy is often seen as the pre-eminent company of the ICT-related consultancy tradition (Kipping 2002). Possibilities for analyzing Accenture are limited, since – as is the case with McKinsey – detailed and non-marketing based information about products and instruments of Accenture is difficult to obtain.

The history of Accenture/Andersen Consulting can be seen as starting in 1913, when Arthur Andersen, an accounting professor, purchased an audit firm in Chicago. The firm grew until it was one of the top accounting firms in the United States. From the 1950s onwards, the company was involved in consulting assignments that required business applications of computers and information technology (IT). Between the 1950s and 1980s, the consulting part of Andersen’s business became at first equally, and later, more profitable than the auditing business (Nanda 1995: 1–2). In 1989, the firm was split into two business units: Arthur Andersen (focused on audit, tax and related consulting services) and Andersen Consulting. In 2001, the business units became completely separated companies and Andersen Consulting became renamed Accenture (Nanda 1995: 2; Accenture 2007).

Much of the growth in consultancy services resulted from assignments related to information technology, which was becoming increasingly central for management from the 1980s onwards. Accounting companies such as Andersen were well positioned to exploit the emerging opportunities of offering IT services to client companies. Their comparative advantage was that they were among the first to

\[51\] In the course of the process of separating from the mother company, Andersen Consulting changed its name to Accenture.
become familiar with large-scale IT systems, due to the fact that accounting and auditing had, earlier than other activities, relied on computer hardware and software. In addition, audit services were a convenient entry for consulting services (Kipping 2002: 34–37).

According to the firm’s own historical accounts, from 1989 to 1999 Accenture evolved from an IT systems integrator to a global management consulting and technology services company (Accenture 2007; see Armbrüster and Kipping 2003: 23–24).

A critical step in the development of a service firm that addressed both management and ICT-related problems was achieved in 1989, when Accenture formalized ‘Business Integration’, its main framework for aligning a client’s people, processes and technology in support of its overall strategy to enable all components of the client organization to work to enhance business performance. (Accenture 2007)

![Figure 7.3: Model of Business Integration framework (Nanda 1995)](image)

The Business Integration framework is set out in figure 7.3. Table 7.1 describes the phases of a typical project under the Business Integration framework and indicates how much time would be spent on each phase (Nanda 1995: 3, 18).

Table 7.1: Phases of a typical project under the Business Integration framework (Nanda 1995)

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Conceptual</th>
<th>Design</th>
<th>Implementation</th>
<th>Post-implementation support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Spent</td>
<td>15–20 %</td>
<td>25–30 %</td>
<td>50 %</td>
<td>5–10 %</td>
</tr>
</tbody>
</table>
While the Business Integration framework underlines Andersen Consulting’s/Accenture’s goal to become a leading service provider of integrated (strategy and ICT related) business solutions, the table explains the basis of their argument that they would offer a more extended range of services than strategy consultants. Strategy issues were included (among others in the conceptual phase), but the focus was on implementation of business solutions (e.g., in form of ICT systems).

The Business Integration framework was combined with a strategy of fast adaptation of specific intervention concepts such as BPR. As new techniques become popular, Andersen Consulting/Accenture quickly integrated them into their consulting practice, offering them as a product and moving on to other products when those became popular in their turn (Fink and Knoblach 2003: 324–325).

Having implemented BPR in this way the consultancy was able to generate immense financial gains during the period in the first half of the 1990s when BPR was globally the most attractive business concept (Valentine and Knights 1998: 78–81 Fincham 2000: 179; Davenport et al. 2003: 156).

From 1992 onwards, the identification and capture of best practice knowledge was supported by an increasingly sophisticated knowledge management infrastructure. In an early phase of the knowledge management infrastructure, the employees of Andersen Consulting/Accenture began to put everything that they subjectively considered as being of value into the databases. This led, however, to information overflow and also to duplication and redundancies within the information stored. Therefore, the architecture as well as the design was globally standardized and the process for the contribution of documents formalized. After more than 10 years of elaboration, the infrastructure – called Knowledge Xchange – now allows all Andersen Consulting/Accenture consultants globally to use and share items as proposals, client deliverables, project plans, or links to experts and to external information. Employees can access the Web-based Knowledge Xchange infrastructure from all of Accenture’s more than 110 offices worldwide, or from remote locations such as client sites (Falk 2005: 77–81).

Andersen Consulting/Accenture powerful knowledge management system is an example of a general strategy for maximum standardization and reuse of given knowledge. Svenja Falk, an employee at the company, puts it the following way:

*Accenture’s strategy is to identify, capture, and deploy best practice project content in sales cycles and current engagements. The focus is on re-using as much knowledge as possible, based on the assumption that problems are more or less similar.* (Falk 2003: 64)

The strategy at Andersen Consulting/Accenture of re-using knowledge wherever possible was combined with their highly disciplined project methodology, ‘Method/1’.

This methodology stressed standardization and formalization of tasks as keys to delivering uniformly high quality services to clients, and incorporated strict guidelines for project management as well as a common language for questioning clients and defining requirements. Because of the consultancy’s regimented ap-
proach, its consultants were sometimes called ‘Andersen clones’ by competitors, which was ‘something the Andersen Consulting executives took great pride in’ (Nanda 1995: 7).

Wanda Orlikowski (1992) analyzes the development of a project methodology of a consulting company which a commentator – a former Andersen/Accenture consultant – claims is the Andersen Consulting/Accenture methodology Method/1 (Thompson 2004).52

Orlikowski observes that in the early period of the analyzed IT consultancy, knowledge on conducting IT related projects (systems development) was accumulated mainly through (a) the sharing of experiences, and (b) some informal checklists that were compiled and circulated.

As the company acquired more personnel and clients, the informal traditions by which the consultancy’s practice guidelines were learned and communicated were no longer adequate. Non-standardized instruments were too open-ended, assumed too much competence and were unable to deal with exceptional conditions. Projects became bigger and more complex. Mistakes and losses would be more severe and visible.

As a consequence a firm-wide task force was set up to codify the informal systems development heuristics, expanding them where appropriate, and formally instituting practice guidelines. This task force created the official and comprehensive systems development methodology. The methodology prescribed a sequence of systems development stages, articulated the tasks and deliverables of each stage, defined the skills needed to perform the tasks, established guidelines for estimating time and budget requirements and specified quality controls and process milestones.

In the second half of the 1980, the company invested large amounts of money to use information technology to standardize and speed up the work of consultants. This investment was to transform IT systems development – traditionally paper-based and labor-intensive – into a rationalized production process with specific IT tools that automated the actions and operations of IT systems development.

The task of constructing specific IT tools was delegated to a separate group of ‘technical consultants’ (experts in hardware and systems software), who constructed computer routines that encoded knowledge of systems development. In order to automate the company’s systems development practices, technical consultants had to articulate and rationalize the existing manual procedures that consultants utilized daily in their work. The result was that conducting systems development was controlled by an IT-based methodology characterized by extremely detailed rules and routines (Orlikowski 1992).

52 The claim is convincing since the descriptions of Orlikowski and Thompson coincide in many points. Regardless of whether this is the case, there is a great deal of data supporting the central claim that Andersen Consulting’s/Accenture’s project methodology is highly standardized.
According to Thompson (2004), the former Andersen/Accenture consultant, the Andersen/Accenture project methodology Method/1 occupied the entire discursive space. The consequence was that it simply would not have occurred to new staff that there might be any other way to operate on a client project. Thompson supports the conclusions of Orlikowski that the project methodology had a low interpretive flexibility and the new staff exhibited a trained incapacity to do consultancy work in any other way than the prescribed.

According to Orlikowski the potential benefit of such an automatization and standardization was:

- To decrease the length of systems development projects,
- To reduce the number of consultants required on each project,
- To diminish the company’s dependence on the technical knowledge of individual consultants (with the possibility of exchanging employees quite easily),
- To improve management leverage by increasing the number of consultants per senior manager.

Taken together, these factors opened the path towards increasing productivity and gaining an advantage against competitors (Orlikowski 1992).

The highly standardized project methodology was combined with an appropriate recruitment and training practice. Andersen/Accenture recruits who specialized in IT consultancy work were mostly bright, young university graduates. They were put through a rigorous three-week training program at Andersen’s/Accenture’s own campus to learn the project methodology Method/1 (Nanda 1995: 7).

Similar to McKinsey, the firm operated a rigorous up-or-out policy and a ‘one-firm’ philosophy. All consultants were to be recruited by the firm rather than by an office. Profit shares of the partners were derived from a firm pool, not an office pool (Nanda 1995: 7–9).

While some practices (such as recruiting young graduates, up-or-out policy, one firm philosophy) are similar to those of strategy and structure consultancies such as McKinsey, the grade of standardization and the leverage (ratio of consultant per partner) represent important differences. According to Kipping, these variances represent the main advantages of the IT consultancy generation over the strategy and structure consultancy generation. For IT consultancies, the partner-consultant ratio is around one to twenty, which is much higher than that of the strategy and structure consultancies, where the ratio is one to six, as is the case at McKinsey. According to Kipping, this circumstance is due to the fact that the vast majority of projects the IT consultancies carry out are highly standardized and require less first-hand experience (Kipping 2002: 43–44).

The focus on maximum standardization, automatization and reusing knowledge not only gave Andersen a competitive advantage with regard to consulting projects with a dominant IT focus, but it was even possible to offer projects with a predominantly strategy and strategy focus at a price below that of competitors such as McKinsey (Kipping 2002: 44; Nanda 1995: 3). The result, according to Kipping (2002: 36–37), was that in the 1990s Andersen/Accenture assumed the
position that McKinsey had held in the 1960s and 1970s, as the world’s leading consultancy, with revenues of 8.3 billion US$ in 1998 (11.6 billion US$ in 2002 (Falk 2005: 18)).

7.2.5 Conclusions

Current developments in work and organizations take place within the context of the Computerization wave (1970s-ongoing). This chapter described and analyzed phenomena from the early period of this wave. The main developments in the Computerization wave are still unfolding. The chances and risks of the ongoing technical, social and organizational developments are under discussion within various disciplines. Pessimistic and optimistic attempts to characterize the evolving new context have been made. It seems clear that work activities develop from corporations towards complex network organizations or even less bound forms of ‘patchwork entities’. It seems possible to conclude that the mass production paradigm has gradually lost its earlier almost complete dominance. It is less clear what the new dominant production paradigm is, or even whether there will be a dominant one.

Several societal problem-solving processes have emerged, one of which was described in detail: the one related to BPR. Problem-solving processes with a considerable impact on work activities in the early period of the Computerization wave, but not described in detail, were related to Mass Customization, Knowledge Management or Co-Creation. Unlike the early period of the Electrification (the period in which Scientific Management emerged) and Motorization waves (the period in which strategy and structure solutions emerged), a single dominant, clear-cut problem-solving process is not discernible. Instead a series of partially interrelated problem-solving processes emerged. 53

This study argues that all of these problem-solving processes can be interpreted as being related to the contradictory shift from mass production to post-mass production:

The ‘struggle’ between an urge to utilize the new possibilities related to the ICT revolution, on the one hand, and the dominance of the old paradigm of utilization – ‘smoothened’ strategy and structure-oriented mass production – on the other.

53 While this pattern of partly interrelated societal problem-solving processes was not observed in the early periods of the Electrification or Motorization wave, it was discerned in the most recent period before the Computerization wave – i.e. the later period of the Motorization wave – where several partly interrelated societal problem-solving processes (such as those related to the quality movement and systemic tradition) were observed.
Against the background of the desire to utilize new ICT possibilities, inner contradictions associated with work activities dominated by the old pattern of utilization become increasingly visible.  

The problem-solving processes named above can be interpreted as having attempted to define core problems (e.g., centralization vs. decentralization, standardization vs. flexibility) and to conceptualize core solutions against the background of the contradictory shift from mass production to post-mass production. Figure 7.4 depicts this pattern of problem-solving processes with a common context in a simplified form.

![Figure 7.4: Series of problem-solving processes in the early period of the Computerization wave](image)

The focus in this section was on analyzing the societal problem-solving process related to Business Process Reengineering. The development of the virtually shared object of the dynamic problem-solving formation could be described by the following problem-solving trajectory:

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54 Due to the fact that the Computerization wave is ongoing, in contrast to analyses and findings with regard to previous waves, the definition of the societal problem and the assessment of significance of the mentioned problem-solving processes have to be taken with certain reserve. Furthermore, specific local trends and developments have to be taken into account. While there is a tendency towards similarity of organizational arrangements across countries (Ackroyd et al. 2005: 11), also clear local/cultural differences in the way of addressing and utilizing the new conditions associated with the ICT revolution exist (Castells 2004). This issue will be readdressed in section 9.2.
The main actors in the problem-solving process were related to ICT but also to management. Several attempts (e.g. the MIT90 and the PRISM projects) were undertaken to understand the obstacles to the emergence of new forms of production and organization that fully exploit new technological possibilities.

Scholars such as Venkatraman (1991) were engaged in understanding and defining the pattern of societal problems. They suggested that the possibilities of ICT have to be implemented not simply in order to automate an existing process but instead to stimulate the development of entirely new forms and processes of work activity. IT managers such as Sieloff and McCaig and line managers such as Olson and Glover did exactly this at Hewlett-Packard as well as at Mutual Benefit Life. In their practice they developed solutions that made use of the ICT possibilities to establish novel models of work. Scholars on the boundary between ICT and management such as Hammer and Champy, and also Davenport and Short, generalized these solutions and derived the concept of Business Process Reengineering/Redesign. This was either achieved by generalizing the new practice model as a new prototype (Hammer and Champy), or by embedding the generalization into certain theoretical frame (Davenport and Short). IT Consultancies such as Andersen Consulting/Accenture developed a highly elaborated form of conducting interventions which made use of concepts such as BPR.

The creators of Business Process Reengineering attempted to define the core social and organizational problems of work activities in the early period of the Computerization wave very specifically and to then apply a routinized solution. However, there was no full ‘backwards process’. BPR did not represent the core solution that led to a dominant new form of production. Rather, it was a partial solution that preserved many aspects of the old mass production paradigm. It was taken up by many companies, but by the same token given up relatively quickly.

While not analyzed in detail in the study, further problem-solving processes in the Computerization wave such as the ones related to Mass Customization, Knowledge Management or Co-Creation appear to show a similar pattern. The pattern of problems related to the utilization of the new possibilities of the ICT was redefined and partial solutions developed, the partial solutions were popularized, but they did not signify a genuine breakthrough – at least not in the sense that Taylor’s or Sloan’s solutions did (figure 7.5).
Hammer and Davenport drew on the innovative solutions of practitioners (from companies such as HP and MBL), to conceptualize the core of these solutions. The resulting concept (BPR) became the central instrument when Hammer and Davenport became entrepreneurs and offered their advice to support the transformation of organizations. Their form of conducting interventions show parallels to those of Drucker and of the quality experts Deming and Juran.

Andersen/Accenture developed a very sophisticated way of standardizing and reusing knowledge as well as a high degree of automatization of intervention actions and operations. Their form of conducting interventions relied on highly elaborated instruments (e.g., highly sophisticated knowledge management instruments, IT supported ways of conducting intervention steps, modules of ready-made solutions, etc.), and a highly elaborated community system (a higher number of consultants and a more elaborated division of labor than McKinsey) that allowed a very fast application of solutions.

As far as the case of BPR is concerned, Andersen Consulting/Accenture was not involved in the creation process. The firm’s form of conducting interventions relied on others such as Hammer and Davenport, who derived popular conceptualizations of BPR that could be commodified and used in consultancy work.
This chapter’s research question focused on forms of conducting interventions in the early period of the Computerization wave, and sought to ascertain the main characteristics of these forms. If the forms of conducting interventions are viewed together, a pattern emerges that, on first glance appears similar to that of the Electrification and Motorization wave. Hammer and Davenport acted as bridges between specific companies such as HP or MBL, science and other companies interested in applying BPR in practice. In contrast, large IT consultancies such as Andersen/Accenture developed forms of conducting interventions that enabled them to disseminate solutions in large numbers to a high number of clients (see figure 7.6).

One could argue that BPR was an important organizational innovation that constitutes one side of a contradictory relationship similar to the relationship of Scientific Management vs. Human Relations (see figure 5.8 in Chapter 5 and figure 6.10 in Chapter 6). However, this would not be convincing. It is clear that BPR (or any other contemporary concept or method) did not have the same impact as Scientific Management or strategy and structure innovations in the previous wave. A series of significant problem-solving processes and management concepts have emerged and there is no end in sight. Furthermore, in the case of BPR a clear-cut content-related ‘opponent’ (e.g. ‘human’ concept opposed to BPR) is not evident. One could argue that ‘Knowledge Management’ is an opposing concept to BPR. Knowledge Management takes up criticisms of BPR. It is, however, a concept that

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**Figure 7.6: Preliminary overview of analyzed forms of conducting interventions in the Computerization wave**
also addresses issues completely outside the focus of BPR. \textsuperscript{55} ‘Human’ opposition to BPR came from BPR proponents such as Champy (1995) and Hammer (1996) themselves, who claimed that BPR should address the importance of the human factor to a higher degree (Adler 2003).

Overall this analysis of a problem-solving process in the early part of the Computerization wave suggests that there are developmental patterns similar to those of the Electrification wave and of the Motorization wave but that there are also entirely new and different patterns emerging. The contradictory nature of this picture will be analyzed more closely in the next chapter by re-examining the overall development of societal problem-solving processes and forms of conducting interventions in the Electrification wave, in the Motorization wave and in the early part of the Computerization wave.

\textsuperscript{55} In this sense the connection between BPR and Knowledge Management is an example of partially interrelated problem-solving processes in contrast to earlier problem-solving processes that opposed each other diametrically.
8 From the historical analysis of the dynamic of forms of conducting interventions to their zone of proximal development

8.1 Introduction and procedure

This study began by questioning what forms of conducting interventions might address effectively emerging post-industrial problems (located between different actors and activities).

In Chapter 3 it became clear that the elements necessary for describing and comprehending the historical development of forms of conducting interventions (e.g., intervention instruments, the logic of intervention business) seem to be scattered across different theoretical fields and need to be assembled into a unifying picture. The ‘overview model’ (table 3.7) placed individual findings provided from different research traditions alongside each other, outlining a selection of organizational problems, solutions and forms of intervention that should be integrated in the historical analyses of this study.

A dynamic formation of actors and activities that address a societal problem and develop it towards a general solution which is diffused in society was proposed as a framework in Chapter 4. The phases of such a societal problem-solving process were described as a life-cycle of ‘problem definition’, ‘innovative solution’, ‘conceptualized solution’, and ‘diffusion/dissemination’.

This framework was used in Chapters 5, 6 and 7 to analyze past societal problem-solving processes and selected ‘representative’ examples of forms of conducting interventions. It turned out that very different actors and activities (inventors, scholars, service providers such as bankers and accountants, state agencies) contributed to advancing the solution, conceptualization and dissemination processes of societal problems. Their contribution occurred in different phases of the problem-solving process and their focus was often very different.

Surprisingly, this study found that from each phase of the life-cycle, there were examples of activities that had later expanded their original focus and specialized in supporting the transformation of work activities. The inventor Taylor, the researcher Lewin, the management/IT scholar Hammer, the accountants that established Andersen Consulting – all developed a form of conducting interventions. Because of their different origin and developmental trajectory, however, their focus was very different.
For each of the forms of conducting interventions described and considered it was possible to trace back how their object\textsuperscript{56}, their main instruments, and as well as their subject and their community arrangement originated in the different phases of the associated problem-solving processes.

The radical changes associated with the industrial revolutions of the Electrification, Motorization and Computerization waves have led to changing societal problems in work activities. As these societal problems have changed, the actors and activities engaged in the societal problem-solving process have also changed, as have the object and main instruments of the forms of conducting interventions. This interplay has led, in each techno-economic wave, to the emergence of a new generation of forms of conducting interventions.

The forms identified in each of the techno-economic waves appear to be complementary rather than competitive, displaying a recurring pattern illustrated in the four-quadrant-diagrams at the end of the last three chapters. The comparatively stable pattern of four complementary forms of conducting interventions in the Electrification and Motorization waves can be explained by the observation that the developmental processes leading to each of these four complementary forms of conducting interventions remained basically the same.

While the pattern of emerging forms of conducting interventions remained stable in the Electrification and Motorization waves, the pattern does not seem to remain the same in the Computerization wave. The basis for this observation will be set out in the following by focusing first on the problem-solving processes and then by addressing identified forms of conducting interventions (see figure 8.1).

The governing idea in this chapter is to elaborate the understanding of the overall dynamic of development of forms of conducting interventions in a way that will enable the formulation of 'historical hypotheses' about a transitional area of forms of conducting interventions. This transitional area (or space) is,

\textsuperscript{56} The understanding of the activity-theoretical concept of object (Gegenstand in German) is crucial here. The object of forms of conducting interventions encompasses not only the potential outcome of the intervention process – e.g., a transformed work activity – but also the original state of the work activity, the state when an organizational problem is encountered. How an organizational problem is defined and addressed has a decisive influence on the outcome of an intervention process.
in activity-theoretical terms, designated as the zone of proximal development.\textsuperscript{57} Such a formulation of ‘historical hypotheses’ of a zone of proximal development of forms of intervention is based on the theoretical comprehension of 20\textsuperscript{th} century’s main forms of conducting interventions; it comprises hypothesis of contradictions these main forms might face in the changing conditions in the 21\textsuperscript{st} century and the discussion of possible future developments of forms of conducting interventions. The research question for this chapter is:

\textit{What is a historical hypothesis of a zone of proximal development of main forms of conducting interventions in the course of the shift from the industrial era to the post-industrial era?}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Figure_8_1}
\caption{Focus of analysis in this chapter}
\end{figure}

\textsuperscript{57} This zone describes a transitional area of change and development between present activity and visions of the future generated as solutions to disruptions and gaps, which are symptoms of deeper historical contradictions. Such a zone is usually connected to a specific context and community, where contradictions within work activities are encountered by actors within the community who attempt to find and use qualitative-ly new cultural artifacts to resolve the contradictions (Engeström 1987: 174–175, see section 2.1). The hypothetical zone of proximal development of forms of conducting interventions in this study will be formulated by referring to historical hypotheses of contradictions associated with existing main forms of conducting interventions, as well as by referring to culturally available artifacts that could be used to resolve those contradictions. Such a formulation of a zone of proximal development remains a theoretical hypothesis as long it is not connected to a concrete context where actors encounter these contradictions in their daily work practices.
The following sections extend the discussion from single problem-solving processes and forms of conducting interventions to a focus on the overall dynamic of past and contemporary forms of conducting interventions. First, the identified pattern of problem-solving processes (section 8.2) and forms of conducting interventions (section 8.3) will be readdressed and theoretically elaborated. Then, it will be clarified how the theoretical comprehension relates to previous scientific knowledge and how that comprehension will provide the basis for discussing future developments of forms of conducting interventions (section 8.4). The discussion of the changing conditions in the Computerization wave (section 8.5) will make possible hypotheses about the zone of proximal development of forms of conducting interventions (section 8.6). Finally, conclusions about how to continue the investigation in this study will be drawn (section 8.7).

8.2 The pattern of societal problem-solving processes in the industrial era and its relation to the inner dynamic of techno-economic waves

The Electrification, Motorization and Computerization waves are characterized by very different societal problems, production logics and types of work activities. In the Electrification wave, mass production logic was established on the shop floor-level in production activities. A typical form of organization of work activities was the factory. In the Motorization wave the mass-production logic was extended to embrace management, organization and marketing. A typical form of organization of work activities became the corporation.

In the current Computerization wave, the final outcomes of technological and socio-economic developments remain uncertain. Despite that uncertainty it is clear that there are new societal problems, and that a different production logic and a new type of work activities is emerging. Companies originating in ‘developed’ countries seek new forms of alliances in a globalized world, focusing increasingly on innovation and high technology. Work activities appear to become more network-like or even less-bounded formations. One could argue that mass production has extended to product and service development – or that a completely new kind of production paradigm (or even kinds) is emerging. The recent developments in the Computerization wave will be discussed later (in sections 8.5 and 8.6). In this and the next section some data from the beginning of the Computerization wave will be included.

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58 The term ‘industrial era’ is used to characterize the historical period that was and is dominated by industrial production and mass production. This includes the Electrification wave, the Motorization wave and the beginning of the Computerization wave. It is argued that in the current period of the Computerization wave a shift away from the dominance of mass production is taking place (see section 8.5 and 8.6).
In spite of these differences, for most of the 20th century it seemed that the inner dynamic of societal problem-solving processes and resulting forms of conducting interventions within a techno-economic wave showed – to a high degree – a recurrent pattern.

In previous chapters, this study noted that there was a recurrent tension between societal problem-solving processes in the early period and problem-solving processes in the later period of the techno-economic waves. Furthermore, there was a repeated contrast within societal problem-solving processes – that is, a contrast between early and later phases of problem-solving processes.

To determine the characteristics of this pattern more clearly, the definition or ‘state’59 of societal problems in different phases and periods are juxtaposed along with examples of the main organizational innovations (table 8.1).

Table 8.1: Identified problem definitions/states and examples of work activities

<table>
<thead>
<tr>
<th></th>
<th>Early phases in early period of wave</th>
<th>Later phases in early period of wave</th>
<th>Early phases in later period of wave</th>
<th>Later phases in later period of wave</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrification</td>
<td>Bringing order and system to manufacturing at a time when against the background of the new possibilities of the Electrification wave inner contradictions of the old craft production system became increasingly visible</td>
<td>Efficiency (of work operations)</td>
<td>Aggravation of problems such as workers non-collaboration; high costs because of turnover and absenteeism as dysfunctional side effects of introduction of Scientific Management based form of industrial production</td>
<td>‘Human Relation’ between ‘manager and the worker’</td>
</tr>
<tr>
<td>State of problem when it was addressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Example of social/organizational innovation</td>
<td>Taylor’s Scientific Management</td>
<td>‘Hawthorne effect’ leading to technique for influencing workers</td>
<td>Lewin’s Action Research and Group dynamics</td>
<td></td>
</tr>
</tbody>
</table>

59 Previous chapters have emphasized that a societal problem must be understood in its dynamic, that is, from its early phase of formulating the problem and then the later phases of creating a solution that is conceptualized and disseminated. For the sake of readability, only brief references to societal problems are made here, mirroring only to a certain degree the complex inner structure of the trajectory of such problems and their corresponding solutions.
This table makes clear the dialectical relationship between problem-solving processes in the early and later periods of the techno-economic waves. In the early period of the Electrification wave, the societal problem was related to bringing order and system to manufacturing at a time when, against the background of new possibilities related to the emerging technologies (Electric power, new kind of machines etc), the inner contradictions of the old craft production system became increasingly visible. Scientific Management became the key organizational innovation used to diffuse a new paradigm of work organization: the factory system.

<table>
<thead>
<tr>
<th>Motorization</th>
<th>Early phases in early period of wave</th>
<th>Later phases in early period of wave</th>
<th>Early phases in later period of wave</th>
<th>Later phases in later period of wave</th>
</tr>
</thead>
<tbody>
<tr>
<td>State of problem when it was addressed</td>
<td>Dealing with a chaotic accumulation of organizational units and products in a time when against the background of the new possibilities of the Motorization wave inner contradictions of the early form of mass production became increasingly visible</td>
<td>Strategy and structure</td>
<td>Aggravation of problems such as lack of quality, lack of cooperation, political games as dysfunctional side effects of introduction of 'strategy and structure oriented form of mass production'</td>
<td>Quality improvement; weak cooperation</td>
</tr>
<tr>
<td>Example of social/organizational innovation</td>
<td>Sloan’s flexible market oriented strategy and decentralized structure of General Motors</td>
<td>Ohno’s Toyota Production System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computerization</td>
<td>Finding a profitable way of production (in the widest sense) at a time when against the background of new possibilities related to ICT, inner contradictions in work activities dominated by the mature mass production paradigm become increasingly visible</td>
<td>Reengineering of business processes (later other problem definitions)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Example of social/organizational innovation</td>
<td>Different kinds of specific innovations (e.g., Sieloff’s use of ICT at HP to combine centralization and decentralization)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In the later period of the Electrification wave, the societal problem was associated with dysfunctional side-effects of the diffusion of Scientific Management (workers non-collaboration; high costs because of turnover and absenteeism). While problems concerning manager-worker relations already existed prior to Scientific Management, the diffusion of Scientific Management aggravated and spread those problems.

The same pattern observed in the Electrification wave was observed in the Motorization wave. In the early period of the Motorization wave, the limitations of the factory based work organization in an environment of turbulent global markets became increasingly visible. The new paradigmatic work organization became the multidivisional corporation. In the later period of the Motorization wave, the societal problem was associated with the dysfunctional side-effects of the diffusion of the ‘strategy and structure oriented form of mass production’ (quality problems; lack of cooperation/political games). The final outcome of social and organizational developments in the Computerization wave remains uncertain. It seems to be clear, however, that a paradigmatic shift towards a new form of work organization (network-like formations of work activities) is underway.

Societal problem-solving processes in the early period of the Electrification, Motorization and Computerization waves were associated with the emergence of a radically different context (a paradigmatic shift). Emerging societal problem-solving processes in the later period of the Electrification and Motorization waves were highly related to the dysfunctional side-effects of the dominant solutions to the societal problem in the early period. In this sense, the societal problem-solving processes in the later period of the techno-economic waves are offspring of problem-solving processes in the early period of the waves.

In addition to the dialectical relationship between problem-solving processes, there is a dialectical relationship within problem-solving processes. This further dialectical relationship was previously related mainly to the opposing focuses of forms of conducting interventions. In respect of the problem-solving process associated with Scientific Management (in the early period of the Electrification wave), Taylor was principally oriented towards the creation and conceptualization of solutions whereas Bedaux was principally oriented towards the dissemination of solutions. A closer look reveals that this observation is related to differences between the definition or state of the societal problem in the earlier and later phases of the problem-solving processes.

When the ‘early’ Taylor addressed the societal problem in the early period of the Electrification wave at the Midvale Steel Company, he attempted to bring order and system to manufacturing at a time when a series of technological innovations were developed and inner contradictions around the old craft production system had become increasingly visible. Later, after Taylor’s organizational innovation, the problem was associated with ‘efficiency’ (of work operations), a term based on the knowledge about the solution.

When the ‘early’ Lewin (1920: 17) addressed the societal problem of the later period of the Electrification wave, he related the problem as a consequence of the ‘ruthless exploitation’ of workers made possible by Scientific Management. Later,
after the Hawthorne experiments, the problem was described as ‘Human Relations’ between managers and the workers (a solution-based terminology).

Similar differences between the early and later definition of the problem within the societal problem-solving processes can be observed in the problem-solving processes of the Motorization and Computerization waves. The contrast in definition is associated with the fact that in the later phases of problem-solving processes, a solution has already been found and it is then used to characterize the problem. This phenomenon is related to the dialectical relationship between problem and solution. The relation between a problem and its solution changes in the course of the trajectory of the societal problem-solving process (as elaborated in Chapter 4).

Seidel describes this dynamic within the problem-solving process in the following manner: ‘Historically new’ problems become ‘historically old’ problems where the solution has ‘only’ to be adopted or appropriated (Seidel 1976: 67–73). As the historically new problem is addressed, solved and then redefined by referring to the solution, something of its richness and potential is eliminated or ‘lost’ in a sense. However, when the redefined problem is conceptualized and diffused it is clear that something was also ‘gained’. The generalized solution becomes applicable in different work activities – a market for addressing the redefined problem is created.

Freeman and Louçã (2001), as well as Perez (2002), have developed a theory of techno-economic waves and associated societal processes. This study suggests that these processes are fundamental for societal problem-solving processes and forms of conducting interventions, and contribute to a deeper grasp of the previously described dialectical relationships within and between societal problem-solving processes.

According to Freeman, Louçã and Perez, occasionally a cluster of revolutionary technical innovations emerge that bring new, generally available resources to the economy and society. The assimilation of a technological revolution by a society is a process that takes place on different levels and across different time periods and phases. At the beginning of a wave (such as the Electrification, Motorization and Computerization waves), the assimilation of new possibilities occurs mainly on the technological level, only later reaching ‘deeper’ organizational and institutional spheres of the society. Correspondingly, it is a recurrent pattern that industrial revolutions first entail technological problems and innovations and only subsequently social and organizational problems and innovations. For a certain period, existing institutional structures and forms of organization (the ‘old’ techno-economic paradigm) prevent the full utilization of new resources. Emerging new elements of a developing new techno-economic paradigm collide with elements of the still dominant old paradigm, question them, and occupy gradually more and more space. Various manifestations of contradiction between the old and the new emerge. Only after new forms of organization and management as well as new kinds of social institutions have been developed does an upswing of economic growth get momentum. Eventually the growth potential of the new resources is exhausted and a period of economic downswing begins (Freeman and Louçã 2001: 146–150; Perez 2002: 41–43).
Table 8.2: Technological 'big bangs' identified by Freeman and Louçã (2001: 146), and Perez (2002: 11), and organizational innovations analyzed in this study

<table>
<thead>
<tr>
<th>Techno-economic wave</th>
<th>Examples of highly visible, technically successful innovations (technological 'big bang')</th>
<th>‘Carrier’ branch and other leading branches of the economy</th>
<th>Example of social/organizational innovation</th>
<th>Work activity where organizational innovation took place</th>
<th>Paradigmatic work activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrification</td>
<td>Carnegie’s Bessemer steel rail plant (1875)</td>
<td>Electrical equipment</td>
<td>Taylor’s Scientific Management (1880s)</td>
<td>Midvale Steel Company</td>
<td>Big, nationally operating factory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heavy engineering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heavy chemicals</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Steel products</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Motorization</td>
<td>Ford’s Highland Park assembly line (1913)</td>
<td>Automobiles</td>
<td>Sloan develops innovation about flexible market oriented strategy and decentralized structure (1920s)</td>
<td>General Motors</td>
<td>Big internationally operating corporation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trucks</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Tractors, tanks</td>
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<tr>
<td></td>
<td></td>
<td>Diesel engines</td>
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<tr>
<td></td>
<td></td>
<td>Aircraft</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Refineries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computerization</td>
<td>Intel microprocessor (1971/1972)</td>
<td>Computers</td>
<td>Different kinds of specific organizational innovations; for example: Sieloff’s use of ICT at HP to combine centralization and decentralization in the late 1980s</td>
<td>Hewlett-Packard (and many others)</td>
<td>Complex, internationally operating network</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Software</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Telecommunication equipment</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Biotechnology</td>
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</tbody>
</table>

Perez (2002) calls examples of highly visible and successful technical innovations ‘big bangs’, and uses them to define the starting point of the techno-economic wave. Table 8.2 shows that the organizational innovations analyzed in this study (‘germ cells’ within the corresponding problem-solving processes) from the early periods of the Electrification, Motorization and Computerization waves occurred about 5–15 years after the technological big bangs. Furthermore, all observed organizational innovations took place in companies from the ‘carrier branches’ of the emerging techno-economic waves, which are the branches where innovations are supposed to occur. These findings correspond to the views of Freeman, Louçã and Perez about the relation between technical and organizational innovations described above.

Perez (2002: 23) uses the term ‘installation period’ for the early period of a techno-economic wave when the new technologies and a corresponding new
techno-economic paradigm begin to advance in some core industries. She uses the term ‘deployment period’ for the later period of the techno-economic wave when the new techno-economic paradigm is diffused more evenly across the society (2002: 22; 36–46). This deployment period correspond to a high extent with a period of high economical growth and is termed an ‘upswing period’ by Freeman and Louçã. According to Freeman and Louçã (2001) the upswing is followed by a period of economical destabilization termed ‘downswing period’. In this downswing period the once new and advancing techno-economic paradigm is now declining while the next techno-economic paradigm is occupying more and more space on the ground. This period of declining of the old coincides with the ‘installation period’ of the new paradigm and the techno-economic cycle begins anew (Perez 2002: 42–43). Figure 8.2 offers a graphical representation of main periods in the techno-economic paradigms of Perez (2002: 37), and extends it to cover the main periods analyzed by Freeman and Louçã (2001) – in this way including the ‘decline’ or downswing period.

Figure 8.2: The inner structure of the techno-economic waves after Perez (2002: 37); extended and modified
It is important to understand the different inner logic of the installation and deployment periods. Perez (2002: 36) characterizes the ‘installation period’ in the following way:

It is the time when the new technologies irrupt in a maturing economy and advance like a bulldozer disrupting the established fabric and articulating new industrial networks, setting up new infrastructures and spreading new and superior ways of doing things. (Perez 2002: 36)

Due to the commitment to the previous paradigm – on the part of institutions, companies, individuals and the economy – the initial decades of emergence and installation of each technological revolution are a turbulent battle of the new against the old, involving Schumpeterian creative destruction both in the economy and in the institutional framework. (Perez 2005/2007: 7)

The ‘deployment period’ (Perez 2002: 36) is characterized as follows:

It is the swing of the pendulum from the extreme individualism […] to giving greater attention to collective well being usually through regulatory intervention of the state and the active participation of other forms of civil society. What is held here is that this switch does not occur for ideological or voluntaristic reasons, but as a result of the way in which the installation of a paradigm takes place. The unsustainable structural tensions that build up in the economy and society […] must be overcome by a recomposition of the conditions of growth and development. (Perez 2002: 52)

The problem-solving processes from the early periods of the Electrification, Motorization and Computerization waves (related to Scientific Management, strategy and structure, BPR) had their origins in Perez’s installation periods (see table 8.2 and figure 8.3). The problem-solving processes from the later periods of the Electrification, Motorization and Computerization waves (related to Human Relations, quality improvement and weak cooperation) had their origins in Perez’s deployment periods (see table 8.1 and figure 8.3).

Perez’s characterization of the installation period explains the previous observation that societal problem-solving processes in the early period of the Electrification, Motorization, and Computerization waves were associated with the emergence of a radically different context (a paradigmatic shift). Societal problems in the early period of the techno-economic waves were associated with the phenomenon that, against the background of new technological possibilities, inner contradictions of the old techno-economic paradigm became increasingly visible – leading finally to the establishment of a new techno-economic paradigm. An important element of each new techno-economic paradigm was a new paradigm of work organization. The installation periods, as well as problem-solving processes that trace their roots to them, are characterized by a paradigm/context breaking nature.
Similarly, Perez’s characterization of the deployment period explains the observation that the emerging societal problem-solving processes in the later period of the techno-economic waves were, to a high degree, related to the dysfunctional side-effects of the diffusion of the dominant solutions to the societal problem in the early period.

The societal problem-solving processes in the later periods of the techno-economic waves were characterized by ‘opposing’ the societal problem-solving processes in the early period. They did not, however, establish a radically different paradigm of work organization, but instead remained within the context of the prior problem-solving process and the corresponding paradigm. The deployment period, and those problem-solving processes that have their roots in a deployment period, have a context or paradigm stabilizing or balancing effect.

To sum up, the societal problem (and the corresponding process) that have their roots in the installation period of a techno-economic wave will be termed context/paradigm breaking, and the societal problem (and corresponding process) that trace their roots to the deployment period will be termed context/paradigm balancing. The distinction between context/paradigm balancing and context/paradigm breaking that is made here with regard to problem-solving processes comes very close to Thomas Kuhn’s distinction between remaining within scientific paradigms and leaving them (1970: 187–200) as well as to Gregory Bateson’s distinction between learning within given contexts (Learning II) and learning that breaks a given context (Learning III; Bateson 1972: 301).

Perez’s theory of the techno-economic waves contributes also to a more profound understanding of the contrast within the problem-solving processes described above—differences between problem definitions (or ‘states’) at the early phases and at the later of problem-solving processes:

[… each technological revolution begins with a group of core industries […] a new infrastructure and a few main products and processes. From there it spreads to the most closely connected industries, forming a strongly interactive constellation with high synergy and intensive feedback effects. This helps the generic elements of the paradigm become clear and well tested, facilitating their adoptions by a wider circle of industries and activities. (Perez 2002: 63)

Perez’s description of ‘generic elements of the paradigm’ that become clear over the course of the techno-economic wave corresponds to the observed change of definitions of societal problems from ‘historically new’ and more open towards ‘historically old’ appropriation problems. Perez’s theory also explains why historically new problems and innovations were encountered at Midvale Steel Company, General Motors and Hewlett-Packard. These companies were all leading work activities of Perez’s ‘core industries’. It also elucidates the later spread to a wider circle of industries — as ‘historically old’ problems became defined in terms of ‘generic’ organizational innovations.

The adoption of the generic elements (that have their roots in the installation period) by a wider circle of industries occurred to a high extent in the deployment
period (termed ‘upswing periods’ by Freeman and Louçã). This corresponds with the observation that later phases of the problem-solving process associated with the dissemination of Scientific Management and of strategy and structure took place *some decades after* the organizational innovations. Figure 8.3 demonstrates this phenomenon by locating the main events associated with the problem-solving processes in the framework of the different periods of techno-economic waves.

Figure 8.3: Main events associated with analyzed problem-solving processes and periods of techno-economic waves in the industrial era

Hitherto this section has primarily considered the characteristics of the early and later phases of the context breaking problem-solving processes (that have their roots in the installation periods). Observations made in the previous chapters (condensed in table 8.1 and figure 8.3) support the conclusion that a similar pattern exists for problem-solving processes that have their roots in deployment periods. Figure 8.4 constitutes a rough outline of the connection between observed problem-solving processes in the industrial era\textsuperscript{60} and the inner structure of the techno-economic waves after Perez.

\textsuperscript{60} It is important to emphasize that this pattern is only observed for the Electrification and Motorization waves. In the shift towards a post-industrial era (i.e. in the course of the Computerization wave), the pattern begins to change, as will become clear in a later section of this chapter.
Figure 8.4: Outline of connections between observed problem-solving processes in the industrial era and periods of techno-economic waves

The pattern of earlier and later problem-solving phases, and earlier and later affected industries, can be further elaborated by considering the dominant model of adopters of innovations (Rogers 1995). This model distinguishes between different kinds of users of innovations, focusing on the degree to which some users are relatively earlier in adopting new ideas than other users. One receives a wave-like picture of different subsequent users: innovators, early users, early majority of users, late majority of users and users lagging behind (Rogers 1995: 252–262).61

Early users on the one hand, and the majority of later users on the other, would encounter the societal problem at a different period of time, and also in a different state. Early users would encounter such a problem when it is historically new and at a time when no innovative solution has yet been found. Later adopters would encounter a societal problem when innovative solutions have been identified and are in the process of becoming generic elements of the new production paradigm so far as solutions have been conceptualized and disseminated. Innovators and early users can be associated with the 'core industries' of a technological revolution in Perez’s terms; and the majority of users with the 'wider circle of industries'.

To sum up, the state of the societal problem as it is associated with early phases of the problem-solving processes is characterized as a historically new problem, affecting early users in core industries. The state of the societal problem as associated with later phases of the problem-solving process is characterized as a historically old problem, affecting the majority of users in a wider circle of industries.

A summary of the recurrent pattern of societal problems as well as their relation to the societal processes in the installation and deployment periods of techno-economic waves in the industrial era is shown in the following four-quadrant-diagram (figure 8.5).

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61 The model of Rogers was developed to describe innovation processes in the 20th century, which explains its linear and clear-cut pattern. In the later discussion of developments in the Computerization wave, it will be argued that this pattern changes.
8.3 Historical types of conducting interventions in the industrial era

In the previous section, the characteristics of problems in the different phases of problem-solving processes were examined and theoretically elaborated. That examination suggests that the main characteristics of the problem-solving processes in the industrial era this study considered, can be explained by relating them to fundamental societal processes in the installation, deployment and decline periods of techno-economic waves. The previously developed perspective on societal problem-solving processes will serve as the basis for a characterization of forms of conducting interventions that were identified and analyzed in the historical analysis\textsuperscript{62}.

In previous chapters, this study showed how forms of conducting interventions associated with the early phases of the context breaking PSP\textsuperscript{63} (Taylor, Drucker, Davenport), with later phases of the context breaking PSP (Bedaux, McKinsey, Andersen/Accenture), with the early phases of the context balancing PSP (Roethlisberger, the quality experts Deming and Juran; Lewin’s research center, the systemic consultancies), as well as with later phases of the context balancing PSP (TWI system, Baldrige system) demonstrated recurrent characteristics.

\textsuperscript{62} Table A.1 and Table A.2 in the Appendix provide an overview of the historically identified forms of conducting interventions, their key instruments and their community pattern.

\textsuperscript{63} To enhance readability in this section, in what follows ‘context breaking PSP’ and ‘context balancing PSP’ will be used as short forms for the terms ‘context breaking problem-solving process’ and ‘context balancing problem-solving process’. Also the plural ‘PSPs’ will be used.

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Figure 8.5: Pattern of societal problem-solving processes in the industrial era
To be able to describe those characteristics more clearly, the key instruments and community models used in the associated forms of conducting interventions identified in this thesis, are brought together in the following section.

The key instruments of forms of conducting interventions associated with the early phases of the context breaking PSP were representations of previously developed specific solutions to the historically new, context breaking problem. These instruments were mainly developed by abstracting the specific innovative solution from its context (at General Motors, Hewlett-Packard etc), by generalizing key characteristics of the innovative solutions (e.g., decentralized structure, reengineering principles of Hammer and Davenport), and by fixating the key characteristics in concepts. Taylor’s instruments, however, differed from the others. His main instrument was an overall system for conducting interventions (the scientific management methodology), which contained experiments as part of the system. In the case of Drucker and Davenport, experimenting did not comprise part of the logic of main instruments.

The key instruments of forms associated with later phases of the context breaking PSP (Bedaux’s efficiency consultancy, McKinsey’s Management consultancy and Andersen/Accenture’s IT consultancy) were the commodified (reduced, simplified and standardized) representations of solutions provided by main actors of the early phases, as well as instruments to transfer these products in a efficient form to clients (knowledge management systems, IT based standard tools for conducting intervention steps).

In the case of forms of conducting interventions associated with early phases of the context balancing PSP, we see almost the same pattern as that found in the early part of the context breaking PSP. Actors such as Roethlisberger abstracted from the specific context of innovative solutions of context balancing problems and generalized main elements of the solutions fixating them in representations. On the other hand, the key instruments of Lewin’s research center and of the systemic consulting companies were theoretical concepts (relating to group dynamics, theory of social systems), as well as intervention methodologies (action research, systemic intervention methodology).

The key instruments of forms associated with the later part of the context balancing PSP (the TWI system, the Baldrige system) were the condensed representations of solutions from the scholars (JRT training; quality solutions), and also a frame for identifying and freely proliferating best-practice solutions.

The key instruments of the different forms of conducting interventions can be distinguished theoretically by referring to the work of the philosopher Wartofsky (1979). Wartofsky’s model (1979: 201–210) addresses the question of different levels of instruments or artifacts with different potential for reproducing or breaking contexts. He distinguishes between 3 levels of instruments (see table 8.3). Primary instruments are used directly in production. Axes, clubs or needles are examples of instruments that could be used as instruments to produce goods. Secondary

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64 Meaning ‘considering apart’, ‘selecting’ in the sense of dialectical logic
instruments are representations to preserve or transmit modes of action by which the production is carried out. A ‘prototype’ of an axe or a ‘model’ to show how to produce axes used in hunting are examples of secondary instruments. Tertiary instruments are used to constitute possible ‘new world’ by ‘free’ construction or game activity. The development of a model of a new form of hunting with different new kinds of representations would constitute an example of the use of a tertiary instrument.

Table 8.3: Wartofsky’s levels of instruments

<table>
<thead>
<tr>
<th>Wartofsky’s level of instruments</th>
<th>Use of instruments</th>
<th>Examples from conducting interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tertiary instruments</td>
<td>Constitute possible ‘new world’ by ‘free’ construction or game activity</td>
<td>Intervention methodologies that create context breaking solutions</td>
</tr>
<tr>
<td>Secondary instruments</td>
<td>Representations to preserve or transmit modes of action by which the production is carried out</td>
<td>Intervention methods as well as theories that preserve or transmit given solutions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Representations of innovative solutions</td>
</tr>
<tr>
<td>Primary instruments</td>
<td>Directly in production</td>
<td>Tools that support the conduction of intervention steps, e.g., knowledge management tools</td>
</tr>
</tbody>
</table>

When Wartofsky’s model is applied to considering forms of conducting interventions, the representations of innovative solutions can be understood as secondary instruments. These representations were developed largely by abstraction from the context of the specific innovative solution and by generalizing key characteristics of the innovative solutions.

Instruments for transferring these solutions in a standardized/condensed form to clients (knowledge management tools, tools for selecting solutions) display, at least partially, a primary character. Intervention methodologies applied by Taylor, Lewin and the systemic consultants (Scientific Management, Action Research, the systemic intervention methodology) may potentially possess a tertiary character.

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65 Wartofsky’s model of levels of instruments can be linked to the work of Davydov (1977), who describes different ways of generalizing knowledge. He juxtaposes two forms of knowledge production. One he terms ‘abstract-empirical’ which can be related to Wartofsky’s secondary instruments. The other form he terms ‘theoretical-genetic’ which is relatable to Wartofsky’s tertiary artifacts (see Engeström 1987 and Pihlaja 2005).
Correspondingly, it can be concluded that the key instruments of the forms of conducting interventions associated with the early phases of the context breaking PSP (Drucker, Davenport), with the exception of Taylor’s, possess a secondary character. Key instruments of the forms in the later phases of the context breaking PSP (Bedaux, McKinsey Andersen/Accenture) display a secondary or even primary character. Key instruments of one group of the forms of conducting interventions associated with the early phases of the context balancing PSP (Roethlisberger, the quality experts Deming and Juran) possess a secondary character – similar to key instruments of the forms in early phases of the context breaking PSP.

Key instruments connected with the other group of forms of conducting interventions associated with the early phases of the context balancing PSP (Lewin’s research center, systemic consulting companies) also had the potential to function as tertiary instruments (Action Research; systemic intervention methodologies). However, the use of these instruments always occurred within certain boundaries contingent on the context retaining/balancing problem. This becomes very clear in Lewin’s case. Action Research might have addressed different kinds of problems, but because of its combined use with group dynamic concepts the problems addressed and solutions created always remained inside the boundaries of the Human Relations context.

In the case of systemic consulting companies, the potentially tertiary instrument (systemic intervention methodology) was, in practice, mainly applied to a certain group of problems – dysfunctional patterns of weak cooperation and political games inside corporations. Thus, the context breaking (‘tertiary’) potential of key instruments of Lewin and the systemic consulting companies was not realized in practical interventions.

Key instruments of forms associated with the later part of the context balancing PSP (the TWI system and the Baldrige system) exhibited a secondary or even a primary character.

Some aspects of the pattern of key types of instruments linked to forms of conducting interventions in specific phases or periods can be more easily understood once they are related to the types of problem states or definitions in those phases or periods. Addressing historically new problems that affect early users – as carried out by forms of conducting interventions associated with the early phases of context breaking and context balancing PSPs – requires higher level instruments to create and capture solutions. Addressing historically old problems that affect a majority of users – as carried out by forms in later phases of context breaking and context balancing PSPs – requires lower level instruments oriented on a high-scale production of solutions.

However, it is – at least at first sight – astonishing that context breaking problems are not addressed using context breaking (tertiary) instruments in Wartofsky’s sense. Tertiary context breaking instruments remain primarily with the innovators – which means outside any form of conducting interventions. Taylor is the exception in that he retains elements of experimentation in his Scientific Management methodology. On the other hand, context balancing problems in the case of Lewin and systemic consulting companies are addressed using instruments
(Action Research, the systemic intervention methodology) that have at least potentially a tertiary, context breaking character.

Figure 8.6 depicts different types of key instruments associated with the forms of conducting interventions analyzed in this study.

![Figure 8.6: Historical types of main instruments of forms of conducting interventions in the industrial era](image)

To extend the comprehension of the characteristics of identified forms of conducting interventions, their community models are juxtaposed and analyzed in the following (see Table A.2 in the Appendix for an overview).

Forms of conducting interventions associated with early phases of the context breaking PSP (Taylor, Drucker, Davenport) were overwhelmingly set up by scholars with close contact to practitioners (Taylor, Sloan, Olson/Sieloff/McCaig/Glover), and who were conducting experiments to derive innovative solutions to historically new, context breaking problems. After an innovation was made by the practitioners, the scholar(s) involved took it up and derived a ‘conceptual prototype’s of the solutions. The difference between Taylor’s instruments (scientific management methodology including experiments) and those of the other scholars can be explained by the fact that unlike Drucker and Davenport, Taylor was also an innovation creator.

Those scholars were in a very good position to make use of conceptualized solutions by publishing books and becoming entrepreneurs who conducted interventions that applied the solutions. The object of the form of conducting interventions of these ‘scholar-entrepreneurs’ was to support the transformation of selected organizations that had encountered the historically new, context break-
ing problems. By so doing, they applied, tested and elaborated their prototype solutions. Furthermore, these scholars functioned as a bridge between ‘early user’-companies (Midvale, General Motors, Hewlett-Packard) where solutions were created, the academic world where solutions were conceptualized, and the business/consultancy world where solutions were applied and disseminated.

Forms associated with the later phases of the context breaking PSP (Bedaux’s efficiency consultancy, McKinsey’s Management consultancy and Andersen/Accenture’s IT consultancy) rose to prominence in a period when the problems were no longer new or open. Solutions had been created by innovators and representations had been derived by the scholars. A market for dealing with historically old (appropriation) problems was emerging (often fuelled by scholarly publications), and Bedaux, McKinsey and Andersen/Accenture were quick to exploit the opportunity to sell products to a high number of users in this emerging market. They took up the conceptualized solutions, made a product from them, and used increasingly elaborated instruments for disseminating those solutions. The object of the form of conducting interventions of Bedaux, McKinsey, Andersen Consulting/Accenture was to support the transformation of a large number of organizations that encountered the historically old, context breaking problems.

Bedaux, McKinsey, Andersen Consulting/Accenture had a sophisticated community, a hierarchical division of labor (junior consultant, senior consultants, managers), and formal and informal rules (‘don’t reinvent the wheel’) to support the rapid dissemination of solutions. As is the case of the key instruments a development from Bedaux to McKinsey and Andersen/Accenture can be observed. Later forms develop increasingly sophisticated ways of enabling the high-scale dissemination of solutions. The division of labor becomes more pronounced and involves a higher number of junior consultant ‘clones’ (the term applied by some observers to Accenture/Andersen junior consultants). The rules became increasingly oriented around ensuring the highest possible degree of standardization and reuse of knowledge.

Forms associated with later phases of the context breaking PSP made use of resources (developing new concepts, recruiting graduates) from the academic world, but were clearly oriented towards the world of their clients – the world of business. All of the identified forms had strong relations to the top management of companies of all kinds of industries as well as public organizations.

The first group of forms associated with early phases of the context balancing PSP (Roethlisberger and the quality experts Deming and Juran) display the same community arrangement as forms in the early phases of the context breaking PSP. They mainly represent scholars who became entrepreneurs and applied, tested and elaborated their prototype solutions. The object of the form of conducting interventions of this group of ‘scholar-entrepreneurs’ was to support the transformation of selected organizations that encountered the historically new, context balancing problems. Their additional function was to build bridges between early user companies, the academic world and government agencies/ state systems focused on application and dissemination of solutions.
The second group of forms of conducting interventions relied on a theory and intervention methodology (Lewin’s research center and the systemic consulting companies). The object of Lewin’s research center was to combine the support of transforming selected organizations that encountered the historically new, context balancing problem with the creation of new knowledge. In contrast to Lewin’s research center’s object, the object of the systemic consultancies was characterized by a lesser focus on creating new knowledge and a greater focus on applying concepts and methodologies. The two activities were either based on a relatively autonomous research center within a university context or on a consulting firm with close and cooperative relations with academic institutions. Unlike large consultancies, it takes years rather than months to acquire enough experience to use the key instruments of these forms adequately, which makes it very difficult to educate and rely on a high number of junior interventionists. As a consequence, these forms are characterized by community models that consist of more experienced researchers/interventionists and less experienced PhD. students/interventionists, who learn to use the theory and methodology under the guidance of the more experienced researchers/interventionists. While the community model of the research center and the theory-oriented consulting companies share many characteristics, financial resources are different and entail correspondingly different rules about conducting projects in a faster or slower manner. The wider community of these forms is characterized by social scientists and practitioners, who are interested in the utilization of the specific theory and methodology and experts from companies, who believe in the problem-solving potential of the theory/methodology.

Forms associated with later phases of the context balancing PSP were the state-organized Training Within Industry (TWI) and Baldrige award systems. These forms emerged at a time period when solutions to context breaking problems had already been identified and conceptualized, but had not yet been applied country-wide by US companies. Particular societal emergency situations (WWII, decrease of competitiveness of US corporations) motivated the US government to find a way to supply the majority of US companies with solutions that would enable them to deal with the emergency situation. The object of the form of conducting interventions of TWI and the Baldrige systems was to support the transformation of specific parts of a large number of organizations that had encountered the historically old, context balancing problems. The systems included experts from state, science and industry that worked together on a non-profit basis and with a high degree of cooperation.

For a theoretical reflection of the community models one can turn to scholars such as Fichtner (1984) and Raeithel (1983), who explored and detailed the connection between community models and instruments.

Fichtner distinguishes three levels of collaboration in communities:

‘Coordination’ is understood as a form of working together limited to dividing an object into individual tasks by a leading figure such as a teacher. Individuals then work separately on conducting tasks.
'Cooperation' is understood as a form of working together that emerges when individuals become more oriented towards an 'over-individual' object. Subject-subject relations in conducting tasks leading towards the common object are reflected and objectified. The individuals become conscious that they have to balance own actions and action results of others. Joint meetings become means of influencing each others actions.

'Communication' is understood as a form of working together that emerges when the common object is comprehended and treated as a joint object of the entire community (e.g., of teacher and pupils). The individual regards him or herself not only as a single unit but as part of a collective subject with the potential to use the totality of the dynamic knowledge of the whole community. It becomes possible to use the totality of the dynamic knowledge to address the shared object.

Fichtner emphasizes that instruments should not be seen as isolated from communities and from the form of collaboration within communities. He argues that there is certain complementarity between instruments and the collaboration form as it is depicted in table 8.4 (Fichtner 1984: 215-225; see also Raeithel 1983). Fichtner’s argument means that a lower level form of collaboration (e.g., a strict division of labor) might reduce the potential of a higher level instrument to create ‘new worlds’ – solutions to context breaking problems – because the integrated use of knowledge that is often necessary becomes very difficult.

### Table 8.4: Levels of instruments and collaboration

<table>
<thead>
<tr>
<th>Wartofsky's levels of instruments</th>
<th>Fichtner's types of collaboration and agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tertiary instruments</td>
<td>Communication</td>
</tr>
<tr>
<td>Secondary instruments</td>
<td>Cooperation</td>
</tr>
<tr>
<td>Primary instruments</td>
<td>Coordination</td>
</tr>
</tbody>
</table>

A complementarity between instruments and community/collaboration models was observed in the case of the Bedaux consultancy, the McKinsey consultancy and Andersen/Accenture consultancy. Their community form is characterized by a high number of consultants, pronounced hierarchies, strict rules for the fast conduct of projects and the business focus of imposing solutions on clients. This relatively low degree of collaboration corresponds with the use of secondary and primary instruments.

Similarly, the smaller number of interventionists and the higher degree of (inside and outside) collaboration associated with the research centers and systemic consulting companies corresponds with their higher level instruments.

Forms identified in the early phases of the context breaking PSP (Taylor, Drucker, Davenport), as well as some forms from the early phases of the context balancing PSP (Roethlisberger and the quality experts Deming and Juran), usually
comprised individuals moving from context to context. In this respect, they relate to different collaboration patterns.

State-organized forms, however, show a very high level of collaboration even while their key instruments can be characterized as primary or secondary. This is a further surprising observation that requires additional discussion.

The different types of community arrangements are depicted in figure 8.7.

Figure 8.7: Historical types of main community arrangements associated with forms of conducting interventions in the industrial era

The high level instruments (of Lewin’s research center and the systemic consulting companies) and the high level collaboration (of the state organized forms) in forms of conducting interventions associated with the context balancing PSP can not be fully explained as yet. To explain the observation above it is necessary to address Perez’s (2002) analysis of the installation and deployment periods of the techno-economic waves more thoroughly.

According to Perez, in the installation period there is a strong mechanism of ‘technology push’ backed by short-term oriented capital:

This financial frenzy is a powerful force in propagating the technological revolution […] and enhancing – even exaggerating – the superiority of the new products, industries and generic technologies. The ostentation of success pushes the logic of the new paradigm to the fore and makes it the contemporary ideal of vitality and dynamism. (Perez 2002: 43)
At the beginning of that period the revolution is a small fact and a big promise; at the end, the new paradigm is a significant force, having overcome the resistance of the old paradigm and being ready to serve as propeller of widespread growth. (Perez 2002: 36)

Using Perez’s description of the installation period, it is possible to understand more profoundly the main characteristics of the two groups of conducting interventions associated with the context breaking PSP. As described in the last section, context breaking problem-solving processes have their roots in the installation period. Taylor’s, Sloan’s and Sieloff’s innovations all took place in the installation periods, about 1–2 decades after the respective technological big bangs (see figure 8.3).

The dominance of the logic of ‘technology-push’ and that dynamism of short-term oriented capital in the installation periods explains why there is a trajectory from the innovators (Taylor, Sloan, the practitioners at HP and MBL) to (innovator-)scholar-entrepreneurs (Taylor, Drucker, Davenport) to business-oriented solution disseminators (Bedaux, McKinsey, Andersen/Accenture).

Innovators contribute means (organizational innovations) to ‘overcome the resistance of the old paradigm’. Scholar-entrepreneurs contribute to the breakthrough of the new paradigm (from ‘a small fact’ to ‘a significant force’) by publishing papers and popular books. The quantitative expansion to a wider circle of industries now becomes possible. This is, however, realized predominantly by business-oriented solution disseminators such as Bedaux and McKinsey.

The key instruments of each of the actors described above reflect the ‘push logic’. The highest level instruments remain with the innovators. Scholar-entrepreneurs (with the exception of Taylor) do not focus on building theories but on the faster development of representations of the solution (secondary instruments). These representations are taken up by the business-oriented solution disseminator and then transferred to the greater majority of users through the use of further routinized secondary and primary instruments.

Community models utilized by (innovator-)scholar-entrepreneurs and by business-oriented solution disseminators complement their instruments.

The logic of the deployment period differs considerably from that of the installation period. To emphasize this difference there follows a previously cited section of Perez’s work:

It is the swing of the pendulum […] to giving greater attention to collective well being usually through regulatory intervention of the state and the active participation of other forms of civil society. […] The unsustainable structural tensions that build up in the economy and society […] must be overcome by a recomposition of the conditions of growth and development. (Perez 2002: 52)

According to Perez, the logic in the deployment period is characterized by ‘regulatory intervention of the state and the active participation of other forms of civil society’. ‘Context balancing innovations’ emerged as solutions to ‘structural ten-
sions’ (the roots of context balancing problems). Forms of conducting interventions with their roots in the deployment period either developed or took up these context balancing organizational innovations. Furthermore, the logic of these forms is not dominated by the business/push-type logic, but by state involvement and the ‘active participation of other forms of civil society’ ‘giving greater attention to collective well-being’.

The social science-oriented research and consulting centers (Lewin’s form and the systemic interventionists’ forms) retained a more integrated form of problem-solving that included the creation, conceptualization and application of a solution. High level instruments (theories and methodologies) and the collaboration pattern/community arrangement (cooperative academic or academic-industry setting) corresponds to this academia/theory oriented logic. This type of conducting interventions could be termed ‘social science oriented problem-solving center’.

Based on the contribution of (innovators-)scholars-entrepreneurs such as Roethlisberger and the quality experts, forms in the later phases of the context balancing PSP (the TWI and Baldrige system) did not integrate actions for creating solutions. They focused on the dissemination of solutions, making use of corresponding dissemination instruments. They integrated, however – moreover, to the highest degree of all of the forms analysed in this study – different communities from state, academia and industry that contributed collaboratively to the identification and proliferation of best-practice solutions. These forms did not follow the push/business logic either but were real ‘state interventions’ to supply US companies with the means to achieve ‘growth and development’. This type of conducting interventions could be called ‘state-academia-industry solution proliferating system’.

The earlier ‘surprising’ can now be explained: The reason why the types associated with the context balancing problem-solving processes were characterized by ‘high level’ instruments or ‘high level’ collaboration patterns/community arrangements was that they were backed by state and academia and they followed a logic of more integrative development.

This study suggests in figure 8.8, that in the industrial period (Electrification wave and Motorization wave, and beginning of the Computerization wave) a clear-cut societal division of labor existed between the different types of conducting interventions. A first historical type of conducting interventions is associated with the early phases of the context breaking PSP (‘(innovator-)scholar-entrepreneurs’). A second historical type of conducting interventions is associated with the later phases of the context breaking PSP (‘business-oriented solution disseminators’). Both types have their roots in the installation period. A third historical type of conducting interventions is associated with the early phases of the context balancing PSP (‘social science oriented problem-solving center’) and a fourth historical type of conducting interventions is associated with the later phases of the context balancing PSP (‘state-academia-industry solution proliferating system’). These latter two types have their roots in the deployment period.
The observations and tentative theoretical elaborations above may be understood as representing the beginning of a theoretical outline of the interdependence between societal processes in the installation, deployment and decline periods of techno-economic waves, societal problem-solving processes and formations, and forms of conducting interventions.

This study suggests that the emergence of specialized forms of conducting interventions had its roots in societal processes in the installation and deployment periods. This study also suggests that forms of conducting interventions are linked to the creation of social/organizational innovations in core industries to the need to adopt social/organizational innovations in a wider circle of industries during techno-economic waves. The nature of forms of conducting interventions might be summarized in the following proposition:

*Forms of conducting interventions contribute to the social assimilation of new possibilities opened up by technological revolutions in the techno-economic waves. Their original function is to mediate the organizational transformation of work activities in periods of radically changing contexts.*

Furthermore, with regard to the Electrification wave, the Motorization wave and the beginning of the Computerization wave – the industrial era – a more specific proposition can be made:

*In the industrial era, main social/organizational problems, as well as main forms of conducting interventions, showed a relatively clear-cut pattern of different historical types (including complementary main instruments and community arrangements). This clear-cut pattern of different historical types was explained by two different proc-*
esses of development of these types (integrating methods of problem-solving vs. preserving representations of solutions) that were associated with earlier and later phases of two different types of problem-solving processes (context breaking vs. context balancing). The two different types of problem-solving processes, again, were linked to innovation and adoption processes associated with the installation and deployment period of techno-economic waves.

This relatively clear-cut pattern could be described as a kind of societal division of labor between different historical types of conducting interventions when addressing societal problems and contributing to the social assimilation of new possibilities in the techno-economic waves.

8.4 The ‘industrial’\textsuperscript{66} ideal types as a heuristic guide for further investigation

The previous historical analysis addressed mainly 19\textsuperscript{th} and 20\textsuperscript{th} century developments of forms of conducting interventions (the ‘industrial era’). What was learned from this analysis of the past? How can historical types of conducting interventions in the industrial era contribute to the discussion of the future of forms of conducting interventions?

Before considering what was learned it would be timely to review how scientific knowledge is applied to understanding the phenomenon of conducting interventions. There is a body of literature, which sets out the current scientific knowledge about different generations of ‘rational’/‘technical’ or ‘normative’/‘human’ intervention concepts and methodologies for dealing with general problems in work activities (for example described in the models of Barley and Kunda (1992) and Adler (2001)). There exist overviews of different generations of consultancy businesses that have specialized in addressing specific problems (described in Kipping’s model of 2002). Etzkowitz’ (1998, 2003) triple helix describes the (changing) role of different spheres (science, industry, state) in addressing general problems in society.

The triple helix is of immense value as a heuristic. The idealized types of conducting interventions that were introduced in the previous section fulfil the same function for the phenomenon of intervention. The ideal types can be understood as representing historically established logics of forms of conducting interventions. Some of the ideal types could be interpreted as being predominantly associated with one of the sphere of science, industry and state. The ‘pure’ innovators such as Sloan, Ohno or Sieloff as well as the ‘business oriented solution disseminators’ (consultancies such as Bedaux, McKinsey, Accenture) operate(d) primarily within the sphere of industry. The ‘social science oriented problem-solving centers’ (e.g.,

\textsuperscript{66} In the following the terms ‘industrial form of conducting interventions’, ‘industrial type of conducting interventions’ and ‘industrial contradiction’ are used to describe forms, types and contradictions with origin in the industrial era.
Lewin’s research center) and the ‘state-academia-industry solution proliferating systems’ (TWI and the Baldrige quality award system) were largely backed by resources from the spheres of science or the state, respectively, although they had also strong ties to the other spheres. Others such as the (innovator-)scholar-entrepreneurs (Taylor, Hammer, Davenport) were more ‘moving’ across different spheres.

Historical forms of conducting interventions were oriented to different types of problems that were described by dialectical relationships (context breaking vs. context balancing; historically new (non-standardized) vs. historically old (defined by its solution/standardized)).

The contradiction between the orientation on context breaking and context balancing problems corresponds to Barley’s, Kunda’s (1992) and Adler’s (2003) characterizations of dilemmas of managerial/organizational problems and discourse. (rational/technical vs. normative/human, or control vs. commitment). Context breaking problems were described earlier as being associated with the emergence of a radically different context – a paradigmatic shift – at the beginning of techno-economic waves. Historically have these paradigmatic shifts been dealt with by developing, conceptualizing and disseminating rational/technical concepts of management and organization (efficiency focused factories, strategy and structure oriented corporations, ‘reengineered’ networks). Context balancing problem were previously described as related to the dysfunctional side-effects of the diffusion of the dominant context breaking solutions. These side-effects had to be addressed to support more harmonic organizational and socio-economical developments. Historically, as Barley and Kunda argue, these context balancing problem were often connected to the deterioration of work conditions for humans (i.e., employees); methods from Human Relations and organizational culture traditions (such as Personnel Counseling) were used to address them.67

The context breaking/rational vs. context balancing/human contradiction is helpful when discussing differences in the intervention instruments (methodologies, methods, management and organization models). The historical analysis suggests, however, that intervention instruments should not be understood as isolated artifacts. Particular types of instruments and complementary types of community arrangements (or ‘business models’) displayed a mutual congruence. Borrowing a metaphor from chaos theory (e.g., Gleick 1987) one could say that certain patterns of stability and order existed historically. The comparatively standardized rational/technical models of management and organization were sold by the business oriented solution disseminators (i.e. the big consultancies). Necessary innovation was achieved largely by practitioners outside of those consultancy businesses. Consultancy businesses had little incentives and resources to experiment with

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67 The dilemma between rational/technical and human/normative might be, however, too narrow to capture adequately the characteristics of more recent problems. The differences between the understandings developed in this study and the models of Barley and Kunda (1992), Adler (2003) and Kipping (2002) will be discussed more thoroughly in Chapter 12.
innovation-creating methods or methodologies. They were oriented to high-scale dissemination of solutions to a large number of work activities (‘majority of users’ that were in need of ‘modern’ management/organization models). Research centers, in contrast, which were backed by a university or by other institutions, had the opportunity (or even the obligation) to experiment with different theoretical concepts and intervention methods/methodologies as well as to address historically new (non-standardized) problems.

By also reflecting the contradiction between the orientation to historically new (non-standardized) problems vs. the orientation to historically old (standardized) ones – the historical ideal types capture not only differences between intervention methodologies but differences between entire logics of (organizational) forms of conducting interventions.

As was the case with the triple helix heuristic, the historical types can stimulate thinking – thinking about possible hybrid forms of conducting interventions. In his model Kipping convincingly describes three generations of consultancies (associated with Scientific Management, strategy and structure and IT/networks). But this study argues that big consultancy businesses (on top of the differences in each generation) are only one of four ideal types that might be relevant for discussing the future development of forms of conducting interventions. By relying on a theoretical understanding that encompasses a model of several very different ideal types, a discussion of new (hybrid) forms of conducting interventions can draw on a broader basis.

This study has intended to integrate and go beyond existing scientific knowledge in order to provide a more specific heuristic guide than the triple helix. The purpose of the ideal types, derived from the analysis of 20th century developments, is to facilitate discussions about 21st century forms of conducting interventions through a discussion of possible hybrid forms. However, why would hybrid forms of conducting interventions emerge if the historical forms exhibited a relatively stable pattern in the 20th century? This would be likely only in the case of a general qualitative change of the contextual conditions of forms of conducting interventions.

8.5 The changing conditions in the Computerization wave and the emergence of qualitatively new problems

While work activities, problem-solving processes and forms of conducting interventions in the industrial era (the Electrification wave and the Motorization wave) could be examined by looking back on completed developments, the development in the Computerization wave is currently unfolding.

At the beginning of the 21st century the mass production logic was still present. Moreover, it was argued that mass production had developed its most advanced form, mass production logic being extended to embrace product and service development as well as cultural activities. At the same time inner contradictions within work activities dominated by the mass production logic became increasingly visible. Recent problem-solving processes seem rather to lead to new forms of ICT
based production that are qualitatively different from mass production. However, the pattern of such (a) new ICT-supported production form(s) is still not clearly discernible.\footnote{There are interesting parallels between developments in the Electrification wave and in the Computerization wave. Current development might in the future be regarded as only the establishment of an early form of a new ICT-supported production and not as a late form of mass production in the same manner as the development in the Electrification wave from a today’s perspective is regarded in this study as an early form of mass production and not as a late, electrification and mechanization technology supported form of craft production.}

The present period is still a time of high turbulence and uncertainty. The outcome of the current processes depends on different developments (further change in information and communication technology as well as social, political and managerial change) that are interdependent (Castells 1989; Perez 2005/2007). No new socio-institutional framework exists that would create the conditions for a more stable socio-economic development. Proponents of long wave theory argue that such a new frame is possible (Perez 2003: XVIII). Other scholars are more pessimistic.

While there is no consensus about the final outcome of the current development, many scholars would agree about the emergence of new types of actors and activities and a development towards more complexity in structures and of relations. Different terms such as ‘disorganized capitalism’ (Lash and Urry 1987), ‘risk society’ (Beck 1994) or ‘post-traditional society’ (Giddens 1994) have been used to describe these development towards a qualitatively new form of capitalistic society. A prognosis of the final outcome of the ongoing technological and socio-economic developments with regard to dominant future models of management and organization seems very difficult.\footnote{It is unclear what the typical or predominant new form of work organization will be, or whether indeed there will be a typical new form. Scholars such as Hopper and Hopper (2007) argue that a return to the approaches to organization of an earlier age is required.} It appears, however, more possible to describe some characteristics of the current development of work activities.

As described in the previous chapter, a greater part of the production process is characterized by the knowledge-intensive design process and a smaller part by the material manufacturing process. Often larger parts of manufacturing processes are undertaken in other countries (often ‘third world’ ones) than the original country of the ‘mother company’. Work activities became increasingly less bounded and simultaneously new kinds of alliances between work activities emerge. New forms of work activities appear to show the characteristics of networks (Castells 2004), or even ‘patchwork entities’ (Lee and Roth 2003). Consequently, problems are increasingly located between work activities. Interventions that attempt to deal with such problems need a focus beyond single systems, a focus that includes multiple and qualitatively different actors and activities.
Today’s work activities and today’s work activities’ problems have developed towards more complexity. More specifically, the study argues that structures (e.g., divisions of corporations), actors (CEOs, middle managers, workers etc.) and relations between actors (e.g., conflicts between management and workers’ representatives from the period of mass productions still exist. However, new kinds of actors (e.g., new client groups, new kind of experts, new partners from different industries), relations (e.g., designer-manufacturer-user relations) and structures (e.g., collaborative arrangements between universities, businesses and the state) have also emerged or have become more important.

Thus, some patterns of work activities have remained qualitatively the same, while others have changed and both old and new patterns are intertwined in a complex way. The study argues that the current developments entail the emergence of a new type of problems associated with the contradictory combination of radically new and historically old patterns of actors, relations and structures. These new kind of problems were earlier termed ‘post-industrial problems’.

This study suggests that the old contradictions (context breaking vs. context balancing, historically new vs. historically old) continue to constitute the pattern of problems of work organization. There is, however, a qualitatively new characteristic in this pattern emerging. This study argues that a zone is opening where the clear-cut separation between context breaking vs. context balancing problems, as well as between historically new vs. historically old problems is becoming blurred. Correspondingly, the distinction between early users and the majority of users will become blurred to a greater extent. That suggests that a greater number of users than in the Electrification wave and in the Motorization wave will encounter problems with at least some partially new characteristics. Furthermore, having to deal with qualitatively new problems will no longer be an exceptional experience; rather, it will be a continuous phenomenon. The hypothesis concerning the change in the pattern of types of problems in the post-industrial era is depicted in figure 8.9. Following the previous characterization of the new hypothetical zone of post-industrial problems, this figure locates the new zone between the ‘old’ zones of the industrial types of problems as they were depicted in figure 8.5.
In activity-theoretical terms the proposed hypothesis suggests the following:

As today’s work activities and the problems encountered in today’s work activities evolve towards more complexity the object of conducting interventions will expand.

### 8.6 Hypothesis concerning a zone of proximal development of forms of conducting interventions

As described previously, in the Electrification wave and in the Motorization wave types of conducting interventions corresponded with types of problems and showed a relatively clear cut ‘societal division of labor’ between the historical types of ‘(innovator)-scholar-entrepreneur’, ‘business-oriented solution disseminators’, ‘social science oriented problem-solving center’ and ‘state-academia-industry solution proliferating system’.

However, in the previous section the hypothesis that work activities will become more complex was developed. That emergent complexity suggests the emergence of a zone containing a qualitatively new type of problem. What then are the consequences for the future development of conducting interventions?

Before answering this question it is instructive to remember the historical types of work activities that innovators or interventionists previously described had to deal with.

Taylor’s innovation was used to transform a set of tradition based occupational groups into a unitary production organization. Sloan’s innovation was used to transform unitary production organizations into multi-unit, multi-business organizations. These multi-unit organizations have now evolved into global networks...
encompassing various entities and distinct forms of expertise. No prototypes for these networks exist that could be used to guarantee a longer-term effectiveness of their work organization. The ‘industrial pattern’ of a rare transformation of the concept of management and organization that is based on an organizational innovation within a ‘forerunner’ company does not function any more for complex networks. This suggests the following central hypotheses of this study:

(1) As problems show – at least partially and in certain cases – qualitatively new patterns, solutions that rely on existing knowledge are less easily or frequently found. Innovation – i.e. creation and conceptualization of solutions – becomes to a higher extent part of intervention. Intervention as an activity becomes in this sense more enriched. That does not mean that the dissemination of solutions (addressing ‘historically old’ problems) becomes less important, on the contrary. Parallel to the tendency towards more complexity, a tendency towards similar organizational arrangements across countries exists (Ackroyd et al. 2005: 11), and that retains a need for reusing and adapting solutions:

The ICT paradigm fosters two apparently contradictory trends: standardization and adaptability. Both are global, both affect the local markets. They are in fact complementary and can even be combined. (Perez 2005/2007: 29)

This study suggests that the *industrial contradiction of either focusing on historically new problems and creation of solutions or focusing on historically old problems and dissemination of solutions has to be overcome: Dissemination of solutions has to become more creative and the creation of solutions more disseminative.*

(2) Work activities show more than just qualitatively new patterns with regard to certain aspects of work and organization (e.g., human or cultural processes). In the Computerization wave so far no model of work organization exists that could serve as a prototype such as did the factory system or the multidivisional corporation in the Electrification wave and in the Motorization wave. The old prototypes, however, do not function any more in the time of increasingly network-like or less bounded formations of work activities. Consequently, (innovation oriented) interventions have increasingly to address the entire model and logic of organizations (i.e. address context breaking problems). Again, this does not mean that only ‘rational’ aspects have to be addressed within interventions. The example of BPR (the confession that humans were forgotten which entailed the emergence of new problems) showed that it is increasingly costly to push through unbalanced interventions and neglect social and cultural processes. This thesis suggests that the *industrial contradiction between focusing either on context breaking problems and changing the work organization fundamentally or focusing on context balancing problems and transforming partial aspects of a work activity, has to be overcome.*
Having to address complex network organizations (partially context breaking and balancing, partially new and old problems affecting a higher number of users) would increasingly cause contradictions to the established forms of conducting interventions. These ‘industrial’ forms were oriented only towards a part (either historically new or old, context breaking or balancing) of post-industrial problems. A possible consequence might be that established forms of conducting interventions – e.g., IT consultancy and Management consultancy with an orientation to the historically old (comparatively standardized) problems, majority of users and dissemination – would have to negotiate certain kinds of disturbances when they encountered the qualitatively new type of problems.

Imagine a company engaging an IT consultancy to create an ICT system that would support dynamic cooperation arrangements with relatively different partners and clients as well as corresponding internal changes with regard to actors, relations and structure. For the consultancy it would probably be possible to make use of certain standard modules in the course of producing such an IT system. But existing standard modules would probably not cover all core characteristics of the client company (and even less core characteristics of the company in the near future).

Strong critics of IT and Management consultancy for delivering inappropriate standard solutions to non-standard problems and covering up these difficulties by using impression management (see section 1.2) can be interpreted as some of the consequences of the disturbances caused from encountering the qualitatively new type of problems.

The hypothesis that innovation becomes a much more important dimension of intervention does not mean, however, that industrial types of conducting interventions such as IT and Management consultancy will vanish. As described in the previous subsection, several characteristics of the industrial pattern of societal problem-solving remain. Historically old problems will persist and will still be addressed by correspondingly oriented forms of conducting interventions – such as IT and Management consultancy.

*This study argues that the increasing complexity of work activities will entail the opening of a new zone (a transitional area) of post-industrial forms of conducting interventions that are better adjusted to the emerging qualitatively new form of problems than industrial types of conducting interventions are.*

Figure 8.10 highlights this idea. The new pattern is not that different from the industrial pattern (figure 8.8). Industrial types of forms of conducting interventions still exist. What is new, however, is the zone of post-industrial forms that is situated between the ideal types of conducting interventions of the industrial era.
At this point in this study we do not have a concrete understanding of the specific characteristics of such ‘post-industrial’ forms. So far, they are understood as forms of conducting interventions that resolve the contradiction between innovation and dissemination as well as the contradiction between fundamental change of the model of work organization and transforming partial aspects. In the remaining part of this study this ‘gap’ will be filled by identifying concrete examples of instruments as well as examples of actors and community arrangements of ‘post-industrial’ forms.

As described in section 8.4, the ideal types of conducting interventions can be used to stimulate thinking about new forms of conducting interventions. For each of the industrial ideal types, one could discuss which characteristics (with regard to instruments and subject/community arrangement) would appear as strengths and which as challenges when dealing with more complex work activities and corresponding post-industrial problems. The intent of the following discussion is not to deliver a comprehensive analysis, but to highlight some key aspects and thereby to prepare the basis for further investigation.

(1) Business-oriented solution disseminators
The comparative strength of consultancies such as McKinsey or Accenture in addressing post-industrial problems is the sophisticated community, division of labor and rules (ensuring the highest possible degree of standardization and reuse of knowledge) to support the large-scale dissemination of solutions. These characteristics were a huge advantage when addressing large client companies with subsidiaries all over the world that demand the simultaneous consideration of similar problems in their subsidiaries. Large Management and IT consultancies have also
found a way of dealing with the increasing need for rapid changes in work activities. They have adjusted to this need by adapting, using and abandoning a cascade of management/organization concepts (such as BPR, knowledge management, mass customization etc.). Close cooperation with scholars or whole scientific institutions is often established to increase the speed and quality of the refinement and adoption of new models. This way of adopting a stream of widely implemented standardized concepts (some observers would say fads) can be interpreted as one way of bringing innovation closer to intervention. An alternative would be to specialize in a certain type of work activity (e.g., insurance companies, aerospace companies); a strategy which is often adopted by smaller consultancies. Specialization allows them to reduce the amount and scope of the relevant new concepts they must handle to a manageable size.

The ways of bringing innovation closer to intervention described above would be a kind of quantitative enrichment of intervention. The qualitative level of intervention instruments and cooperation remains the same (secondary in the sense of Wartofsky and Fichtner). In the case of a weakly bounded network organization the complexity of the problem might be so high that innovation would have to be realized in the very intervention projects. Such a qualitative integration of innovation would imply the use of higher-level instruments (innovation creating intervention methodologies) and higher-level community arrangements (distributed and collaborative agency).

(2) Social science oriented problem-solving centers
The comparative strength of intervention oriented research centers to address post-industrial problems is that they possess high-level intervention instruments, which potentially enable them to create innovative solutions not prior to interventions but within intervention projects. Various scientific traditions (OD tradition, systemic tradition and others, see section 3.2) have reflected the current development of work activities by creating new intervention methods and methodologies. One notable example is the 'Full Engagement' approach developed by Heckscher et al. (2003) that focuses on dealing with work activities in a manner that reflects the emergence of new kind of relations between new kind of actors (see subsection 3.3.3). Another notable example is the creation of the Finish Developmental Work Research (DWR) methodology aimed at creating qualitatively new models of work activity (see Engeström 2005).

The challenge for research centers in addressing post-industrial problems is that they do not have the dissemination orientation nor the community arrangement that would enable them to undertake interventions with a large number of client companies or client companies with subsidiaries all over the world that might demand the simultaneous consideration of similar problems in all of their subsidiaries.

(3) State-academia-industry solution proliferating system
The comparative strength of the state-organized systems such as Training Within Industry (TWI) and the Baldrige award system is the high level community ar-
arrangement (distributed and collaborative agency) potentially enabling them to involve a high number of work activities (i.e. whole societies) in a joint endeavor of state, academia and industry for facilitating organizational change. The state organized form makes possible not only the widespread dissemination of solutions, but also opens up the possibility of establishing multi-professional and cross-disciplinary collaboration. The corresponding weakness is, however, equally apparent. The state system was predominantly a system for the distribution of solutions and did not include instruments (i.e. intervention methods and methodologies) for creating solutions.70

(4) (Innovator)-scholar-entrepreneur
It is also interesting to discuss whether any trends exist to replace interventions conducted by external actors and to invest in innovation-creating structures inside (or among) companies. ‘Pure’ innovators such as Sloan, Ohno fulfilled important roles within their respective company. The challenge would be to find a systematic way of producing innovation, which is not based on long-lasting experimentation or on individual genius. Systemic ways for facilitating innovation, however, call for scientific instrumentation and, in turn, often for some kind of collaboration with external actors (e.g., scholars).

One interesting idea of ‘self-organized’ experimentation within organizational communities (albeit from the public sector) is proposed by Patricia Shields (2003). She discusses the idea of a ‘community of inquiry’ that makes use of scientific methods and relies on the idea of participatory democracy to address problematic situations:

Common to all communities of inquiry is a focus on problematic situation. The problematic situation is a catalyst that helps or causes the community to form and it provides a reason to undertake inquiry. Most problematic situations require further investigation and action (i.e., inquiry). Second, members of the community of inquiry bring a scientific attitude to the problematic situation. The scientific or experimental attitude is a willingness to tackle the problem using working hypotheses that guide the collection and interpretation of data and facts. Both

70 Could the state possibly be involved in facilitating innovation oriented interventions? While historically some form of state organized interventions such as TWI or the Baldrige system existed, these systems were not interpreted as interventions that were in any way comparable to the consultancies or the research centers. In the time of the ‘internet mania’ in the 1990s (called the ‘frenzy phase’ by Perez 2003) a direct engagement of the state to facilitate problem-solving in work activities would have been rejected as absurd by many societal actors. The 2000s witnessed, however, the implosion of NASDAQ and investment banking bubbles as well as the call of the Deutsche Bank CEO Josef Ackermann (known as a vehement supporter of deregulation) for state support to deal with the crisis of investment banks. Today the idea of the state supporting problem-solving seems far less absurd. While there is no general discussion about this, a concrete example of state supported, innovation generating intervention exists in New Zealand (see Hill et al 2007; chapter 10).
theory and methods are viewed as tools to address the problematic situation. In addition, the community is linked through participatory democracy. The parameters of the problematic situation and approaches to resolution are shaped by the interaction of the community and the facts. (Shields 2003: 511)

What certainly is observable (at the latest since the Enron scandal) is an increasing wariness in organizations (i.e. potential clients) towards outside interventionists. Some authors suggest approaches of ‘client professionalization’ that would support managers to develop a more critical and effective way of dealing with consultants (Mohe 2003). While this study argued that all of the ‘industrial’ forms of conducting interventions would have to face challenges to achieve a more effective way of dealing with complex network organizations and post-industrial problems, it is also the case that many of these forms offer knowledge that would be useful for addressing post-industrial problems. High-level instruments (in Wartofsky’s sense) such as innovation oriented intervention methodologies are used within the social science-oriented problem-solving centers. High-level community arrangements/collaboration patterns (in Fichtner’s sense) that organized multi-professional and multi-disciplinary collaboration existed in the state-academia-industry solution proliferating systems.

Post-industrial forms of conducting interventions were characterized as resolving more effectively the contradiction between innovation and dissemination as well as the contradiction between fundamental change of the work organization and transforming partial aspects of a work activity. It seems clear that post-industrial forms would not be associated with one of the ideal types, but would rather be a kind of hybrid of different earlier forms. As described in section 8.4, the ideal types of conducting interventions can be used to guide investigations about such hybrids. All of the ideal types described previously could be starting points for such a further investigation. Correspondingly, it is clear that from this point in this study, several paths are possible. The decision concerning which path will be followed will be made in the next section.

8.7 Conclusion: continuing the investigation by focusing on an example of innovation oriented forms of conducting interventions

The aim in this chapter was to set out a comprehension of the overall dynamic of past and contemporary forms of conducting interventions in a way that would enable the formulation of a zone of proximal development of forms of conducting interventions.

The corresponding research question for this chapter was:

What is a historical hypothesis of a zone of proximal development of main forms of conducting interventions in the course of the shift from the industrial era to the post-industrial era?
On the basis of the historical analysis of problem-solving processes conducted in the previous chapters the following comprehension of forms of conducting interventions in the industrial era emerged.

The core function of forms of conducting interventions is to mediate the organizational transformation of work activities in periods of radically changing contexts. Forms of conducting interventions can be understood as contributing to the social assimilation of new possibilities made available by technological revolutions in the techno-economic waves.

Just as societal problems repeatedly exhibited radical change, so do forms of conducting interventions. Changing societal problems in work activities have led repeatedly to the emergence of new generations of forms of conducting interventions. In the techno-economic waves of the industrial era (the Electrification wave, the Motorization wave, and the early part of the Computerization wave), each generation of social and organizational problems, as well as each generation of forms of conducting interventions, showed a relatively clear-cut pattern or division of labor of different historical types (including corresponding objects, main instruments and community arrangements).

A first historical type of conducting interventions was associated with the early phases of the context breaking problem-solving process – the ‘(innovator-) scholar-entrepreneurs’-type. A second historical type of conducting interventions was associated with the later phases of the context breaking problem-solving process – the ‘business-oriented solution disseminators’-type. Both have their roots in the installation period. A third historical type of conducting interventions was associated with the early phases of the context balancing problem-solving process – the ‘social science oriented problem-solving center’-type. A fourth historical type of conducting interventions was associated with later phases of the context balancing problem-solving process – the ‘state-academia-industry solution proliferating system’-type. Both of the latter two have their roots in the deployment period.

Problem definition and creation of innovation within the first two types (the scholar-entrepreneurs and the business-oriented solution disseminators) was supported by representations of context breaking problem definitions and corresponding innovative solutions (paradigm changing models of organization and management). The analysis of the developmental logic of these two types demonstrated that innovation was not part of intervention. Innovation actions and methods remained with the creators of the innovative solutions (practitioners from industry). The only type that integrated methods/methodologies for creating innovative solutions was the social science oriented problem-solving center. In this respect the focus of this type was more extended than the focus of the other types. Historically the research centers did not, however, focus on fundamental change of the entire organizational model but largely addressed certain aspects such as social, cultural and quality processes. Neither did the research centers have a dissemination orientation, nor were they able to address a large number of client work activities (in contrast to the business-oriented solution disseminators and state-academia-industry solution proliferating system). In
this respect the focus of the social science oriented problem-solving center type was more limited than the focus of the other types.

The outcome of current developments in the Computerization wave remains uncertain. However, it seems clear that a qualitative change of the contextual conditions of forms of conducting interventions (in general) and the object of conducting interventions (in particular) is taking place.

Work activities are becoming increasingly less bounded and are developing towards more complexity – the object of conducting interventions is expanding in activity-theoretical terms. This development towards more complexity of work activities entails the emergence of a new type of problem: post-industrial problems. Post-industrial problem were described as encompassing characteristics of context breaking and balancing and of historically new and old (repeating) problems. It becomes increasingly difficult to reduce intervention to adapting existing organization models (solutions to old problems) or to reduce intervention to addressing partial problems (context balancing problems). The corresponding central hypotheses of this study are:

The industrial contradiction between either focusing on historically new problems and the creation of solutions or focusing on historically old problems and the dissemination of solutions has to be overcome: the dissemination of solutions has to become more creative and the creation of solutions more disseminative.

The second industrial contradiction between either focusing on context breaking problems and fundamental change of work organization or focusing on context balancing problems and transforming partial aspects of a work activity has also to be overcome.

These two contradictions are used to characterize the zone of proximal development of conducting interventions as well as to distinguish between industrial and post-industrial forms.

Post-industrial forms of conducting interventions were defined as emerging new forms of conducting interventions that resolve the contradiction between innovation and dissemination as well as the contradiction between fundamental change of the model of a work activity and transforming partial aspects.

This study argues that the industrial forms of conducting interventions would have to negotiate certain kinds of disturbances when they encounter the qualitatively new type of problems. This explains the increasing criticism of IT and Management consultancies’ orientation to comparatively standardized (historically old) problems and solutions. However, many forms of conducting interventions offer knowledge that would be useful for resolving the industrial contradictions as well as for addressing post-industrial problems. Such knowledge includes innovation creating methods, a system of reusing solutions, a community arrangement that enable collaboration of multiple and diverse actors and activities. The industrial types of conducting interventions, derived from the analysis of 20th century devel-
opments, were interpreted as ideal types that could fulfill a similar function as did the triple helix model of Etzkowitz and facilitate discussion about hybrid forms of conducting interventions emerging under the new conditions of the 21st century.

Usually, intervention scholars focus only on one or two of the ideal types (predominantly consultancies, sometimes also research centers) when they discuss possible future forms of conducting interventions. We can now draw on a broader basis for such discussions. The ‘state-academia-industry’ type, for example, makes use of a community/collaboration pattern that might inspire completely new forms of conducting interventions (network-like, co-financed, multi-professional, highly collaborative).

At this point in this study we do not have a concrete comprehension of the specific characteristics of post-industrial forms. The next part of this study will identify some concrete examples of instruments, and some examples of actors and community arrangements of ‘post-industrial’ forms.

This study argues that post-industrial forms are not likely to be confined to just one of the ideal types, but are more likely to be a hybrid of different previous forms. Any of the ideal types could be a possible starting point to guide investigations about such hybrids.

At this point of the study the decision is made to focus on the ideal type which has historically integrated innovation to the highest extent: research centers (called in this study ‘social science oriented problem-solving center’). More specifically, this study has selected a form of conducting interventions for further investigation that has a particular focus on creating innovative models of entire work activities: the form associated with the methodology of Developmental Work Research (DWR), which was developed and is used at the University of Helsinki71. A further reason for this selection is that experiments with the use of DWR outside universities exist.

The remaining chapters will focus on enriching the historically based comprehension of the zone of proximal development.

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71 It would be interesting to include other innovation oriented forms of conducting interventions from the systemic or OD tradition in this investigation. However, this has to remain a task for the future.
9 The DWR-oriented research center in Helsinki as an example of an innovation oriented form of conducting interventions

9.1 Introduction and procedure

The analysis of developments in the current Computerization wave revealed that work activities develop towards increasingly complex network organizations. The emergence of these complex organizations indicated the emergence of a qualitatively new type of problems: ‘post-industrial’ problems. Such ‘post-industrial’ problems were described as encompassing the characteristics of historically new and old, context breaking and balancing problems. This study suggested that the ‘industrial’ forms of conducting interventions (e.g., McKinsey and Accenture) focused on a part of post-industrial problems only (e.g., standardizable historically old, context breaking problems). This meant that industrial forms would have to negotiate certain kinds of disturbances when they encounter complex network organizations (i.e., the qualitatively new type of problems).

The historical hypothesis was that two ‘industrial’ contradictions had to be overcome. These were

1. Either focusing on historically new problems and the creation of solutions or focusing on historically old problems and the dissemination of solutions;
2. Either focusing on context breaking problems and fundamental change of the model of work organization or focusing on context balancing problems and transforming partial aspects.

These two contradictions are used in this study to describe the zone of proximal development of forms of conducting interventions as well as to distinguish between industrial and post-industrial forms. The characterization of industrial forms of conducting interventions was condensed by referring to ideal types, which are connected to the ‘extremes’ (or ‘poles’) of the industrial contradictions: those of (innovator-)scholar-entrepreneurs (e.g., Drucker, Hammer or Davenport), business-oriented solution disseminators (e.g., McKinsey or Accenture), social science oriented problem-solving centers (e.g., Lewin’s research center) and the state-academia-industry solution proliferating systems (e.g., the Baldrige quality award system). Post-industrial forms of conducting interventions were defined as emerging new forms of conducting interventions that resolve the contradictions between innovation and dissemination as well as the contradiction between transforming the entire model of a work and transforming partial aspects.

However, this outline of post-industrial forms did not provide a concrete understanding of their specific characteristics. The remaining part of this study will identify concrete examples of the instruments, and examples of actors and community arrangements of those ‘post-industrial’ forms. This study suggested that
post-industrial forms were unlikely to take one of the earlier historical forms, but would rather be a hybrid of different historical forms. Each of the ideal types would be a possible starting point to guide the investigation of possible hybrids. The study intends to continue with a focus on the forms that integrated innovation to the highest extent: research centers (termed in this study ‘social science oriented problem-solving centers’).

In this chapter a form of conducting interventions is selected for further investigation, which has a focus on creating innovative models of entire work activities. The form is associated with the methodology of Developmental Work Research (DWR), used at the University of Helsinki. The societal problem-solving process associated with the development of DWR will be examined (see figure 9.1). Conclusions will be drawn about how the problem-solving process and the associated form of conducting interventions contribute to the resolution of the industrial contradictions and thus assist this study to specify the key characteristics of post-industrial forms of conducting interventions.

Figure 9.1: Focus of analysis in this chapter

The corresponding research question in this chapter is:

*How does the experience of an innovation oriented form of conducting interventions enrich the historically based comprehension of a zone of proximal development of forms of conducting interventions?*

In the following section a ‘life-cycle’ analysis of the problem-solving process related to ‘DWR’ (section 9.2) will be conducted. The main sources will be primary and secondary texts associated with DWR.
9.2 Life-cycle analysis of the societal problem-solving process related to Developmental Work Research

9.2.1 The pattern of societal problems

In the past decades the world of work has become truly globalized. A clear tendency towards similar organizational arrangements exists across countries (Ackroyd et al. 2005: 11). On the other hand, there are also clear local differences in the way actors, activities and institutions have been shaped and are shaping the new conditions associated with the ICT revolution. Manuel Castells (2004) addressed cross-cultural differences about the way of dealing with ICT technology in a recent book. Castells and Himanen (2004: 49) discuss together two very different social and institutional models of utilizing the ICT revolution: the U.S. model (which they call the ‘Silicon Valley model’) and the Finish model.

The view on the Finish context as a theoretically interesting alternative to the US/Silicon Valley context might additionally motivate a closer analysis of problem-solving processes and forms of conducting interventions in Finland.

Different developmental lines influenced the societal problem-solving process associated with the methodology of Developmental Work Research (DWR). The developers of DWR – Yrjö Engeström and his colleagues from the University of Helsinki – were since the 1980s engaged in analysis and critical discussion of the inner contradiction of work dominated by the late mass production form (see Toikka 1984). Furthermore, they argued in favor of overcoming the divide between traditional (disciplinary and analytic) science on the one hand and the need for supporting work activities to deal with problems in their everyday practice on the other hand (Engeström 1987: 24-27). The theoretical fundament of Engeström and his colleagues was Cultural Historical Activity Theory (CHAT, see Chapter 2). Their innovative solution can be seen as developing and applying intervention concepts on the basis of CHAT. The result was the intervention approach Developmental Work Research (DWR), increasingly used by work and organizational scientists and practitioners in Finland, other North European countries and Great Britain.

9.2.2 Innovative solution related to Developmental Work Research


Before describing early empirical applications of DWR interventions, some of the main principles of CHAT will be recalled (see Chapter 2). The following three features or principles provide a means for distinguishing the theoretical basis of DWR:
(1) A systemic unit of analysis (see subsection 2.1.1 and figure 2.1),
(2) Using a historical-genetic method as an instrument of analysis, as well as understanding inner contradictions as the driving force of development (see subsection 2.1.2), and
(3) Expansive learning as a guide to research and development (see subsection 2.1.3 and figure 2.4).

The three characteristics form a common whole, as will become apparent in their application in the early DWR cases analyzed.

Engeström often uses the historical-genetic method with another conceptual model that together provide a useful frame for conceptualizing local (historical) analysis (figure 9.2). This model depicts the current field of historical transformation in expert work. The model is constructed around two dimensions: the degree of flexibility and the degree of collectivity, in work. Flexibility here refers in particular to the ability to alter and make innovations in products and methods of work. The gray area in figure 9.2 refers, at a general level, to a zone of intense disturbance, innovation and search in work organizations – a possible ‘zone of proximal development’ (Engeström 1994: 239, see subsection 2.1.2).

![Figure 9.2: Historical field of transformation of expert work with possible zone of proximal development](image)

The next part of this section describes how the CHAT instruments summarised above, were used in an early case of DWR intervention.
Early DWR interventions

The following ‘Working Health Center Project’ is a case conducted by Engeström and colleagues in Finland at the beginning of the 1990s (Engeström 1994).

After having successfully finished an earlier and smaller health-care project in Finland, Yrjö Engeström was asked to start the ‘Working Health Center Project’ with 21 health centers, including municipalities from Lapland to the southernmost tip of Finland. The project was launched in the fall of 1990, and formally completed in August 1993. It was financed by the Finnish governmental agencies responsible for health and social welfare and by the Finnish association of municipalities. These bodies provided a solid funding base for an independent research group led by Engeström over a three-year period. The project was jointly directed by Engeström and an experienced health-care practitioner. It was agreed that the participating health centers would devote a considerable amount of their own resources to working in the project. Local project groups were formed in these health centers. These local project groups and other health care practitioners became partners in the research work. Staff were trained and supervised by the professional researchers and undertook data collection and analysis. Openness and the participation of all employees were described as key operating principles of the project. Meetings involving all employees took place at least once a month, and almost all employees participated in specific processes on the project (Engeström 1994: 235–236; 244–245; 259).

The particular case described in detail by Engeström (1994) concerns the health center in Oulu – the largest city of northern Finland with a population of around 100,000. The focus of the intervention was the downtown district of Oulu, a district with 14,700 inhabitants. The local project group consisted of seven representatives of the nursing staff and physicians from the district.

As the first step in the Autumn of 1990, the project group organized the collection of basic ethnographic data about the current practices – especially what employees and clients of the health center viewed as problems in the district. The ethnography produced rather vague problems. The most outspoken complaints focused on the shortcomings of management and administration. One example was that the managers ‘are not interested’ in employees work. Another was that the administration ‘first decides, then asks’.

The next step was that the project group began collecting more focused data on the history of their activity system. The project group analyzed, among others, archived documents and conducted oral history interviews with older and retired employees. The outcome was a voluminous report containing detailed accounts of the evolution of the work of various professional groups of health-care practitioners in Oulu. The phases of the overall development of the primary health-care service as a joint system were described in more general terms (Engeström 1994: 247–248).
The historical analysis led to an initial hypothetical identification by the project group, of the following three contradictions as being present in the current activity system:

(1) ‘Fragmented services do not reach the population in a comprehensive fashion and the population does not reach the services. The borders of the district are ambiguous. A sectorized way of working hampers the continuity of care.’ An illustration of this contradiction was the fact that a family with children might have to use at least six different health center facilities, located in different parts of the district.

(2) ‘Rules, directives and bureaucracy make the work difficult. Different rules for different professional groups cause friction. Trade unions guard rigid narrow job descriptions. Administration and management style above the district is sectorized although frontline work was reorganized on the basis of geographic areas.’

(3) ‘Tools are insufficient for the maintenance, improvement and monitoring of the health of the population of the district. There is no quality assurance. Outcomes of work are only measured quantitatively.’

The activity system model was used as a heuristic tool in the collection and analysis of data. Engeström emphasized its particular usefulness in making sense of seemingly individual and accidental disturbances, deviations and innovations occurring in the daily practice of workplaces.

As described above, systemic tensions are viewed as historically evolving contradictions between components of the activity system ‘pulling’ in opposite directions. Engeström’s interpretation of the description of the contradictions of the project group took the following form: previously described components of the activity system (sectorized division of labor, inadequate rules and insufficient tools) had a contradictory relation to the emerging object of the activity – the population of the district had patients with new kinds of health problems. His interpretation is set out in figure 9.3 (Engeström 1994: 250–252).
In the Fall of 1991 – the beginning of the second year – the local project group set up five planning groups, consisting of a large number of employees representing the different professional groups. These planning groups were given the task of designing different aspects of a new model of work for the health center district based on the historical analysis of contradictions discussed above, as well as on analyses of employee interviews, videotapes of patient visits and feedback solicited from patients.

On the basis of the proposals of the planning groups, the project group compiled the new model of work. The new model divided the staff into two teams. Both teams were responsible for the population of their assigned geographical areas. The different professional groups were expected to be flexible with regard to their tasks, and to take comprehensive responsibility for the care of each patient (see figure 9.4).
The new model offered a concrete and specific solution to the contradiction between the object and the – fragmented and sectorized – division of labor in the activity system. It resolved the contradiction by establishing multi-professional teams with flexible job descriptions and comprehensive responsibility for assigned areas and populations. The new model was rather more vague in respect of the new rules and administration, as well as the new tools. Engeström claims that it is typical for one contradiction to gain strategic urgency over the others and to become the springboard for a more or less stepwise or delayed transformation of the entire activity system. In the Oulu Health Center case, the new team-based division of labor became such a springboard (Engeström 1994: 255–258).

The implementation of the new model began on 1 November 1992. Both new teams were given their own space in the health station, and the existing centralized reception was eliminated. The new model evoked broad interest among the population and the local media. The main phases of the project – from 1990 to 1992 – in the Downtown District of Oulu Health Center are summarized with the help of the cycle of expansive learning (see figure 9.5). During the journey of expansive learning, the Oulu Health Center passed through a zone of proximal development, formulated on the basis of researchers’ and practitioners’ analysis of the evolution of the health center’s activity.
This zone of proximal development – with respect to Finnish health centers in general – was outlined by Engeström using the dimensions of the development of expert work (see figure 9.2). The characterizations of the four fields in figure 9.6 were based on the analysis of health center work in the overall project. In the single case of the Oulu Health-care Center, the expansive cycle led from a model of work predominantly belonging to field 2 (administratively centralized, functionally sectorized model) to one representing field 4 (multi-professional teams responsive for assigned geographic areas). According to Engeström, field 1 (individual practitioners bound by their professional codes and territories) was continually present as a heavy layer of tradition, and field 3 (individual accountability, privatization, and services purchased on the market) had an influence as an alternative that was rendered attractive by economic pressures and proponents of ideas about opening services to market forces (Engeström 1994: 258–260, 266).
Transition to network of activity systems

The case described above is one of the earliest applications of DWR concepts. In later, more complex cases, Engeström used the network of activity system as a unit of analysis (see figure 2.2 in subsection 2.1.1). One of these later cases was a project to reorganize children’s health-care in Helsinki (Engeström 2001). In principle, the same CHAT- and DWR-based logic, and the same instruments, were used as in the project described previously— with the exception that the network of activity system was used as the unit of analysis.

The next part of this section does not describe the entire project, but rather one part that highlights the use of the more extended unit of analysis.

The children’s health-care project took place in the second half of the 1990s. This time, three different types of activity systems participated in the project. One was a health-care center in Helsinki, one was the specialized Helsinki Children’s Hospital and one was the system of the families of the children who were patients.

Children with long-term illnesses (such as asthma and severe allergies), especially those with multiple or unclear diagnoses, were an increasingly large group that found themselves in a difficult situation. These children often drifted between caregiver organizations (such as the Children’s Hospital and the health center) without any single organization having an overview or accepting overall responsibility for the child’s care trajectory. The result was extremely difficult for the families.
The Children’s Hospital had a reputation for being possessive of its patients and not actively encouraging them to use primary health-care center services. Because of rising costs, there was a great deal of political pressure to change this division of labor in favor of increased use of primary care services. The challenge in the project was to acquire a new way of working in which parents and practitioners from different caregiver organizations would plan and monitor the child’s trajectory of care collaboratively, taking joint responsibility for the child’s overall progress (Engeström 2001: 139–140).

This goal was achieved using a DWR-based intervention, where the ‘care agreement’ emerged as a central concept. Four interconnected solutions were created as part of the model of care agreement:

(1) The patient’s personal physician – a general practitioner in the local health center – was designated as the coordinator in charge of the patient’s network and trajectory of care across institutional boundaries.

(2) Whenever a child became a patient of the children’s hospital for more than a single visit, the hospital physician and nurse in charge of the child drafted a care agreement which included a plan for the patient’s care and the division of labor between the different care providers contributing to the care of the child. The draft agreement was given to the child’s family and sent to the child’s personal health center physician (and when appropriate, to the physicians in charge of the child in other hospitals).

(3) If one or more of the parties found it necessary, they would have a care negotiation (by e-mail, by telephone, or face to face) to formulate a mutually acceptable care agreement.

(4) In the case of a patient’s unplanned visit or changes in diagnoses or care plans, care feedback, in the form of a copy of the patient’s medical record, was automatically given or sent without delay to the other parties involved in the agreement.

The model implied a radical expansion of the object of activity for all parties: from singular illness episodes or care visits to a long-term trajectory (temporal expansion), and from relationships between the patient and a singular practitioner to the joint monitoring of the entire network of care involved with the patient (socio-spatial expansion) (Engeström 2001: 148–150).

9.2.3 Further conceptualizations related to Developmental Work Research

During the 1990s, DWR established itself as a comprehensive research and intervention methodology aimed at facilitating expansive learning – helping practi-
tioners to develop and implement whole new forms of work activity. In the following subsection, the mature form of DWR, as well as a condensed form of conducting DWR interventions, is described.

The general orientation of DWR is characterized by Engeström as ‘pushing forward and mastering, as well as documenting and analyzing, the cycle of expansive learning’ (Engeström 1994: 243–244). The steps in a DWR intervention – as in the early health-care examples – adhere to the logic of the phases of the cycle of expansive (figure 2.4).

As practitioners pass through the steps of the expansive learning cycle, they analyze with the help of the researcher/interventionist, the evolution of their activity and formulate and pass though a zone of proximal development for their collective practice (Engeström 1994: 243–244; 266).

From the perspective of DWR, developmental possibilities depend to a large extent on the motives, ideas and cooperation of the actors. DWR is participatory and involves the actors themselves in analyzing the activity, as well as in building a future model for it. The researcher/interventionist provides practitioners with conceptual and practical tools for this purpose and helps in their use, but without presenting a predefined normative solution. The use of theoretical models as mediating tools in this process assists the practitioners in taking a new, wider perspective on their activity, analyzing the systemic causes of their daily problems and producing innovative solutions (Virkkunen and Ahonen 2005: 604–605).

By acting in this manner, the DWR-researcher/interventionist deploys a complex form of Vygotsky’s method of double stimulation (Vygotsky 1978: 123).

![Figure 9.7: The setting of DWR](image-url)
A typical setting of DWR, as described in figure 9.7, illustrates how the method of double stimulation connects to DWR. In the double stimulation method, subjects are first invited into a scenario in which they are involved in solving a problem that they could not solve using the intellectual tools available to them hitherto. This step takes place in Developmental Work Research by confronting the project group with data – in the form of videotaped work situations, client interviews and case examples – concerning problematic aspects of their present practice. This first type of stimuli helps the practitioners to recognize where present practice might be inadequate and to question the current way of thinking. Problematic aspects in current practice thus identified become the first representation of the object of joint learning actions. The model of the activity system (figure 2.1), together with a set of more specific intermediate conceptual tools, can be used in the analysis as a second type of stimuli, which then assists practitioners to reveal the systemic causes of daily problems and disturbances as inner developmental contradictions in their historically evolving activity system.

As the basic contradictions have been identified, their representation becomes the first type of stimuli and their resolution becomes the object of the practitioners’ joint actions. Analyses of solutions to similar contradictions that exist in other contexts are used in this phase as further secondary stimuli. Such analyses can help the practitioners in designing a new form of their activity, as well as leading to new concrete tools for the new form. The new model of activity is implemented step by step. The consolidation of the practice based on the new model concludes the DWR intervention (Virkkunen 2004).

A condensed form of utilizing DWR as a research and intervention methodology is the Change Laboratory, developed and established in the second part of the 1990s (Engeström et al. 1996; Virkkunen et al. 1997).

The Change Laboratory is a room or space in the vicinity of the daily workspace that is equipped with a wide variety of instruments for analyzing disturbances and bottlenecks in the prevailing work practices, and for constructing new models and tools for solving these problems. The Change Laboratory is also a DWR-based intervention process. In the laboratory, practitioners step back momentarily from their individual daily tasks and make the system of their joint activity into an object of collaborative inquiry and developmental experimentation (Virkkunen 2004).

A natural team or work unit – initially with the help of a researcher/interventionist – then follows the steps of the cycle of expansive learning. The overall logic of the Change Laboratory corresponds with the logic of earlier DWR interventions. What is different, however, is that a cycle of expansive learning induced in the Change Laboratory typically lasts from three to six months (Engeström et al. 1996/2005: 292–295). After the usual forms of DWR-analyses have been completed, a dynamic period in the Change Laboratory follows where main ideas for a new model of work are developed, tested and implemented step by step. This dynamic period consists of 10 to 12 main sessions, usually taking place once a week, often with additional meetings of subgroups or task forces in between main sessions (Engeström 1999: 70).
The typical Change Laboratory setting is – as with the DWR setting – based on the notion of double stimulation. The Change Laboratory setting has similar characteristics to the usual DWR setting, but is elaborated to be applicable in a condensed way (figure 9.8).

According to Engeström et al. (1996) the central tool within the setting is a 3×3 set of surfaces for representing the work activity. Participants in the Change Laboratory process face the surfaces, aided by a scribe as well as by video equipment and available additional tools such as relevant databases and a reference library.

The horizontal dimension of the surfaces offers different levels of abstraction and theoretical generalization. At one end of the horizontal dimension, the mirror surface is reserved for representing and examining experiences from work practice, important problem situations as well as novel solutions. Experiences take the format of videotaped work episodes, as well as stories, interviews, customer feedback and regular performance statistics.

At the other end, the model/vision surface is used for conceptual analysis with main theoretical tools. The activity system model is used to analyze the systemic quality and interconnections of work activity. The systemic roots of recurring problems are traced and conceptualized as inner contradictions of the activity system. In
addition, the expansive learning cycle is used on this surface to enable workers to analyze the current and projected next stage of their activity’s evolution. The steps of expansive learning are operationalized in the Change Laboratory as follows:

1 CHARTING THE SITUATION:
Something must be done; commitment to change

2 ANALYZING THE SITUATION:
How did we work in the past (history)? What are our present troubles and contradictions?

3 CREATING A NEW MODEL:
How do we want to work in the year 2010?

4 CONCRETIZING AND TESTING THE NEW MODEL:
What changes do we want to try next month?

5 IMPLEMENTING THE NEW MODEL:
Putting into practice the first steps. Pushing for the next steps

6 SPREADING AND CONSOLIDATING:
Teaching others what we learned. Codifying the new rules, etc.

(Engeström et al. 1996/2005: 294)

The third surface in the middle is reserved for intermediate ideas and tools used to facilitate the analysis of problem situations and to design a new model of the work activity. Such ideas or tools can take the form of 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).

As participants move between the mirror surface, with data of their own experiences, and the model/vision surface, involving theoretical tools, they also produce their own intermediate ideas and partial solutions. These are also represented on the middle surface.

The vertical dimension of the surfaces stands for movement in time, between past, present and future. The dynamic part of the Change Laboratory typically starts with the mirror of present problems. Next, the roots of current trouble are traced by mirroring experiences from the past and then modeling the past activity system. The following step is to model the current activity and its inner contradictions, which enables participants to focus their transformation efforts on essential sources of current problems. The process then moves to the envisaging of a future model of the activity. This phase includes the concretization of the new model by means of identifying partial solutions and tools which could be used in a next-step. Step-by-step the new vision is tested and implemented with the help of planning and monitoring in Change Laboratory sessions (Engeström et al. 1996/2005: 292–295).
A Change Laboratory variant for networks of activity systems

A variant of the Change Laboratory is represented by the Boundary Crossing Laboratory. As previously described, the unit of analysis of the Finish school of CHAT moved from activity systems to networks of activity systems. DWR interventions became focused on more complicated cases with different types of activity systems involved (see the example of children’s health-care in the last section). Correspondingly a variant of the Change Laboratory, focusing on networks of activity systems, was developed. The Boundary Crossing Laboratories typically include practitioners from all relevant activity systems and supports the development of innovative models across the traditional boundaries of the activity systems involved (Engeström 2001: 139–140).

9.2.4 Dissemination by the Helsinki-based research center

The most important form in which DWR interventions are conducted is within research centers. The earliest research center where DWR interventions were conducted was the Center for Activity Theory and Developmental Work Research at the University of Helsinki, founded in 1994 and led by Yrjö Engeström. In 2000, the Academy of Finland granted the center the status of a National Centre of Excellence in research.

There are some parallels here between Lewin’s research center at the MIT and Engeström’s center at the University of Helsinki. The Helsinki research center is relatively autonomous within its position in the Faculty of Behavioral Sciences. It has a multidisciplinary orientation where psychologist, sociologists, economists and members of other academic disciplines working together. Many of the actors in the research centers have longer-term experience in non-academic expert work. While there is an openness and a desire to connect to various kinds of theories from different disciplines, there is a common theoretical framework and methodology with CHAT and DWR. With DWR representing a common methodology, there is a corresponding orientation to integrating research and intervention.

Interventionist research is conducted in various kinds of work activities – smaller and larger companies and public sector institutions (such as health-care organizations, schools and courts of law). The DWR methodology requires relatively durable partnerships between researchers and organizations. These are based on mutual benefit and mutual autonomy. Researchers have the obligation and right to produce critical analyses for eventual publication, the organization acquires new tools and critical impulses to examine and change its practices. Researchers are not hired by management to generate recommendations and solutions; their work is typically funded by external, public sources. Practitioners and – usually – union representatives are included in the steering groups that supervise projects within organizations.
Since its foundation, the main work in the center has been conducted within five research groups:

1. New forms or work and learning
2. Workplace communities and work-related well-being in transition
3. Innovations and organization of research work
4. Learning in the boundary zone between school, work and everyday life
5. Change management, intervention and learning (united with group (2) in 2005).

Participants in the research groups are mostly Ph.D students, who take part in a 4-years Ph.D program, during which time they acquire key theoretical and methodological instruments to conduct their own research and intervention projects, mostly supervised by the leaders of the four or five research groups. These Ph.D projects unite – as it is usual in DWR based research – theoretical and empirical work. A theoretical and historical perspective on a phenomenon is combined with a concrete empirical case, where Change Laboratory or other intervention methods are used (Engeström 2005a: 15–16; Engeström 2005b, Center for Activity Theory and Developmental Work Research 2007).

9.2.5 Conclusions

This chapter described the societal problem-solving processes related to DWR. The main actors in this problem-solving process were social scientists with an orientation towards multidisciplinary and academia-practice collaboration. DWR was developed and elaborated in a time (the 1980s and 1990s) when inner contradictions within work activities dominated by the mass production paradigms had become increasingly visible. From the 1980s the developers of DWR had been engaged in analysis and critical discussion about the mass production paradigm. They sought to contribute to overcoming the divide between traditional (disciplinary and analytic) science and work activities that needed a new way for dealing with disturbances in their everyday practice.

In his early theoretical and experimental work with DWR, Engeström created and expressed conceptually an intervention methodology for addressing inner contradictions in work activities and for supporting practitioners to create new models of work. In several intervention projects DWR was applied and elaborated. Condensed DWR adaptations such as the Change Laboratory method were derived. A permanent form of applying DWR was established at the Helsinki research center (and later other research centers). Its diffusion or dissemination in large numbers (comparable to BPR) did not take place, or at least has not yet occurred. DWR is predominantly applied in academic institutions which do not have an orientation towards the large-scale conduct of interventions. More recent developments, however, point to endeavors to developing more ‘disseminative’ variants of the use of DWR. These developments are taking place in Finland (e.g., collaboration of the Helsinki research center with the Finish Institute of Occupational...
Engeström and colleagues conducted research-based interventions aimed at developing new models of work. While making use of completely different instruments, the Helsinki center’s form of conducting interventions displays some parallels with Kurt Lewin’s center. Engeström and his colleagues elaborated their creation and conceptualization-related instruments (with the unit of analysis of activity and the cycle of expansive learning as the core) in such a way that at the Helsinki research center each problem could be addressed as a historically new problem. Compared to consultancies such as Anderson/Accenture, the Helsinki center is very small and functions as a community of experienced researchers and less experienced Ph.D students. The center’s orientation is to collaborate with a small number of clients keen to develop completely new models of work. Collaboration with such ‘forefront’ clients might lead to new and scientifically interesting models of activity. The center’s repeated creation and application of CHAT and DWR concepts is financed by different sources, and opens the possibility of research-oriented interventions that do not depend financially on clients. The form of conducting interventions by the Helsinki research center will be termed ‘DWR-oriented problem-solving center’ in the following.
The research question of this chapter was:

*How does the experience of an innovation oriented form of conducting interventions enrich the historically based comprehension of a zone of proximal development of forms of conducting interventions?*

DWR-based interventions were used to resolve contradictions in work activities and support practitioners to develop entire new logics of their work. DWR can be used as an instrument to address context breaking problems in work activities and to contribute to the fundamental change of their model of work organization. At the same time, the transformation is not limited to the rational logic (such as in BPR) nor to the human logic (such as in Lewin’s research center). The unit of analysis (network of activity systems) and the methodological tool (focusing on addressing historically evolved main contradictions in work activities) address the whole logic of work activities. They are not limited to partial elements or processes of work activities (e.g., social, managerial or technical processes). These conceptual instruments are complemented by the idea of involving actors with diverse knowledge and expertise in settings that stimulate researcher-practitioners collaboration and transformative agency.

*In this sense DWR is an instrument that contributes to the resolution of the industrial contradiction between either focusing on context breaking problems and transforming the entire model of work organization or focusing on context balancing problems and transforming partial aspects.*

The DWR-oriented problem-solving center is clearly oriented to creating and conceptualizing solutions for historically new problems. The focus on addressing historically evolved contradictions in work activities and supporting practitioners to develop new models of work (guided by the cycle of expansive learning) leads to the creation of innovative solutions. These solutions are, however, developed in concrete work contexts. They cannot function as prototypes that could be transferred and multiplied easily without further elaboration and adaptation. Academic DWR does not focus on the dissemination of solutions. The community arrangement of the DWR-oriented problem-solving center is comparatively similar to the community arrangement of Lewin’s research center, with academic rules and division of labor that are oriented to the creation of innovation.

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72 DWR can be characterized as a tertiary instrument in the sense of Wartofsky (see section 8.3).
This chapter suggests that there is an instrument that can contribute to the resolution of one of the two described industrial contradictions. DWR seems to be a useful resource for post-industrial forms. However, the resolution of the second contradiction (dissemination of solutions has to become more creative and the creation of solutions has to become more disseminative) is still an open question. The resolution of this second contradiction might be related to identifying a community arrangement that is different from that of research centers and that supports the dissemination of solutions to a higher degree. Figure 9.10 shows the interpretation that DWR contributes to the resolution of one of the two industrial contradictions by situating academic DWR in the heuristic four-quadrant diagram of historical types.\textsuperscript{73}

This chapter closes with much the same conclusion as the previous chapter. A number of different paths for further study have emerged. One could, for example, undertake more study of academic traditions (e.g., ones associated with OD and systems theory) and study forms of conducting interventions that have a strong focus on involving multiple actors and activities.\textsuperscript{74}

\textsuperscript{73} A much more detailed frame would be required to be able to place specific forms of conducting interventions in specific positions. This figure aims at giving the reader a rough orientation to the direction of any further investigation of post-industrial forms of conducting interventions only.

\textsuperscript{74} Investigating cases how the Full Engagement approach (Heckscher et al. 2003, see 3.3.3) is applied in practice would be definitely an interesting possibility. This approach will be discussed in section 12.3.2.
The study follows a different path. It seems worthwhile to study attempts to make intervention methodologies such as DWR more ‘disseminative’ by experimenting with hybrid community arrangements (see the zone of further investigation in figure 9.9). While it would be possible to study the latest developments in Finland, radical changes in societal problem-solving processes have often occurred when developmental processes took place in environments different from the original one. Correspondingly, the investigation continues by studying a theoretically interesting case of experimenting with community arrangements and forms of conducting interventions undertaken in New Zealand.
10 The empirical case of ‘WEB’ as an example of experimenting with hybrid models of conducting interventions

10.1 Introduction, procedure and overview of data

10.1.1 Introduction

The historical-genetic analysis of forms of conducting interventions in the Elec-
trification wave and in the Motorization wave revealed a pattern of forms of con-
ducting interventions which displayed recurrent characteristics. These character-
istics were reduced to and described as characteristics of four ideal types, those of (innovator-)scholar-entrepreneurs, business-oriented solution disseminators, social science oriented problem-solving centers and state-academia-industry solution proliferating systems.

Industrial types were distinguished by:
(1) Either focusing on historically new problems and creation of solutions or fo-
cusing on historically old problems and dissemination of solutions;
(2) Either focusing on context breaking problems and fundamental change of the model of work organization or focusing on context balancing problems and transforming partial aspects.

Chapter 8 argued that in the Computerization wave work activities develop towards increasingly complex network organizations. As a consequence, post-indus-
trial problems (encompassing partially context breaking and balancing, partially new and old problems) emerge as a qualitatively new type. Such post-industrial problems are beyond the traditional focus of industrial forms of conducting inter-
ventions; this led to the hypothesis of a zone of proximal development of forms of conducting interventions. Post-industrial forms of conducting interventions were defined as emerging new forms of conducting interventions that resolve the two industrial contradictions. The resolution of the industrial contradictions would make it possible to address post-industrial problems more effectively. This ‘in-
direct’ outline of post-industrial forms was intended to be enriched by concrete examples of new instruments as well as by examples of new kind of actors and new community arrangements. The decision was to choose the single ideal type of conducting interventions which integrated innovation to the highest degree as the starting point for further investigation: that type was the intervention oriented research centers (termed social science oriented problem-solving centers in this study).

In Chapter 9 a form of conducting interventions was analyzed that has a par-
ticular focus on innovation: the form associated with the methodology of De-
velopmental Work Research (DWR) developed at the University of Helsinki. The
analysis concluded that DWR can be interpreted as an intervention instrument that contributes to the resolution of the industrial contradiction between either focusing on context breaking problems and fundamental change or focusing on context balancing problems and transforming partial aspects. Academic DWR, however, was characterized by customary academic rules and division of labor that are oriented to the creation of innovative solutions and not on the reuse, adaptation and dissemination of those solutions. The analysis of DWR use in an academic setting did not reveal how to deal with the industrial contradiction of innovation vs. dissemination. This conclusion led to the question as to whether hybrid types that combine the strength of research centers (innovation facilitating instruments such as DWR) with a more dissemination oriented community arrangement were possible.

In this chapter an organization called the New Zealand-based Centre for Research on Work, Education and Business (WEB Research, hereafter WEB) will be studied. The founders of WEB began an experiment into how to survive as a commercial entity by selling research-oriented interventions. The interesting issue with WEB is that in the course of this experiment, WEB seems to have tried out different forms of conducting interventions, embracing elements of research-oriented forms of conducting interventions, as well as conducting interventions as a business. Furthermore, WEB experimented with the intervention methodology DWR, which makes it possible to examine whether alternatives to the academic way of using DWR were created. WEB’s development – including its experiments, learning processes and struggle to identify viable forms of conducting interventions – will be studied and used to enrich the hypothetical comprehension of the zone of proximal development of forms of conducting interventions (see figure 10.1).

75 The hypothetical zone of proximal development of forms of conducting interventions in this study was formulated by referring to historical hypotheses of contradictions associated with forms of conducting interventions, and also by referring to culturally available artifacts (high-level instruments, patterns of collaboration), that could be used to resolve these contradictions. In this chapter and that which follows, the theoretical hypothesis of a zone of proximal development is developed into a partly empirically grounded hypothesis by referring to a concrete context where actors encounter contradictions in their work realities.
Figure 10.1: Focus of analysis in this chapter: WEB’s experimental periods

The corresponding research question in this chapter is:

*How does the experience of a specific case experimenting with finding a way of conducting interventions enrich the historically based comprehension of a zone of proximal development of forms of conducting interventions?*

The selection of WEB as a case raises several questions: Is New Zealand a significant context for studying forms of conducting interventions? How will the focus on an individual case such as WEB be connected with the focus on the overall development of historical types of conducting interventions? What kind of procedure and data will be used to study the empirical case? These questions are addressed in the following subsections.

### 10.1.2 New Zealand’s significance for studying new forms of conducting interventions

The late period of the Motorization wave and the early period of the Computerization wave witnessed radical changes, though of a somewhat contradictory nature. On the one hand, mass production developed towards its most elaborated form; on the other, the potential for new, ICT-supported forms of production became apparent. Against the background of new possibilities associated with ICT, inner contradictions within mass production systems became increasingly visible. It was argued that this turbulent period characterized the new conditions that were seen as the context of the hypothetical zone of proximal development of forms of conducting interventions.
New Zealand (hereafter ‘NZ’) is a country where changes in work and organization have been conducted in a particularly radical manner in the last few decades. The country on ‘the edge of the world’ is therefore an intriguing place in which to study new forms of conducting interventions.

Changes in NZ involved both the private and the public sectors (including science and education). Both consultancies and research activities were engaged in supporting change processes, and were themselves affected by the societal changes. Changes in the public sector were particularly radical. At the end of the 1980s and the beginning of the 1990s, the government developed and applied a program of importing many American concepts of business practices into the public and private sectors. These change programs can be viewed as part of the international wave of New Public Management (see Dunleavy et al. 2005: 467–469). New Public Management (NPM) can be understood as a product of the late Motorization wave. The application of mature mass-production concepts was generalized and extended into the public sector.

Before NPM was implemented, NZ’s science sector was dominated by universities and the Department of Scientific and Industrial Research (DSIR), established in 1926. Until the 1980s, the DSIR was New Zealand’s pre-eminent scientific organization, carrying out the largest share of research in the country, as well as providing a wide range of scientific services. When the New Public Management-based program of the NZ government ‘hit’ NZ’s science sector, the DSIR was broken up into separate units. One unit was formed to manage the development of policy and to set strategic direction, one to manage the process of allocating funding, and a number of stand-alone Crown Research Institutes (CRIs) were established to conduct the actual research. CRIs were intended to be commercially driven and were not wholly funded by the Crown.

These changes in the DSIR constitute just one example of NPM-oriented changes in the NZ public sector. NPM’s related programs addressed the whole range of government agencies and other parts of the public sector, increasing the number of administrative units and creating more complex and dynamic relationships among them. According to Dunleavy et al., this increase in units, complexity and overall dynamic is a typical consequence of NPM’s focus on disaggregation and competition (2005: 476).

While NPM in NZ and other countries is seen as having led to positive effects (such as reduction of costs and bureaucracy in some areas), it is also seen as having entailed negative consequences (erosion of social welfare and an increase in complexity and loss of control of public policy) (see Dunleavy et al. 2005: 469–478).

After several years of debate and struggles in the 1980s and 1990s, by the 2000s, NZ’s government began to consider yet another new regime of public administration. The negative consequences of NPM and the emerging possibilities of the Computerization wave led to an increasing debate about reintegrating functions into the government sphere, adopting holistic and needs-oriented structures, as well as the progressive digitalization of administrative processes. This new constellation of ideas and reform changes is termed ‘Digital-Era Governance’ (DEG) by Dunleavy et al. (2005: 467–469). It affects the whole of the NZ public sector.
However, as it is an ongoing process, precisely what the consequences of the associated debates and reform ideas will be remains an open question.

The empirical case of this study, WEB, emerged and evolved during the period of the changes described in NZ. WEB’s experiments took place in the late Motorization wave and during the installation period of the Computerization wave, at the time associated with New Public Management and the emergence of Digital-Era Governance. WEB’s experiments over the last two decades have been profoundly influenced by the development that was interpreted as the context of the hypothetical zone of proximal development of forms of conducting interventions.

10.1.3 Connecting the focus on an individual case with the focus on the overall development

The analysis of the development of WEB in this and the following chapter needs to satisfy the requirement of reflecting the logic of the local case as well as of enriching the comprehension of the historical hypothesis concerning the overall development of forms of conducting interventions. In consequence, both this and the next chapter will display characteristics of a ’process study’ of WEB’s individual case (see Poole et al. 2000: 10–11). It will seek to connect the local experience to the general pattern of cultural-historical experiences with regard to forms of conducting interventions.

The overall unit of analysis in this study – simultaneously a process model and a structural model – is a dynamic formation of actors and activities that address a societal problem and develop it towards a general solution that is then diffused in society (see section 4.4). The dynamic formation consists of individual actors and activities that address the object (the societal problem). These actors and activities exhibit their own developmental trajectories that only partly coincide with societal problem-solving processes. Following these trajectories can offer a more detailed perspective on the processes of how forms of conducting interventions emerge and evolve.

The dynamic formations of actors and activities that address societal problems described earlier, ‘embedded’ certain forms of conducting interventions. The unit of analysis was used in Chapters 5, 6, 7 and 9 to identify and analyze very different examples of forms of conducting interventions. The act of following developmental trajectories of individual actors and activities (such as WEB) can offer a perspective on more specific changes within one activity, that is, changes from one way of conducting interventions to another.76 Therefore, the unit of analysis for the empirical investigation in this and the following chapter will be more limited (to an individual activity and its network) than in previous chapters. At the end of

76 To clarify the difference between the historically established forms of conducting interventions and WEB’s experiments about finding a viable way of conducting interventions, WEB’s experimental forms are termed ‘ways of conducting interventions’ or ‘models of conducting interventions’.
these empirical chapters, however, the connection to the overall comprehension of problem-solving processes and types of conducting interventions will be made (returning to the logic of a more extended unit of analysis).

Earlier parts of the developmental trajectories of an individual case might be characterized by acquiring (elsewhere existing) cultural-historical knowledge about problem-solving processes and forms of conducting interventions. The later stages in developmental trajectories might be characterized by developing completely new forms of conducting interventions in the sense that these forms are not only new locally, but are also new for contexts outside NZ.

This and the following chapter will connect WEB’s individual case and the overall perspective on historical types of conducting interventions. This connection will be realized step by step beginning with a description of the local developmental logic of the case. It will then be analyzed how the knowledge from earlier societal problem-solving processes and forms of conducting interventions influenced the development of the local case and – vice versa – how the experience from the local case possibly contributes to more general questions about the development of societal problem-solving processes and forms of conducting interventions.

10.1.4 Procedure and overview of data in this chapter

This chapter will describe WEB’s evolution by tracing its developmental logic as an activity of conducting interventions. WEB’s history will be divided into different periods which correspond to major qualitative changes in WEB’s object, that is, WEB’s way of addressing problems by conducting interventions. Each period is characterized by specific developmental processes and by a specific way of conducting interventions that was dominant at that time in WEB’s history. Correspondingly, it will be possible to draw conclusions about WEB’s main ways/models of conducting interventions.

While this kind of analysis reflects the logic of the particular case, it simultaneously opens the possibility of relating that case to the broader development of forms of conducting interventions. A change in WEB’s object might be caused by encountering a new kind of problem (e.g., a qualitatively new form of post-industrial problem), one of WEB periods might coincide with a societal problem-solving process, and one or more of WEB’s ways of conducting interventions might correspond to forms of conducting interventions as summarized in the preceding chapters.

The transition from raw data to developmental periods, as well as from developmental periods to interpretations about main ways/models of conducting interventions, will follow an analytical procedure conducted in steps that makes differences between original data and analytical-interpretative conclusions as transparent as possible (see Poole et al. 2000: 112–113).
Raw data relating to WEB’s historical development is described in the following table 10.1.\(^{77}\) It includes an ‘almanac’ of the organization’s historical development, historical interviews with WEB’s key actors and important clients, and an analysis of WEB’s archive. Furthermore, data is presented from a participant observation (plus interviews and document analysis) of a 2003 intervention project undertaken by WEB in Europe, and data from a change laboratory that the author of the present study conducted with WEB.

The ‘almanac’ constitutes a table of the main incidents in WEB’s history between 1989–2004, jointly reconstructed in a dialogue between WEB’s key actors and the researcher, and counter-checked by all key actors. This central piece of data is complemented by historical interviews, archive documents and the participant observation, with the consequence that three main different sources of data could be used for identifying and analyzing main incidents.

Table 10.1: Overview of data used in Chapter 10

<table>
<thead>
<tr>
<th>Source of data</th>
<th>Time focus of data</th>
<th>Time when data was collected</th>
<th>Content of data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Interviews with 4 former clients and partners</td>
</tr>
<tr>
<td>3. Archives</td>
<td>1989–2004</td>
<td>2004</td>
<td>Written documents filed by WEB:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Meeting protocols and memos</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Strategy plans</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Important correspondence within WEB and with clients or other actors</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Own publications and other papers about projects</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Papers and publications of others related to WEB</td>
</tr>
<tr>
<td>4. Participant observation (of a project)</td>
<td>2003</td>
<td>2003</td>
<td>Participant observation (complemented by interviews with the interventionists and the clients and by document analysis of meeting protocols and reports) of an intervention project of WEB in Europe</td>
</tr>
<tr>
<td>5. Change Laboratory sessions</td>
<td>1989–2004</td>
<td>2004</td>
<td>First 4 sessions of Change Laboratory with WEB that contained discussion about the historical development of WEB</td>
</tr>
</tbody>
</table>

\(^{77}\) Data pertaining to WEB’s case addresses the organization’s development between 1989 and 2007. It was collected between 2003 and 2007. While this chapter mainly uses the portion of data that addresses WEB’s historical development until 2004, in the next chapter the focus is on the ‘present’ time period (2004–2007). Correspondingly, table 10.1 lists data with a time focus on 1989–2004. However, this division has its limits. Data regarding the present development (used mainly in the next chapter; see table 11.1) was also important for comprehending the historical development described in this chapter, and vice versa.
The raw data was processed towards ‘object oriented events’ (Toiviainen 2003: 83–85) and further towards developmental periods consisting of event sequences. These periods were characterized by major changes in the object of WEB’s activity. Events and event sequences are used as natural units of social processes in process theories (Poole et al. 2000: 40). They fulfill the same function as actions (or action sequences) in activity theory (see section 2.1).

Developmental periods describe how major changes in the object of WEB’s activity occurred, and how the method of conducting interventions evolved over time. The description remains very close to the raw data. The periods partly overlap and did not take place in a completely sequential manner. This first analytical step resembles what is called by some authors ‘evolutionary analysis’ (see Toiviainen 2003: 83–85, Poole et al. 2000: 65–66). The developmental periods – the outcome of this first step of data processing – are described in section 10.2.

The next analytical step was to analyze developmental periods as (expansive) learning processes – focusing on developmental contradictions and (expansive) learning actions. It is important to emphasize that contradictions do not necessarily lead to expansive developments or new models of work. They can also lead to a narrowing or fragmentation of objects of work activities, or even to the disintegration of the whole activity system. This second analytical step can be described as dialectical analysis (see Toiviainen 2003: 85–86, Poole et al. 2000: 65–66).

The third analytical step uses the outcomes of the previous steps to analyze the characteristics of models of conducting interventions dominant in the different developmental periods. For this analytical step, the same concepts are used that were deployed in the analysis of historically identified forms of conducting interventions embedded in societal problem-solving processes in Chapters 5, 6, and 7 (subject, object – further specified by the type of problem and typical client – instruments, community arrangement). This approach makes it possible to characterize WEB’s main ways/models of conducting interventions by referring to the theoretical terms used in Chapter 8 to describe historically identified types of conducting interventions. In this way, a connection between the main ways/models of conducting interventions identified in WEB’s case with historical types of conducting interventions can be made. The outcome of dialectical analysis as well as the outcome of the analysis to characterize WEB’s main ways/models of conducting interventions is described in section 10.3, followed by conclusions drawn in section 10.4.

78 The developmental periods correspond with major qualitative changes in WEB’s object – WEB’s way of addressing problems by conducting interventions. A ‘major qualitative change’ concerning the organization’s way of conducting interventions does not necessarily mean that all parts of the activity are fundamentally changed. A Lewinan Action Research-oriented research center and a DWR-oriented research center, for instance, would be understood as qualitatively different forms with qualitatively different objects – even though their community arrangement (academic rules and division of labor) might be very similar.
10.2 Developmental periods of WEB

The outcome of the evolutionary analysis is the division of WEB’s historical development into five developmental periods that are distinguished by the nature of the major changes in the way of conducting interventions WEB made. The partially overlapping periods are:

5. Experimenting with hybrid ways of conducting interventions (2003-ongoing)

The five periods are described in the following subsections.

10.2.1 1989–1994: Developing an initial way of conducting interventions

The origins of WEB can be traced back to a joint venture intervention project on school development in New Zealand. The background initiative for this project was the emergence of a disruptive new discourse about the appropriate models for governing schools in NZ at the end of the 1980s and the beginning of the 1990s. This discourse was summarised and set out in the government’s proposal for the reform of school administration and governance called ‘Tomorrow’s Schools.’ Tomorrow’s Schools imported the central concepts of New Public Management into the education sector (see subsection 10.1.1).

Considerable criticism was directed at the proposed adoption of ‘business’ practices in schools from the schools themselves, from social and educational scientists, and the NZ secondary teachers’ union, the Post Primary Teachers’ Association (‘PPTA’). As government decisions left a certain amount of space for proposing alternative models for governing schools, actors from the PPTA, from social and educational science institutions and from the schools themselves either initiated or became engaged in innovative processes to create new and opposing models for governing schools. This project on school development was essential for the emergence of WEB.

The PPTA was, and remains, one of the most powerful unions in New Zealand, exerting considerable influence on government decisions in the educational sector. In the 1980s, the PPTA established the practice of developing strong positions in negotiations with the government from research the union carried out or commissioned. When an issue was about to become important for New Zealand teachers and schools (e.g., through a government initiative to change laws), research using surveys, case studies and literature reviews was undertaken to help the union either develop or confirm policy. Phillip Capper (hereafter, PC),
a former teacher and later founding member of WEB, was engaged in this kind of research. Research conducted in the PPTA prior to the intervention project on school development was focused on analyzing educational activities, rather than on developing and changing them. When in the late 1980s the government proposed new models of governing schools in NZ that imported central concepts of business practices, the position of actors such as PC from the PPTA and other critics of the government’s plans was weakened. This was the case because they lacked alternative models for governing schools to put forward. They lacked also the means to develop alternative models. PC and other critics of the government’s plans began to consider the need to develop their own vision for models of the governance of schools.

As the government program left space for proposing alternative models for schools, from 1989 onwards PC and other members of the PPTA began to search for ways to develop an alternative vision for governing schools. The first main action was to combine the knowledge and perspectives from actors of the PPTA and from social science research institutions. Roberta Hill (hereafter, RH), a social scientist from the then largest research organization in NZ, the DSIR, was included in the discourse exploring alternative ways for governing schools. The dialogue between PC and other members of the PPTA, and RH about developing alternative ways for governing schools led to a completely new kind of project in the PPTA – the interventionist ‘Shared Decision Making Project’ (hereafter, SDM project):

A school model of shared decision making is important because adult behaviour in schools influences students as much as does the formal curriculum. When students observe and contribute to adult collegiality, reasoned debate, and consensus building activities, they learn to emulate such behaviour, as opposed to the hidden curriculum they learn in an autocratic school environment. As the American educational philosopher John Dewey observed several decades ago, schools provide an opportunity for learning social as well as intellectual skills and habits (Capper, Hill et al. 1993: 5).

PC and RH became main actors of the SDM project. 13 schools from different parts of NZ were selected that expressed an interest in taking part in the development of new approaches to governing schools. Members of research organizations such as the Education Faculty at Victoria University of Wellington (NZ), and the College of Education at the University of Illinois at Chicago (USA), became additional partners in the course of the SDM project and contributed to project discussions.

The project started formally in 1991 and ended in 1994. As proposed by RH, it followed the logic of an Action Research methodology. In an early phase of the project, RH conducted a literature-based theoretical review about the nature and difficulties of changes faced by the school system; that review became a resource for schools to reflect upon their own management structures and processes.

In each school an analysis of the current governing processes and structures was conducted that was based on questionnaires administered to samples of staff, stu-
dents, the board of the school and parents. On top of this, detailed interviews with selected members of the groups described above, analysis of school documentation, and informal observations and conversations in and around the schools were undertaken.

On the basis of theoretical and empirical data, the researchers developed a report for each school. Then they returned to each institution, introducing the report to the staff, the board of the school, parents and students. The staff and board, in mutual consultation, and with input from student and parent groups, then identified a number of observations from the report that they accepted unreservedly as valid and requiring further action. Each school took these actions by itself, assisted by researchers who provided the school with expertise, advice, and opportunities for professional development and networking. At the end of the change processes, an analysis on the basis of the earlier methods was again undertaken.

The results of the SDM project were practical, applied models of governing schools that not only embraced the board of the school, but also integrated wider groups of stakeholders such as students, teachers and other staff, parents and community members into decision making and organizing processes.

The SDM project was limited in time, and it was clear for PC and RH that it would reach an end. From the beginning of the project, it was not intended to lead to a permanent activity focused on conducting intervention projects. However, over the course of the project, PC and RH developed an increasing interest in continuing their recently developed shared model for conducting intervention projects.

10.2.2 1994–1995: Searching for an organizational basis for conducting interventions

While PC, RH and others developed an increased interest in undertaking research of the kind developed in the SDM project, this kind of intervention research would have been a temporary experience if a major change in the NZ research and science landscape had not taken place. The NZ government owned Department of Scientific and Industrial Research (DSIR) itself became the target of the government’s agenda to import concepts of New Public Management into the NZ science sector; the DSIR was split into many parts (see subsection 10.1.1). Since RH was an employee of the DSIR, this impacted upon her work and social science research methods such as those applied in the SDM project and in general. The restructuring of the DSIR led to the establishment of WEB as an independent organization.

Employees in the DSIR were full-time researchers. Universities undertook some social science research but had a focus on teaching. The DSIR was established in 1926. By 1976 the DSIR had 893 scientists and 712 technicians and a total staff of 2,097 organized into 20 research divisions. The DSIR constituted a bureaucratic organization with a hierarchical division of labour including personal assistants for senior staff, and separated IT service units. The Establishment of a social science section at the DSIR began in 1979 with the aim of undertaking research on the social impact of science and technology (Galbreath 1998).
Since the 1980s, RH had been a member of the social science section of the DSIR, which together with the PPTA represented one of the organizational pillars of the SDM project. A major change occurred at the DSIR when the government’s New Public Management-based program was applied to the science sector of NZ. In the period from 1989 to 1992 the DSIR was broken up into separate units. A Ministry of Research, Science and Technology (MoRST) was established to manage the development of science policy and to set the strategic direction for the Crown’s investment in Science. The Foundation for Research Science and Technology (FRST) was established to act as the purchasing agent and to manage the process of allocating funding. To conduct the actual research, a series of ten (later nine) Crown Research Institutes (CRIs) were established. The status of the CRIs was similar to state-owned enterprises, and they were intended to be commercially driven. The social science unit of the DSIR was transformed into a short-lived Social Science CRI: The NZ Institute for Social Research and Development (NZISRD). However, the NZISRD ‘proved commercially unviable and was wound up in 1994’ (Galbreath 1998: 264).

The disestablishment of the NZISRD in mid-1994 left RH without a research institution and social science research as conducted in the SDM project without a main organizational platform. The PPTA had made clear earlier that there would be no further resources for the SDM project or similar project of that dimension, so RH, PC and some other former members of the NZISRD were left with the potential (concerning actors, instruments and some other resources) to conduct intervention research along the lines of the previous SDM project, but without the security of an underpinning organizational platform.

RH and PC were interested in carrying on with intervention research and discussed with various people the possibilities of realizing this aim. The NZISRD still had some resources at its disposal, among others a newly started project funded by the NZ Foundation for Research Science and Technology (FRST), in which both RH and PC were involved. This project could guarantee economic survival for some time, so long as a backing organization could be found or created.

Ken Wilson (hereafter, KW), a former teacher and industrial officer from the PPTA, became involved in the discussion and in negotiations between RH and other members of the NZISRD with the Ministry of Research, Science and Technology about possibilities of succeeding the NZISRD.

RH, PC and KW came to the conclusion that there was an opportunity to establish an independent research institute. PC describes it in the following manner:

They have two years of a project still to run and the contract for that project is with an organization which is about to stop existing. So I got double questions: What happens to our lives and what happens to our project? [...] Out of that came the idea of WEB Research. (PC 02/2004a)

The idea was realized and the independent research institute was named the ‘New Zealand Centre for Research on Work, Education and Business Limited’ (trading
As WEB Research for short). WEB would be based on the existing research experience, starting with still-existing resources from NZISRD, and intended to secure its future by winning further research funding from FRST.

As KW negotiated the formalities with the Ministry of Science, he decided to join the newly established organization:

And the conversations [...] led me to make the judgment that this was a viable way of thinking ahead, that it was possible that WEB could grow and could win more contracts from FRST. (KW 02/2004)

As the Crown Research Institute of social sciences was closed down, PC, RH and KW found a new solution for continuing with intervention research in just 3 months. WEB was founded as an independent research institute (a limited liability company) and was envisaged as a sort of successor to the CRI of Social Sciences. Staff from the disestablished NZISRD was kept on. At this stage Tony Bullard and Kathryn Doig (nee Hawes) joined WEB.

From the struggle to find an organizational platform during this period of profound change for the delivery of social science in New Zealand, WEB Research emerged as a new, independent social science research institute intended to conduct intervention research. WEB’s emerging activity can be viewed as the integration of actors and cultural-historical knowledge from the research activity at the NZISRD, as well as the action-oriented developmental activity related to teachers and schools at the PPTA. Three of WEB’s five founding members were part of the NZISRD (Roberta Hill, Tony Bullard, and Kathryn Hawes), and two were former members of the PPTA (Phillip Capper, Ken Wilson).

10.2.3 1995–1998: Searching for a robust theoretical and methodological framework

With WEB’s formal establishment, processes of experimentation and development did not stop. The experiment to find a viable way of conducting interventions continued into the second half of the 1990s, and even beyond. Within the SDM project, Action Research, methods of empirical research such as questionnaires, interviews, document analysis and participant observations, as well as feedback reports as tools triggering change, proved to be useful methodological instruments. The overall theoretical background for intervention research, however, was still open.

The question of what was the theoretical background for WEB’s way of conducting interventions became an increasingly important issue in the FRST funded project WEB ‘inherited’ from NZISRD: namely, the Economic Restructuring and Skills Formation (ERSF) project. ERSF consisted of case studies of five different organizations in NZ that all faced organizational change due to an environment dominated by rapid economic and technological restructuring. The five organizations included in the project were a vegetable processing company, a manufacturer of refrigerators and washing machines, a telecommunications company, a Maori trust (an organization delivering professional services to urban groups of the original
NZ inhabitants), and an IT consultancy. The economic and technological restructuring that induced organizational change processes consisted, among other things, of radical changes in the (NZ and overseas) markets, as well as new ICT-related technological possibilities. WEB was supposed to investigate how these companies learned to accomplish the organizational change: e.g., how they developed new skills, and capabilities to deal with the environmental changes. If possible, WEB was asked to find ways to support the learning processes in the organizations.

After collecting data about these five organizations (relying on similar methods as used in the SDM project) WEB realized that they needed an overall theoretical framework that would allow them to analyze the data and draw conclusions about ongoing learning processes and possible ways of supporting them.

WEB's existing theoretical 'tool box' included different models and theories from the sociology of technology, the socio-technical tradition (e.g., work of the Australian Fred Emery with which RH was familiar), as well as organization culture and organizational learning tradition (e.g., work of Chris Argyris with which PC was familiar after visiting the University of Illinois at Chicago).

However, when they tried to construct a theory-based analytical framework on the basis of the above named traditions, WEB's members failed. None of their attempts led to a robust frame that would allow them to analyze learning processes in different companies with different technological and economical challenges and consequently different organizational change processes. According to RH and PC, the main obstacle was that they could not find an adequate theory-based way of conceptualizing learning and development as social processes occurring in very diverse and rapidly changing activities.

In addition to the difficulties in the ERSF project, the time that required WEB to apply for new funding from FRST approached; this was of critical importance for WEB's future. It was absolutely necessary to be extremely clear about WEB's theoretical and methodological underpinnings in order to have a good chance of securing FRST funding. PC describes this as a time of great theoretical uncertainty:

> What are we going to do intellectually, academically? [...] What is our brand? What are we trying to do? What are we committed to? So, we begin to sort that out, but one of the things is that we are still doing is the five case studies. And we gather data. And we got problems. [...] Roberta has got a whole body of organizational theory and history behind her. [...] I know something by now, stuff I learned in Chicago. [...] And it does not make sense. [...] None of what we know helps us to explain this data. So we are worried. (PC 02/2004a)

The lack of a robust theoretical framework within the ERSF project shortly before bidding for FRST funding meant high pressure was placed on WEB's actors. They began an extensive search for the knowledge that would lead to an overarching, robust theoretical framework that would allow them to conduct theoretically grounded and practically effective intervention research.
Through participation in the internet-based activity-theoretical discussion group, XMCA, PC had encountered a theoretical framework used mainly for analyzing and developing learning in schools: Cultural-Historical Activity Theory (CHAT). At XMCA there was a discussion going on about CHAT models and concepts that had been elaborated for use in analyzing and developing work places. This CHAT-based intervention methodology was DWR, which had been developed by Yrjö Engeström, then professor at the University of Helsinki and at the University of California at San Diego.

PC recalled the discussion in WEB about the decision to learn more about CHAT and DWR in the following manner:

I have been monitoring XMCA and the activity-theory listeners. And [...] schools as organizations have been my main interest. And here is this guy people are talking on XMCA – Engeström. And he studies things like work places from an activity theory point of view.

I say to Roberta: ‘Well, activity theory did a lot for schools, maybe activity theory has got something to say about this data [...]’. And we sit down. And we say: Where is our future? What are we doing here? Where are we going? Here is this data. [...] And this looks like the most promising environment which will make us analyze our data [...].

And Ken [...] says: ‘Ok, we have got to make a big break here; [...] we have got to find a place to stand. Go to Helsinki and find out about if this is going to help us, both in terms of academically in this project and as an organization’. So I contacted Helsinki and they say: ‘No he is not here, he is in San Diego.’ So I flew to San Diego. (PC 02/2004a)

It was decided that PC should go to San Diego to talk to Yrjö Engeström and any other main proponents of CHAT to ascertain whether CHAT might lead to a robust theoretical framework for WEB’s possible way of conducting interventions. If PC thought CHAT was promising, he needed to find a way of learning more about it, with a specific understanding of its application in work places, and also to discuss whether some kind of collaboration with Engeström and the researchers from Helsinki and San Diego was possible.

When PC went to San Diego he met Yrjö Engeström, Mike Cole and Ritva Engeström (the latter two were then major CHAT proponents) and – after coming to the conclusion that the CHAT framework was promising – discussed possibilities for collaboration. Engeström offered that WEB become part of a larger inter-

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79 Developmental Work Research (DWR) supports practitioners in analyzing existing problems in their work activities, in helping them to develop hypothesis of underlying main contradictions as well as in creating and implementing sometimes radically new models of work. DWR comprehends all forms of work activities as developing and developable, and can be correspondingly applied to very different forms of work and organization (see Chapter 2 and section 9.2 for detailed discussion of CHAT and DWR).
national group conducting an intervention project about learning in teams and networks at that time. Furthermore, Yrjö Engeström and Ritva Engeström offered to come to NZ to transfer knowledge about using CHAT and DWR, in general, and about the Finish project on learning in teams in networks, in particular.

After PC returned to NZ, PC, RH and KW decided to accept the offer of collaboration, and prepared a funding bid for the next round of FRST funding on the basis of their participation in the world-wide project about learning in teams and networks. The bid was successful and WEB was awarded funding for the LETN (Leaning and Expertise in Teams and Networks) project slated to start in 1996 and continue until 1998, with the possibility of applying for an extension until 2000. Securing direct FRST funding for the first time was an important event for WEB as a research organization, as KW recalls.

Phil went to UCSD [...] and came back with the kind of intellectual framework and we began to reorient ourselves to DWR type notions. So we put in this bid for LETN and we got it. (KW 02/2004)

The FRST-funded LETN project had a theoretical-methodological character as well as an empirical part. In the first part of the project, the focus was on appropriating CHAT and DWR as the core instruments and on designing interventions that should be conducted in the LETN project on the principles of CHAT and DWR. An important episode for appropriating CHAT and DWR was the visit of Yrjö and Ritva Engeström to NZ:

What we did in the first year is…; basically we got funded to learn about Developmental Work Research. And we brought Yrjö out here and we got him to run workshops under the projects heading [...]. We invited lots of people from FRST. [...] And he ran topic workshops and he ran intensive learning workshops for the three of us. For about 4 weeks. So we had him for ourselves for four weeks. So that was solemnly important for where we are now. (PC 02/2004b)

The second part of the LETN project was geared towards applying CHAT and DWR to identify critical success factors in how work teams and networks learn, gain expertise, innovate and solve problems. Ways needed to be found to support these processes. The intervention research took place at the NZ based furniture designing and manufacturing company Formway Furniture, as well as at the NZ branch of the international courier company, DHL World-wide Express.

Formway Furniture later won an international award for the design of one of their products – the ‘Life Chair’ – and became well known beyond the borders of New Zealand. WEB was not involved directly in this award-winning design process. However, according to members of WEB and Formway Furniture, the intervention conducted in the LETN project had a major impact in improving learning and design processes at Formway and contributed through this indirectly to the later success with the ‘Life Chair’.
At the end of this period that focused upon identifying a robust theoretical framework, WEB adopted CHAT and DWR as their main theoretical and methodological framework and instruments for conducting intervention research.

10.2.4 1998–2003: Struggling for an economical basis for conducting interventions

After WEB received FRST funding in 1996 for the LETN project, and successfully established CHAT and DWR as their main theoretical and methodological foundations for conducting intervention research, it seemed that the organization had finally found ‘a place to stand’ as KW (KW 02/2004) put it. WEB’s predecessor, NZISRD, had been a Crown Research Institute (CRI), whereas WEB was not. The goal of establishing a FRST-oriented, theoretically based research institute, similar to the more privileged CRIs, which had directly emerged from the former state research department DSIR (while WEB emerged out of the ‘remnants’ of the disestablished social science CRI NZISRD), seemed to have been achieved.

However, it was necessary to extend the LETN project after 2 years. Unfortunately for WEB, after these first two years, FRST changed its internal practice of granting funding. Instead, funding had to be focused almost completely on universities and the Crown Research Institutes. As a consequence, although WEB received very good reports from outside evaluators for the LETN project, no further funding from FRST was granted. It was a severe shock for WEB, as their whole strategy was based on securing funding from FRST. When WEB was confronted by the perspective of no further FRST funding in 1998, its very existence came into question, as KW recalls:

As LETN was coming to an end and the funding was going down, but the overheads were staying high [...] having to think about the possibility of not winning any more FRST funding, how could we afford to run WEB on the current basis? (KW 02/2004)

Discussions began among PC, RH, KW, Kathryn Hawes Doig and Tony Bullard to ascertain how WEB could survive without FRST funding. The discussion led to the conclusion that WEB could not be conducted any longer in the manner of a much larger research institute. As the business manager, KW played a central role in arguing that this mode of existence had to change if WEB wanted to survive:

Roberta and Kathryn had come from a Crown Research Institute and had this idea [...] that WEB would behave like a Crown Research Institute [...] that we could spend a lot of money on overheads. [...] We also employed a young man as an accountant. [...] It took a long time before we understood the finances of running a company like us. It was an extremely insecure income and it meant to keep overhead costs to an absolute minimum. [...] We began with far too much rent, far too many people and we were taking on any work we could in order to keep everybody together. [...] we had six to pay or five people to pay and we needed only two and
half or three people to do the work [...] At one stage I think we had no money in the bank and no contracts. It looked like that was the end of us. (KW 02/2004)

After a 10-hour meeting, the decision was taken that only the main interventionists – PC, RH and KW – would remain full employees of WEB, and that the central supporting staff, Kathryn Hawes Doig and Tony Bullard (both who had been founding members of WEB and were directors/owners of WEB), would be brought in and paid only for specific tasks (e.g., doing the accounts, organizational work on larger projects). Further support of tasks in WEB (e.g., IT support) would be conducted in the same way. PC recalls the meeting:

We had this very, very emotional meeting of the directors, in which two of the directors basically were downsized and that is basically what happened. And the miracle of that how we all stayed together as colleagues and friends despite this experience. … But we, Roberta and Ken and I, what we did is, we said [...] ‘If you have a job that is below that you came to be paid in WEB, we will pay the difference’. (PC 02/2004b)

While all of WEB’s members describe this meeting as a very painful moment – a kind of organizational trauma – they all agreed to the radical steps. RH describes it as a crucial act for survival:

Ken’s intervention when we changed the structure of the company was absolutely crucial. Had we not changed our overhead structure we would have gone out of business completely. We could not have survived. [...] That was absolutely fundamental for turning us into more of a business. (RH 02/2004a)

Turning WEB into more of a business meant that strong internal rules emerged based around being efficient in projects and spending only as much time as the client was willing to pay – which had been different earlier when the quality and rigor of the science were more important than how much money was available. WEB survived in the initial period after the restructuring mainly because they conducted many smaller and often quite different projects. ‘We became very good at scrambling to get money in’ (KW 2002b) as KW recalled. WEB developed an increasingly extended network of potential clients and partners that would help them to get new assignments and conduct projects.

In smaller projects with schools and other organizations where a solution had to be found quickly, WEB could often rely on knowledge from earlier longer-term projects.

As WEB undertook a larger number of smaller and shorter projects, WEB’s overall time horizon also became shorter and the projects became increasingly individual responsibilities, with PC, RH or KW often undertaking projects on their own. Another consequence was a strong rule about avoiding risks such as growing costs or overheads (employing new staff). Those were to be considered only when there was longer-term financial security, e.g., if FRST changed its internal
practice and began again to grant funding to WEB – which was rather unlikely to happen.

To show in greater detail how these post-restructuring changes affected WEB’s way of conducting interventions, the following subsection describes an intervention project intended to reorganize the education of train drivers in an European railway organization.

The ER project

At a conference in Europe in 2002, members of WEB came into contact with representatives of the training and education service provider of a large European railway company (hereafter, ER). ER is the main public transport railway company in an EU country. The railway system used by ER is one of the most crowded networks in Europe. ER therefore has to deal with questions of dangerous overcrowding and punctuality constantly.

The training and educational service provider of ER (hereafter, ERT) is part of the ER holding company and is – among other things – engaged in the education of train drivers. WEB was asked to support the reorganization of the education of train drivers. As the resources of ERT were limited, the project schedule was extremely tight. WEB’s interventionists (PC, joined later by KW) stayed at the home base of ER in Europe for one month in Spring 2003. The substantive part of the intervention project was carried out in that period. After that period WEB supported local staff via email and telephone.

The intervention project followed the logic of the ‘Change Laboratory’ intervention method. In the original Finish version of the Change Laboratory, a natural team or work unit, with the help of a researcher/interventionist, follows the steps of the cycle of expansive learning to resolve the main contradictions in the work activity of the team. The outcome is a subsequently elaborated and consolidated new model of work.\(^\text{80}\).

The project was jointly led by two of WEB’s interventionists, and by two ‘internal’ ERT facilitators/interventionists. There was a cooperative leadership of project and WEB’s interventionists made efforts to share their knowledge by giving workshops on CHAT and DWR, explaining their actions to the internal interventionists in ‘debrieﬁng meetings’. A project group was formed with people connected to the education of train drivers from different parts of ER (including some train drivers). Guided by the WEB interventionists, the project group went through a series

\(^{80}\) After those forms of analyses usual in Developmental Work Research-related interventions (ethnography of problems, historical analysis of main activity systems and related theoretical models of the activity, often lasting several months or longer), there is a dynamic period in the Change Laboratory where the main ideas for a new model of work are developed, tested and implemented stepwise. This dynamic period consists of 10 to 12 main sessions, which normally take place once a week (see section 9.2, Chapter 2).
of 8 workshops that followed the logic of the ‘Change Laboratory’ intervention process, but was in some aspects differing from the original Change Laboratory procedure.

PC commented on the consequences of the shortened time frame in the intervention project:

ZB: So far you analyze parts of the relevant activity systems, could you say so? The training system and the [...] driver system
PC: Yes. Not really analyzing, because it is not a scientific piece of work, but adapting a scientific process to a consultancy. (PC and ZB 03/2003).

Before and within the period of the first Change Laboratory workshops, PC undertook a number of both formal and informal cases of ethnographic observation and interviewing of educators, train drivers, passengers and other actors. The idea was to gain a rapid familiarity with the operations of ER and to see if there were any disturbances or contradictions related to the education and practice of train drivers that were immediately apparent. It became clear that there was a persistent dialogue around problems such as punctuality, safety, dissatisfaction of passengers and personnel. Amongst the operational staff of ER (such as train drivers and conductors) there was a deep distrust of management. Managers were suspected of making procedural rules that were ‘obviously’ impossible to follow and of pushing those onto operational staff. The workplace common-sense explanation was that this was a strategy by managers to evade future blame by making operational staff the inevitable victims of blame for accidents relating to the poor performance of the railway system.

In a second step, PC collected – together with the project group – more focused data on the main activity systems. This took place within the period of the first three Change Laboratory sessions and was partly done within the sessions and partly outside.

On the basis of earlier experiences of WEB’s interventionists with public transport companies (such as airway organizations) and the experiences gained in ER the intervention came to tentative conclusions about the main contradictions in the practice of the education of train drivers.

The hypothesis was that the practice of educating train drivers at ER before the intervention largely followed a linear path and was influenced sequentially (and in a disintegrated way) by different separated activity systems and that this was the underlying reason for the disturbances. Train driver aspirants had to pass an exam to be able to work as train drivers. Government agencies engaged in railway safety issues and the ER management, interested in a high degree of safety and efficiency, represented the main sources of influence on the formal education program of train drivers (including their test). Educators of ERT prepared drivers for the test. As the education program and test was mainly focused on safety and efficiency issues, the successful train drivers aspirants were prepared to follow safety regulations. However, strictly following all of the safety regulations did not prepare be-
ginner train drivers very well for dealing with the practice of driving that actually lay ahead of them. Strictly following all safety regulations would lead to a decrease in punctuality and low satisfaction for passengers.

So aspirant train drivers were confronted with two tension-laden tasks:

1. They had to pass the exam and learn the theory of operating a train;
2. They had to learn how to combine operating a train safely and efficiently with operating it on time and in a manner that was comfortable for passengers.

The interventionists’ overall view was that the linear and separated practice of educating train drivers led to a double bind situation for the train driver aspirants. That double bind could be described as a tension between the theory and practice of train driving or as a conflict between the demand for safety and the demand for punctuality:

There is a gap between the theory and practice of driving a train and the aspirants experience that gap. When teaching aspirants the teachers are careful to do so to assist the aspirants to pass the exam; this is not the same as learning to drive the trains on time. (PC in a report to WEB 04/2003)

The interventionists presented the hypotheses of the underlying reasons for the current problems in education and practice of train drivers to the project group and discussed it. The project group agreed to the hypotheses. The interventionists then proposed the outline of an alternative new model. The basic idea of this outline was to address the linearity/separated practice and to move it towards a form with a more integrated character: the proposal was that the theoretical education and the practice of train drivers should be done more in parallel.

An important part of this new model was to increase the value of the role of the ‘mentors’ of train drivers. Mentors performed the role of helping aspirants to become skilled at operating trains in practice. They were often sources of knowledge about informal strategies about how to combine safety and punctuality issues, thus fulfilling the function of a bridge between the teaching program and the daily practices of train driving. The vision of the new model was centered on such ‘on-the-job training’ elements of train driver education. By identifying, systematizing and extending on-the-job training elements, the new model should be concretized and subsequently realized.

This vision of the new model for the education of train drivers was discussed and accepted by the project group. In later Change Laboratory sessions, there was a focus on elaborating the vision of the new model, discussing emerging problems, and preparing for the implementation of parts of it. An important topic in these later sessions was the question of the relation of the system of driver education to other systems that had direct or indirect influences on the train drivers’ education and practice.
As the period of the WEB’s interventionists’ stay reached an end, the responsibility for guiding the process was left to the two ‘internal’ ERT facilitators/interventionists. Significant discussions and parts of the implementation process took place after PC and KW left ER. WEB’s interventionists maintained an advisory role, with regular telephone conferences taking place between them and the two ‘internal’ ERT facilitators/interventionists that supported the further development of the reorganization process at ER.

The ER project illustrated the changes that had taken place in WEB’s way of conducting interventions after the period in which WEB struggled for survival. WEB’s restructuring not only entailed reducing personnel and other costs, but it also involved conducting interventions more in a ‘consultancy’ manner. The number of projects grew, and projects became shorter. Any problems in projects were addressed within the frame of CHAT and DWR, but when time pressure made it necessary, data-based conclusions were replaced by experience-based, and occasionally intuitive conclusions.

10.2.5 2003-ongoing: Experimenting with hybrid ways of conducting interventions

As WEB’s main actors ‘became very good at scrambling to get money in’ and applied increasingly business-oriented rules and division of labor, the financial situation achieved a state of relative equilibrium. It was, however, a tension-laden equilibrium.

Although WEB was forced to adopt a business orientation after failing to secure FRST funding in 1998, the organization did not give up the idea of conducting research-oriented interventions. PC, RH and KW still operated within a theoretical frame based on CHAT and DWR. Furthermore, WEB had contacts with different natural science and technology-oriented Crown Research Institutes, as well as with several government agencies. Some Crown Research Institutes subcontracted WEB to address social science related elements within their FRST funded research projects. Government agencies (such as the Department of Labor and the Department of Education) had access to specific smaller research funds which they used to contract WEB Research. Despite the now greater business orientation, WEB’s members continued to struggle to retain the practice of conducting research oriented interventions as much as they could.

This struggle was perceived with ambivalence. RH put it the following way:

It’s also the orientation. Are we a research center? Are we a consultancy? The strength is we are both and it is a good thing, but it is also a difficulty. (RH 02/2004)

The strength was that elements of a ‘research center’ and a ‘consultancy business’ could be combined: PC, RH and KW had become increasingly good at conducting interventions effectively and efficiently, using different scientific or experience-based tools and models of work and organization to produce good solutions for
WEB had access to a vast network of former and actual clients and partners that would help them to acquire new work, or include additional people in projects where necessary. There was also the scientific frame of CHAT and DWR, which proved useful, even in intervention projects that were required to be carried out in a business-like manner.

The difficulty was that combining elements of a ‘consultancy business’ and ‘research center’ did not lead to a fully satisfying way of conducting interventions. Since the trauma of having to downsize, WEB did not grow in terms of personnel, but instead became used to taking on new work only until PC, RH and KW were operating at capacity. There was no longer-term public funding – a ‘coherent funded program’ as KW described it (see below) – that would make the permanent research-oriented development of new models possible. Neither had WEB chosen, in the alternative, the ‘pure’ business path of exploiting systematically the successful models they had developed for schools, manufacturers and other organizations.

This open question of what might constitute a viable and sustainable future business model was the main topic when the author of this study visited NZ to work with WEB. The dynamic is illustrated by the following discussion:

PC: This is a sustainable business which has value in its own right. [...] Do I want WEB as a business to become a part of New Zealand life, working in a way which is constantly – for as long we can foresee, long after I have parted from the world – a contribution to the well being for New Zealanders?.

 [...] 

KW: But, you know, after ten years we are no closer to that then we were ten years ago. [...] It would be a light-year’s difference, if we were doing it in a coherent funded program. The question for me is: When do I give up this dream?

 [...] 

RH: I have become quite aware of how my orientation within WEB has changed quite substantially since we formed the company. I was very much motivated by the idea that the business would provide me with the opportunity to continue something I was passionate about, which was the combination of doing research and learning stuff about people and what they did at work and business and so on – and making a difference. I was really passionate about that. And earning an income was there, but it wasn’t what was driving me. Now it is. Earning an income is definitely a driver. [...] We are all aging. [...] We don’t have the luxury of still remaining, doing this another ten years. (Change Laboratory session 1 02/2004)

The issue of finding a viable and sustainable future model of conducting interventions seems to have become more pressing. In 2003 WEB began an intervention project geared towards identifying new models of collaboration between small and middle-sized enterprises (SME) and government agencies in NZ, with an overall purpose of ‘enabling SME’s to thrive in a regulated world’. This project might bestow positive benefits for the overall NZ economy as SMEs represent a substantial part of that economy.
The initiative for beginning the SME project came from new initiatives within NZ government and government agencies aimed at moving beyond the concepts of New Public Management applied in the 1990s (a period referred to in NZ as ‘the reforms’). After the New Public Management period in NZ, relations between government agencies and SMEs have become increasingly complex, difficult to control and even more difficult to optimize in terms of achieving benefits for all involved parties. The SME project can be seen as a NZ-based piece of the international wave that has occurred after New Public Management: this new wave was called the Digital Era Governance by Dunleavy et al. (2005: 467–469, subsection 10.1.1).

The problem that had to be solved in the ‘SME project’ – a new model of work embracing a high number of very different activities – was challenging in many respects. WEB could rely on a great deal of knowledge in the form of tools and instruments for conducting interventions, as well as networks that could add knowledge for dealing with the problem in the SME project. Nevertheless, WEB’s actors had to tread new paths in order to deal with the project. No ready-made solution existed. As a consequence, the problem could not be treated as if it were a normal ‘consultancy’ project. Neither was the project, which included a large number of different actors and activities, a research project in a comparable manner to earlier research projects. RH described the project as ‘the most diffuse and amorphous project’ that confronted WEB with its strength and its weaknesses, being both a source of inspiration for the future as well as a source of trouble.

As a consequence, the beginning of the SME project saw a further period of experimentation begin at WEB. Different types of new ideas for combining consultancy and research elements in conducting interventions were developed and applied. A more detailed description and a closer analysis of the SME project will be given in the next chapter.

10.3 Main ways/models of conducting interventions emerging in WEB’s development

In the previous section, WEB’s development was divided into periods in which major changes of WEB’s way of conducting interventions occurred. The previous description of WEB’s evolution is refined to single out more clearly the dynamic and the characteristics of WEB’s main ways/models of conducting interventions. The aim is also to identify WEB’s connection to the broader cultural-historical processes around the development of forms of conducting interventions.


The initial developmental period (the period of the SDM project) had the following characteristics. There was an existing tradition of analytical research on educational activities (e.g., conducting surveys or literature reviews about ways of teaching and learning) in the PPTA. However, this kind of research was unable to develop a counter to the government’s program for deregulating the educa-
tion sector and implementing a model of school governance based increasingly on business practices.

As the idea for an alternative model for governing schools emerged, PC and other members of the PPTA were motivated to replace the old instruments (methods of analytical research, e.g., surveys, literature reviews) with new ones.

From today's perspective, the period when the SDM project took place was a time when a first layer of the main elements of WEB's later activity were formed. PC and RH, two of WEB's founding members, emerged as collaborative actors, combining knowledge from school practice with that from academic research. Developing an alternative model of governing schools and the in practice developed and tested alternative models of governing schools (with a high degree of integration of various groups) were object and outcome. The main instruments were Action Research, used as an intervention methodology, different concepts of schools, organizations and management as well as methods for analysis and feedback.

Secondary schools, the NZ secondary school teachers' union (PPTA), the NZ government and public, as well as the scientific community can be seen as key members of the community in the wider sense.

The PPTA's (and PC and RH's) model for governing schools could be understood as a 'participative, human-oriented' alternative to the government's New Public Management (NPM)-based model. As described in subsection 10.1.1, NPM was a late representative of the mass production logic of changing work and organization. The opposition between the government's and the PPTA's model corresponds with that between 'rational' (or technical) orientation versus 'normative' (or human) orientation in the Electrification wave and the Motorization wave (see section 8.2, section 3.2, and Barley and Kunda 1992).

Action Research is the main interventionist methodology of the 'humanized' intervention tradition (Human Relations and Organizational Culture and Quality). It was developed by Kurt Lewin (one of the main proponents of forms of conducting interventions of the Human Relations tradition, see section 5.3), and also used by Chris Argyris and Edgar Schein (two of the main proponents of forms of conducting interventions of the Organizational Culture and Quality period, see subsection 6.3.1).

In a sense, even the integrated subject (PC and RH) mirrors the cultural-historical experience from the Human Relations or Organization Culture and Quality periods. The action-oriented teacher PC and the researcher RH represent both sides of the 'practical theorist' Kurt Lewin.

The period during which the SDM project took place was the one in which an initial form for conducting interventions of the activity that would later come to be called WEB was developed. Its emphasis was on the formation of subject, object and instruments. The period is characterized by a connection to the cultural-historical knowledge from the Human Relations and Organizational Culture/Quality periods. PC and RH used main artifacts rooted in these traditions (such as Action Research) in the course of the expansive learning process of this first developmental period.

The beginning of the second developmental period of WEB was characterized by the desire of PC and RH to carry on with intervention research (as had been possible in the SDM project). This desire was, however, increasingly undermined by a radical government program of deregulating the science sector, which in turn decreased the possibility of conducting state-sponsored social science research in NZ. As NZISRD closed down and resources from the PPTA declined, the organizational community in which PC and RH then operated was disestablished and another had to be found (or developed). The possibility of the ongoing project (‘two years of a project still to run’) functioned as a springboard. The resources that remained in the NZISRD (primarily the new project that would continue for 2 more years) were transferred to WEB indirectly and represented a kind of ‘start up support’.

The second developmental period represents a time when a further layer of the core elements of WEB’s activity were formed. The independent research center became a new organizational community and the new ‘carrier’ of the subject, object and instruments that had emerged in the previous period. As described in the last section, the NZ government’s program of importing concepts of business practices into the science sector (with the consequence of NZISRD’s disestablishment) can be seen as a catalyst for the emergence of WEB.

WEB’s activity as an independent intervention conducting research center can be viewed as an integration of elements of the research activity at NZISRD, as well as the action-oriented developmental activity at the PPTA. All of WEB’s founding members belonged to either of the two organizations.

The way of conducting interventions that had been established in the SDM project was largely retained, except that the object of the activity was expanded to include the development of models for other organizations than schools. Corresponding to the expansion of the object, the expected outcome of interventions was to develop models for schools and other organizations. Action Research remained the intervention methodology and the earlier research methods did not change. The set of models concerning organization and management was extended as the object expanded. Schools, other organizations, the NZ government agencies (including FRST and MoRST), and the ‘scientific community’ can be seen as part of the wider community.

The rules and division of labor at NZISRD (whose roots lay in the earlier central NZ research institution, DSIR) profoundly influenced the constitution of WEB’s rules and division of labor. Quality and rigor were regarded as more important than time and money. RH became research director, PC senior researcher, and KW business manager. Kathryn Hawes Doig and Tony Bullard were also employed and supported the undertaking of research interventions.

PC and RH responded to the demise of their former community by establishing a relatively independent research center. In a sense, this response of PC and RH is a cultural-historically ‘classic’ response of (social science) researchers to contradictions with the community. Lewin, the pioneer of social science oriented forms
of conducting interventions, consciously looked for a supportive context for his
research center. His relatively independent position at MIT allowed him to realize
his vision of combining research and achieving social change (‘Research that pro-
duces nothing but books will not suffice’ (Lewin 1947b: 150), see subsection 6.3.7).
Another example of such a relatively independent research center is the Tavistock
Institute of Human Relations in the United Kingdom.


The third developmental period of WEB is characterized by the following ini-
tial state. The existing way of conducting Action Research oriented interventions
longer seemed a useful basis for understanding data about very different develop-
mental and learning processes in the ERSF project. It thus became a possible risk
for the future (especially in the context of the next FRST bid). As the situation in
the ERSF project did not improve and the FRST bid drew nearer, WEB’s actors
began a search for new main instruments. They acquired the knowledge to use
CHAT and DWR and applied this knowledge in the successful bid for FRST fund-
ing and the subsequent conduct of the LETN project.

The third developmental period led to changes in WEB’s main instruments.
At the end of 1998, WEB no longer regarded Action Research as their core in-
tervention methodology; instead they had begun to use CHAT as their theo-
retical frame and DWR as their primary intervention methodology. Within this
framework, different models from social sciences (related to organization, man-
gement, etc.), as well as different methods for gathering data such as observa-
tion, interviews, document analysis and questionnaires, were used. The object
and outcome of WEB’ way of conducting interventions changed in accordance
with the new main instruments. The object could be described as the need for
new models in different work activities (in schools, companies and other work
places), and the outcome as new models for work activities developed on the
basis of DWR-grounded, research-oriented interventions. The community ar-
rangement did not change.

DWR was developed by Yrjö Engeström in Finland (see section 9.2). The means
of transferring the cultural-historical knowledge from Finland to NZ was provided
by the personal contact of WEB’s actors with Yrjö and Ritva Engeström. The changes
made in the third period of WEB were focused mainly on the formation of a second
layer of main instruments, but also led to a change in the overall object. WEB’s ac-
tors appropriated and applied the main concepts and methods from the Finish
DWR tradition in the course of this third developmental period.


By the beginning of the fourth developmental period, WEB had consolidated
its way of conducting intervention as a research centre. However, the situation
changed quite radically as it became clear that FRST/MRST no longer favoured
bids that asked for independent research centers such as WEB to be funded. This
threatened the survival of WEB yet again. As the funding of the LETN project ran out, WEB’s actors were confronted with the fact that the income of WEB’s actors had to be created without FRST funding. The insight that intervention is essentially an ‘extremely insecure’ business (as formulated by KW) can be seen as a springboard. Following this idea, many elements of WEB activity were reduced to core functions. WEB changed from a research center into a business-oriented consultancy center.

The main interventionists – PC, RH and KW – remained as WEB’s actors. The object of WEB still could be described as a need for new models of schools and other organizations. However, the outcome, first and foremost, was no longer new models of schools or other organizations that were to be developed from an entirely research-oriented intervention.

The example of the ER project demonstrates this conclusion:

The object that the interventionist had to deal with in the ER project group was ER’s need for an appropriate model of education of train drivers. The problem that the interventionists faced at ER (described as the separated and contradictory relation between the system of train drivers’ formal education and the system of train driving practice) involved many actors and activities but was not entirely new in the field; other railway organizations and airlines had already encountered similar problems. This opened up the possibility of ‘adapting a scientific process to a consultancy’, as PC put it. DWR methodology and the Change Laboratory approach were used as a framework. What would normally be research-oriented steps were replaced to a large degree by understandings based on existing knowledge. A key example of this was the formulation of contradictions within the old model and the formulation of a more adequate model that might be used to overcome these contradictions. After a theoretical analysis of the client’s main contradictions, WEB’s interventionists suggested a model that would possibly resolve the contradictions as a basis for further discussion and orientation. This suggestion was based on their extant previous knowledge.

The new usual outcome of WEB’s interventions could be described as more adequate models of client activities. This outcome was usually based on knowledge from previous experience and on the adaptation of scientific processes constrained by given time and money. WEB’s main instruments were still CHAT as a theoretical frame and DWR as the intervention methodology. Within this framework a ‘store’ of experience-based models and different models from social sciences were used.

WEB’s way of conducting interventions changed in a quite radical manner. Deeper reasons for these overall changes in activity were new rules and a new division of labor which emerged after WEB’s restructuring:

It became of central importance to demonstrate efficiency in projects and to spend only as much time as the client was willing to pay. Projects were conducted more individually by WEB’s interventionists. There was no additional staff to undertake support roles; only occasionally, and only if a particular service was
needed and was demonstrably funded, was someone engaged for a limited time. The relations with clients remained cooperative.

WEB responded to the withdrawal of funding by the old community by establishing a more business-oriented consulting center for the purpose of conducting interventions. WEB’s response is again cultural-historically not entirely new. The systemic consultancies that were analyzed in section 6.3 often display a close collaboration with social science research institutes, and researchers often move from such institutes to systemic consultancies.81

The fourth period of WEB represents a period in which a second layer of community logic was formed, but which also affected significantly the object, and the whole general model of WEB’s way of conducting interventions. From one perspective this new way of conducting interventions appears as a contraction. It is important to emphasize that this development also contained aspects of expansion. It became possible to address ‘multi-system’ problems (albeit not historically new ones) in a relatively short period of time on the basis of a deep theoretical understanding and existing knowledge.

**Period 5 (2003–ongoing)**

In spite of the consolidation of the ‘consultancy model’, WEB remained interested in conducting research oriented interventions and regained some (indirect) access to specific smaller research funds. The beginning of the fifth developmental period of WEB was characterized by the primarily rather latent dualism of either conducting research- or ‘consultancy’-oriented interventions.

This situation became more pressing when the government initiative to address the complex collaboration between SMEs and government agencies in NZ became more concrete and the project got under way.

The problem that needed to be solved in the ‘SME project’ can be described as the imperative to develop new models of collaboration between small and middle-sized enterprises (SMEs) and government agencies in NZ with the overall purpose of ‘enabling SME’s to thrive in a regulated world’.

The current developmental period of WEB is still in progress. It is dominated by the experience of being confronted with a new object – the qualitatively new problem in the SME project – and has potential to lead to important changes with regard to the way of conducting interventions that may go beyond earlier research or ‘consultancy model’ orientations (i.e. ‘classic’ historical types of conducting interventions).

There is a strong connection between the SME problem and overall societal development in NZ and beyond. After the New Public Management period in NZ (dominated by the mass production logic of the late Motorization wave), relations between government agencies and SMEs have become increasingly complex.

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81 We can also point to the example of SIAR, a former Swedish intervention research center that became a consultancy business.
difficult to control and even more difficult to optimize with a view to achieving benefits for all involved parties (SMEs and the economy as a whole). The initiative for embarking on the SME project can be interpreted as being associated with ‘Digital Era Governance’ the public management logic emerging after New Public Management (see Dunleavy et al. 2005: 467–469, subsection 10.1.1).

This study suggests that the problem in the SME project corresponds to the qualitatively new form of post-industrial problem (in part context breaking and retaining, in part new and old, affecting a large number of users) described in Chapter 8. The complexity and diversity of relations between SMEs and government agencies has its roots in the New Public Management period. The SME problem is situated between different work activities. Some aspects of the problem are historically new, while others are a repeat. In a sense, the problem is related to the attempt to restore some balance to the now visible defects of the New Public Management based reforms; however, due to new ICT-related possibilities, it also opens up an entirely different context. This claim will be substantiated in the next chapter.

The current and fifth period of WEB is characterized by WEB encountering a new object (the hypothetical post-industrial problem in the SME project), which ‘pulled’ WEB into a zone of proximal development that might lead to a way of conducting interventions that is beyond the research/consultancy model’ dilemma. This study also suggests that WEB’s zone of proximal development is related to the theoretical hypothesis of a zone of proximal development of forms of conducting interventions.

Table 10.2 summarizes the key characteristics of WEB’s ways/models of conducting intervention as they emerged in the different periods with a focus on problems and work activities (characterizing the object), as well as on subject, instrumentalities and the community arrangement. Furthermore, how those ways/models relate to previous cultural-historical knowledge about problem-solving processes and forms of conducting interventions is highlighted.
Table 10.2: Characteristics of WEB’s ways/models of conducting interventions from 1989 to 2003

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problem</strong></td>
<td>Alternative model of governing schools</td>
<td>Alternative/ enhanced models for schools and other organizations</td>
<td>New models for different work activities (schools, companies, others)</td>
<td>New models for different work activities (schools, companies, others)</td>
<td>New models of collaboration between SMEs and government agencies in NZ</td>
</tr>
<tr>
<td><strong>Clients</strong></td>
<td>Single schools in NZ</td>
<td>Single schools and other organizations</td>
<td>Single work activities</td>
<td>Higher number of single work activities</td>
<td>Higher number of interconnected work activities</td>
</tr>
<tr>
<td><strong>Subject</strong></td>
<td>PC (PPTA), RH (DSIR)</td>
<td>PC, RH, KW, Tony Bullard, Kathryn Hawes Doig</td>
<td>PC, RH, KW, Tony Bullard, Kathryn Hawes Doig</td>
<td>PC, RH, KW</td>
<td></td>
</tr>
<tr>
<td><strong>Main instruments</strong></td>
<td>Action Research methodology, different concepts about development of schools, organization and management</td>
<td>Action Research methodology, different concepts about development of schools, organization and management</td>
<td>CHAT as main theoretical frame, DWR as methodology; different concepts from social sciences (about organization, management, etc.)</td>
<td>CHAT as main theoretical frame, DWR as methodology; 'store' of experienced based models as well as different concepts from social sciences</td>
<td></td>
</tr>
<tr>
<td><strong>Community (in narrow sense and wider sense)</strong></td>
<td>PC-RH and school actors, Schools, PPTA, government/public, scientific community</td>
<td>WEB as independent research center with focus on quality and scientific rigor, including interventionists (PC, RH, KW) + central staff</td>
<td>WEB as independent research center with focus on quality and scientific rigor, consisting of interventionists (PC, RH, KW) + central staff</td>
<td>WEB as a business with focus on time and money strictness, consisting of individual interventionists (PC, RH, KW)</td>
<td>Cooperative relations to many different kind of scientific, state and business organizations (NZ and international)</td>
</tr>
<tr>
<td><strong>Relation to previous societal problem-solving processes or forms of conducting interventions</strong></td>
<td>Action Research instrument from Human Relations and Organizational culture/learning traditions (e.g., Lewin, Argyris)</td>
<td>Community arrangement of relatively independent research center (Lewin's or Argyris' research center)</td>
<td>CHAT and DWR instruments from Helsinki based DWR-oriented research center</td>
<td>Community arrangement of social science-oriented consultancies such as the systemic consulting companies</td>
<td></td>
</tr>
</tbody>
</table>
10.4 Conclusions: no escape from the research logic vs. business logic dilemma?

The aim of this chapter was to study the experiments and formation processes of WEB, and to investigate how WEB’s development is related to the overall development of forms of conducting interventions as had been summarised earlier in this study.

WEB’s evolution as an activity was analyzed in terms of periods of developmental logic that corresponded to major qualitative changes in WEB’s object – WEB’s way of conducting interventions. These ways/models of conducting interventions were analyzed and linked to concepts used in Chapter 8 to characterize the overall dynamic of historical types of conducting interventions. It became apparent how much the development of ways/models of conducting interventions in the particular case of WEB was influenced by broader societal processes in the late period of the Motorization wave and the installation period of the Computerization wave. After the NZ government’s New Public Management program acted as a kind of a catalyst for the emergence of WEB, the Digital Era Governance-related initiative of the NZ government once again acted as a catalyst for WEB’s most recent development.82

Analysis revealed that WEB’s activity consisted of several historical layers of conducting interventions and that it was deeply connected to existing cultural-historical knowledge related to problem-solving processes and forms of conducting interventions.

As far as the main problems around client activities are concerned, WEB’s focus was on historically new, context balancing problems (alternative model of governing schools) in the first and second developmental period. It developed towards historically new, context breaking and balancing problems (new models of work activities) in the third historical period. The focus changed to historically old problems (appropriate models of work activities) in the fourth period. In the final period WEB encountered the problem between SMEs and NZ government agencies. This study argues that this problem is an instance of the ‘post-industrial problems’ (situated between activities; partially context breaking and balancing, partially historically old and new).

Key instruments in the first and second developmental periods were Action Research as an intervention methodology (a secondary/tertiary instrument in the sense of Wartofsky), and further theoretical concepts (associated with education, organization and management). In the third period, DWR became the main intervention methodology and CHAT the main theoretical framework (complemented by further social science concepts). DWR was interpreted in the previous chapter as a ‘tertiary’ instrument with a context breaking and balancing potential. In the

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82 These observations also support the plausibility of the connection between types of conducting interventions, societal problem-solving processes and deeper societal processes in the installation, deployment and decline periods of techno-economic waves (in the sense of Freeman, Louçã and Perez) made in the last chapter.
fourth period, DWR and CHAT remained the main instruments but were increasingly complemented by experienced-based representations of solutions for social and organizational problems.

In the second and third developmental period, the main community models were based around social science-oriented research centers (similar to Lewin’s center), changing in the fourth developmental period to a social science-oriented consulting company (akin to systemic consulting companies).

Relations between the main problems, the main instruments and the community logics in the case of WEB and previous cultural-historical patterns of societal problem-solving processes and forms of conducting interventions were revealed. These relations were specific for different elements (object, instruments, community arrangements) of WEB’s activity. Nevertheless, it might be instructive to attempt a rough outline of the overall dynamic of WEB’s ways/models of conducting interventions:

In the first two periods, WEB moved towards an Action Research-oriented problem-solving center, a typical representative of forms of conducting interventions that addressed historically new, context balancing problems. In the third period, WEB developed the form of a DWR-oriented problem-solving center addressing historically new, context breaking and balancing problems. In the fourth period, WEB developed towards a DWR-oriented problem-solving consulting company that more often addressed historically old, context breaking and balancing problems. It became possible to address problems that involved many actors and activities (albeit historically old ones such as in the railway case) in a relatively short frame of time. The fifth period seems to be related to post-industrial problems and might lead WEB to a new way of conducting interventions.

Next, the study will clarify how this understanding of WEB’s evolution contributes to addressing the research question of this chapter, which was:

*How does the experience of a specific case experimenting with finding a way of conducting interventions enrich the historical hypothesis of a zone of proximal development of forms of conducting interventions?*

Post-industrial forms of conducting interventions were characterized by resolving more effectively the industrial contradictions of (1) either focusing on historically new problems and creation of solutions or focusing on historically old problems and dissemination of solutions as well as (2) either focusing on context breaking problems and fundamental change of the model of work organization or focusing on context balancing problems and transforming partial aspects (see figure 10.2).
The evolution of WEB can be interpreted as a series of experiments that contributed to the discussion about how to resolve the industrial contradictions. This series of experiments is set out in the four-quadrant-diagram depicted above. WEB ‘developed’ from a ‘classic’ Action Research-oriented variant of social science-oriented problem-solving centers (in the first two periods) to a DWR-based one (in the third period). In the previous chapter, academic DWR was interpreted as contributing to the resolution of the contradiction between fundamental change and balanced transformation, but not to the contradiction between innovation and dissemination. Hence this form of conducting intervention is placed in the center of the upper half of the four-quadrant-diagram.

In the fourth developmental period WEB ‘moved’ to a hybrid form of conducting interventions. The community arrangement, which followed a business logic to a higher degree, was used in combination with innovation facilitating instruments such as CHAT and DWR, which had previously been used only in academic settings. This business-oriented community logic had the limitation that the time for research and experiment was radically reduced. On the other hand, WEB came into contact with a larger number of clients and developed a quicker, but nevertheless theoretically guided way of conducting intervention projects.

It seems that WEB did not succeed in creating an organization that integrated the full strength of a research center (incorporating experimentation and creation of innovative solutions into intervention) with the full strength of a business-oriented organization (high scale and fast production of solutions). Depending on the particular intervention project, a tension-laden switch from the research logic...
to the business logic could be observed in WEB. The strength and weaknesses of both logics were preserved. It seemed to be difficult for WEB to escape the dualism between the innovation-oriented academic logic and the dissemination-oriented business logic.

This chapter, however, has argued that WEB’s present local zone of proximal development is related to the emergence of a post-industrial problem. This study argued earlier that post-industrial problem would not be addressable effectively by neither the business logic of the business-oriented solution disseminators, nor the academic logic of the social science-oriented problem-solving centers. The remaining task for this study is to analyze the SME project, to investigate how WEB addressed the new kind of problem the SME project presented and to examine the possible new way of conducting interventions that might result. These are the tasks of the next chapter.
11 The SME project as an experiment of involving multiple interconnected activities in an innovation oriented intervention

11.1 Introduction, procedure and overview of data

11.1.1 Introduction

This thesis has argued that the changing conditions in the Computerization wave entailed the emergence of complex network organizations and post-industrial problems (being located between activities). The development towards more complexity in work activities would signify challenges for ‘industrial’ forms of conducting interventions (e.g., consultancies such as Accenture and McKinsey) and lead to the emergence of post-industrial forms of conducting interventions. Post-industrial forms were defined by a more effective way of resolving the following industrial contradictions of forms of conducting interventions:

(1) Either focusing on historically new problems and the creation of solutions or focusing on historically old problems and the dissemination of solutions;
(2) Either focusing on context breaking problems and fundamental change of the model of work organization or focusing on context balancing problems and transforming partial aspects.

The aim in the previous two chapters was to enrich this ‘indirect’ outline of post-industrial forms by identifying concrete examples of instruments as well as examples of actors and community arrangements of those forms. Chapter 9 argued that DWR could be seen as an intervention instrument that contributes to the resolution of the contradiction between either focusing on context breaking problems and fundamental change or focusing on context balancing problems and transforming partial aspects. Chapter 10 argued on the basis of the analysis of the historical development of WEB that neither the business-oriented logic and community arrangement of consultancies nor the academic logic and community arrangement of research centers offered an effective way of resolving the contradiction between innovation and dissemination.

In this chapter WEB’s experience of addressing the problem in the SME (small and middle sized enterprises) project will be studied. WEB’s most recent developmental period is characterized by the challenge of having to deal with the problem arising in the SME project. As described in the last chapter, this problem was proposed as being an example of the qualitatively new form of problems – that is, post-industrial problems. Because of the nature of the problem in the SME project, WEB’s actors were motivated to conduct the project in a manner that seems to go beyond ‘industrial’ forms of conducting interventions. The struggle and experiment to find an effective way of conducting interventions (WEB’s local zone of
proximal development) will be used to enrich the historical hypothesis about the emergence of possible new forms of conducting interventions (hypothetical zone of proximal development of forms of conducting interventions) (see figure 11.1). WEB’s struggle to find a new way of conducting interventions was reflected and supported by a Change Laboratory (see section 9.2), facilitated by the author of this study. The corresponding research question in this chapter is:

How does the experience of a specific project where a new model of conducting interventions is developed enrich the historically based comprehension of a zone of proximal development of forms of conducting interventions?

Figure 11.1: The focus in Chapter 11 within the context of the overall procedure

11.1.2 The significance of the spatiotemporal context of the SME project for studying new forms of conducting interventions

Carlota Perez argues that the assimilation of the Computerization revolution by society is a process that takes place at different levels and in different stages. In the early phase of the installation period of the Computerization wave, the assimilation of new possibilities occurred mainly on the technological level. Organizational and institutional spheres, for a limited time, continue to be dominated by the old paradigm. Only in the 21st century does the assimilation of the computerization revolution fully reach the organizational and institutional spheres of society (Perez 2002: 41–43).
Perez’s theory of societal processes in the installation and deployment periods of the techno-economic wave explains why New Public Management (NPM) remained as the dominant public management paradigm in NZ and other western countries in the early phase of the Computerization wave. Of course, computers and other new technical artifacts of the ICT revolution were deployed in the public sector in NZ. However, a new constellation of ideas and reforms in the public sector – termed ‘Digital-Era Governance’ (DEG) by Dunleavy et al. (2005) – that moved beyond the organizational and institutional logic of the Motorization wave (i.e. the mature mass-production paradigm) seems to have been emergent since the 2000s.

An example of the emergence of a new constellation of ideas in NZ is the ‘SME project’. Following the New Public Management period in NZ, relations between government agencies and small and middle-sized enterprises (SMEs) became increasingly complex, difficult to control and even more difficult to optimize to achieve benefits for all parties. The emerging negative consequences of NPM and the emerging possibilities in the Computerization wave led to an increasing debate about reintegrating functions into the government sphere, adopting holistic and needs-oriented structures, and progressive digitalization of administrative processes. The SME project is a result of such debates: an intervention project focused on finding new models of collaboration between SMEs and government agencies in NZ with the overall purpose being to ‘enable SMEs to thrive in a regulated world’.

The nature of the problem in the SME project profoundly influenced the experimental manner that characterized the way in which the intervention was conducted. The SME project began in 2003 and continued formally until 2006, taking place during the period of the emergence of Digital-Era Governance, and possibly also during the period when the Computerization revolution began to reach the organizational and institutional spheres. Thus, WEB’s most recent experimental period is deeply embedded in the context of qualitatively new developments in the world of work associated with Digital-Era Governance and the evolution of the Computerization wave.

11.1.3 Procedure and overview of data in this chapter

The focus in this particular empirical instance will be connected to the overall development of problem-solving processes and of historical types of conducting interventions, as was the case in the last chapter (see subsection 10.1.3). First, the development of the SME project will be described. The project was divided into three phases designed by the key project members. These phases also correspond with major qualitative changes in the object of the project – that is, the problem of SME-government agency relations that had to be dealt with in the SME project.

The SME project stimulated theoretically interesting developmental processes about WEB’s way of conducting interventions. Conclusions about these developmental processes as well as about the new way of conducting interventions used in the SME project, will be possible. It will subsequently be analyzed how the experi-
ence from earlier societal problem-solving processes and historical forms of conducting interventions influenced the development of the SME project and – vice versa – how the experience from the local case possibly contributes to more general questions of the development of societal problem-solving processes and forms of conducting interventions.

This kind of analysis reflects the logic of the specific case but simultaneously opens up the possibility of relating the case to the overall development of historical types of conducting interventions. The transition from raw data to developments in project phases, as well as from developments in project phases to interpretations about (expansive) learning processes and characteristics of an emerging new way of conducting interventions, will follow an analytical procedure conducted step-by-step. This will make the difference between original data and analytical-interpretative conclusions as transparent as possible (see subsection 10.1.4).

Raw data about the development in the SME project is described in the following table, 11.1. The data consists of interviews and participant observation, document analysis and data from change laboratory sessions conducted by the author of this study with WEB as a means to support its development (all from 2004), as well as the analysis of documents and interviews (conducted mainly by telephone) about Phase 2 and Phase 3 of the project.

Table 11.1: Overview of data used in Chapter 11

<table>
<thead>
<tr>
<th>Source of data</th>
<th>Time focus of data</th>
<th>Time when data was collected</th>
<th>Content of data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Interviews</td>
<td>2004 (-2006)</td>
<td>2004</td>
<td>Several interviews with 4 of the 5 founding members of WEB and the project leader about the SME project (1989–2004)</td>
</tr>
<tr>
<td>2. Participant observation</td>
<td>2004</td>
<td>2004</td>
<td>Participant observation of main events in the SME project (complemented by interviews with the interventionists and the clients as well as document analysis about meeting protocols and reports)</td>
</tr>
<tr>
<td>3. Documents</td>
<td>2004–2007</td>
<td>2004–2007</td>
<td>Written documents filed by WEB: - Meeting protocols and memos - Important correspondence within WEB and with clients or other actors - Publications and other papers about the SME project</td>
</tr>
<tr>
<td>4. Change Laboratory sessions</td>
<td>2004 (-2006)</td>
<td>2004</td>
<td>Sessions 1, and 5–10 of the Change Laboratory with WEB that contained discussion about the SME project</td>
</tr>
<tr>
<td>5. Follow-up interviews</td>
<td>2004–2007</td>
<td>2004–2007</td>
<td>Regular telephone interviews and one face-to-face interview (in 2005) to follow the development of the project</td>
</tr>
</tbody>
</table>
The raw data was processed towards 'object-oriented events' and event sequences that were important for characterizing major changes of the object within the three phases of the SME project. The description remains very close to the raw data. The three phases are described in section 11.2. The next analytical step was to analyze the developmental processes in the SME project as expansive learning processes – focusing on developmental contradictions and expansive learning actions (Engeström 1987, 1999). This second analytical step can be described as dialectical analysis. The outcome of this analytical step is described in section 11.3. The third analytical step used the outcomes of the previous steps to analyze the characteristics of the way of conducting interventions that emerged in the SME project.

In the previous chapter, it became clear that projects played an important role in WEB’s development by confronting WEB’s old way of conducting interventions and by inspiring a new way of conducting interventions. Thus the SME project will be analyzed as an example of a particular way of conducting interventions; however, we will remain conscious at the same time that the case being analyzed contains only elements of a possible new model of conducting interventions; those elements have to be singled out. For this third analytical step the same concepts are used as in previous analyses of historically identified forms of conducting interventions. This analytical step will be conducted in section 11.4.

In section 11.5, on the basis of previous outcomes the emerging new way of conducting interventions in the SME project will be related to the historically grounded comprehension of the zone of proximal development of forms of conducting interventions leading to a more generalized outline of an instance of a new form of conducting interventions. Conclusions are presented in section 11.6.

11.2 The intervention process in the SME project

The SME project had different names at different times. Until mid-2004 it was officially called the ‘SME Good Regulation project’; sometimes the informal short form ‘SME project’ was used. Taking up a well known slogan in NZ, it was then officially renamed as the ‘Pure Business Project’. In the present study, ‘SME project’ will be used.

83 This first analytical step is described as ‘evolutionary analysis’ by Toiviainen (2003: 83–85) and Poole et al. (2000: 65–66).
84 The expansive cycle (see section 2.1) constitutes a main analytical instrument for the dialectical analysis of this specific developmental period. This analytical use of the expansive cycle in this part of the thesis should not be confused with the fact that one of the intervention approaches discussed (DWR) uses the cycle as a tool for guiding the intervention process. The same is the case with the (predominantly analytical) use of data from the Change Laboratory the author of this study conducted with WEB to support their development. This use of the Change Laboratory should not be confused with the fact that WEB’s actors themselves use the Change Laboratory as an intervention tool.
The SME project started in 2003 and ended formally in 2006. In the project plan, it was divided into three phases: 'Phase 1: Understanding issues', Phase 2: 'Developing solutions' and 'Phase 3: Delivery of Solutions'.

11.2.1 Phase 1: Understanding issues

After the New Public Management (NPM) period in New Zealand relations between government agencies and small and medium-sized enterprises (SMEs) became increasingly complex and difficult to control. In NZ, SMEs were traditionally regarded as key parts of the economy and social life. Representatives of the NZ government and government agencies often emphasized the importance of SMEs for NZ’s economy and society as a whole, as exemplified in the following quotation from the project plan:

SMEs are vital to the economic and social life of NZ. Firms with fewer than 20 Full-Time Employee Equivalents (FTEs) make up 97% of all firms, and account for around 40% of both GDP and employment. NZ has a large number of both ‘micro’ enterprises and self-employed, and the numbers are growing. These enterprises often come into existence and disappear quickly. (SME Project Plan 2004: 7)

However, although this importance was acknowledged by governmental agencies, the reality seemed to be that SMEs and government agencies did not always support each other sufficiently, on the contrary: SMEs often reported that government regulations were a significant burden (imposing costs of time and money), and a key factor in restraining growth. Government agencies, on the other hand, emphasized that the rules were necessary to secure ‘public goods’ such as the health and safety of workers.

However, to adjust regulation to support SMEs in a better way was not simple since the responsibility for creating and administering regulations was spread across many different government agencies all of whom believed it was their responsibility to protect different ‘public goods’. Furthermore the reduction or increase in regulation would not automatically enhance SME possibilities for growth as earlier experience in the government agencies had shown. Thus, government agencies wanted to support the development of SMEs, whilst maintaining the view that regulations and government agencies should help these bodies rather than hinder them. All the same, they did not find the means to avoid regulation causing growth restraining problems for SMEs.

At the beginning of the 2000s, the problem of relations between SMEs and government agencies was increasingly articulated by actors from government agencies, research organizations and SMEs. This time of realization that ‘something should be done’ can be described as a pre-phase of the SME project (the project started formally in 2003).

The need for better relations was discussed in a section of the NZ Department of Labor (in the following DoL). This group consisted of Richard Whatman (hereafter, RW), Karen Wong and other members of DoL, who aimed to address the
SME-government agencies relation problem but who needed support in order to accomplish this goal. RW contacted members of WEB to participate in discussions with DoL members and others interested in the problem. He knew WEB, since WEB had conducted earlier some projects with government agencies and also with DoL. Dialogue between RW and other members of DoL and WEB over a number of years finally led to an outline of the SME project.

RW became project leader and DoL contracted WEB to design and facilitate an interventionist methodology for what was meant to be a 3-year intervention project. The project was funded by a Cross-Departmental Research Pool grant from the NZ Ministry of Research, Science and Technology (MoRST) as an experimental, interventionist research project that should find a way to support ‘SMEs to thrive in a regulated world’.

For WEB’s members it was clear that there would not be a ready-made solution to the problem of relations between SMEs and government agencies as there had been in some of their earlier projects. The following aspects of the problem were perceived as generating particular difficulties.

The number and variety of possibly important stakeholders was enormous, since the project examined the broad social systems of regulation of SMEs. Figure 11.2 illustrates which key stakeholder groups were identified by WEB and DoL as relevant for the overall project. The overview of stakeholders groups was made according to the knowledge stage at Phase 1 of the project and was considered to be still incomplete.

Figure 11.2: SME ‘Good Regulation’ project key stakeholder groups
The consequence of this first aspect – the high number of relevant stakeholders – was that the problem of relations between SMEs and government agencies (from a general point of view) was characterized by a high number of complex relationships between (and within) regulatory agencies, SMEs and SME networks.

The SME problem was at this early stage of the project referred to in a general way (‘how could SMEs thrive in a regulated world’). However, the main actors from WEB and DoL emphasized that SME-government agencies’ relations should be understood as consisting of a manifold of specific systems of social activity. As a consequence, it was necessary to focus in the project on relationships between certain specific SMEs and government agencies. On the other hand, final solutions would require a general impact. Accordingly, the second extremely challenging aspect of the problem of relations between SMEs and government agencies was that any resolution had to address the problem both generally and specifically.

This was stated in the project plan in the following way:

At this stage of the research ‘the overall system of regulation’ is defined very broadly. In Phase 2, the specific activity system(s) […] will be subjected to detailed cultural-historical research, as well as to detailed research on current practices. (SME Project Plan 2004)

Dealing with such a high number of interrelated stakeholders and problems meant moving into new terrain. WEB actors were convinced that Activity Theory and Developmental Work Research could help them to design a methodological procedure that would lead to a way to address the problem in spite of the difficulties. Those difficulties were the need to integrate the large number of stakeholders as well as the need to derive specific solutions for specific problems that would bring real help to SMEs and yet simultaneously create the possibility of a general impact.

They were, however, also convinced that WEB’s previous use of the DWR-methodology would have to be rethought, and that designing a specific experimental procedure for addressing SME-government agencies relations would be necessary. It would have to include, and possibly extend, the latest developments in CHAT and DWR. Accordingly, RH, PC and KW saw the procedure in the SME as part of the next generation of the theory of expansive learning that points to new forms of work organization that require negotiated ‘knotworking’ and ‘co-configuration’ across boundaries. (Hill et al. 2005: 6)

Correspondingly, the SME project was based on DWR intervention methodology, but also experimented with and extended it.

The planning (and also the later conduct) of the experiments was accompanied by critical and exhaustive discussions. Several controversial ideas emerged about the experimental use of DWR (which will be described in detail subsequently).
One focus in the debate was whether the experimental use of DWR instruments followed an appropriate ‘scientific’ methodology. The increasing demands of the project (underlined by RW and other members of DoL) often inspired pragmatic resolutions to these debates.

In his introductory statement at an important project meeting with actors of government agencies and SMEs (the first IDT meeting, see below) PC emphasized the experimental and risky nature of the project:

PC: I am quite an experienced facilitator, sometimes facilitating very large groups. I want you to know now that I am probably more nervous in this facilitating role than I have been for some years and the reason for that is [...] We and the people of the Department of Labor have developed a very complicated idea. And we know it is high risk. And we know it is on the edge. [...] It is a good idea. I think it works. But it is risky. And everything about this project has this quality. [...] It is a difficult process. And that is necessary; that is the stuff of innovations. That is the stuff of innovations. Innovation is like that. It involves the unknown. It involves the things in different ways, not ways you are familiar with. What we are trying here is to be innovative in our approach, thinking about and acting around government regulations. And there is risk in that. (IDT meeting 1, 03/2004)

There were equally serious debates about the effective way to manage such a complex and experimental project and whether someone fulfilling a central, coordinating function was needed (which had existed when WEB used a research center model supported by FRST). RH reflects on this:

It is not appropriate to run us as a hierarchy, to have somebody working to me to do tasks, administrative tasks. [...] There is a lot of work that just has to be done by the person running the project or involved in the project. But there are other tasks which I believe could be done by somebody else. We could do it, if we could fund it. [...] we would have been more efficient in running the process and the client would be more satisfied. [...] It is the fact that this is the most diffuse and amorphous project. I don’t thing it is anybody’s fault it is certainly not WEB’s fault for not having someone to do that. (RH 2/2004)

The question of coordination of the SME project was resolved for some time as ‘project managers’ from DoL took over the coordination.

The plan of the project enclosed three project phases, outlined in the following.

Phase 1 was called the phase of Understanding Issues. The goal of Phase 1 was to gather and analyze information and to provide a clear indication of exactly where regulatory problems lay and to highlight areas where solutions were most needed. It was also meant to uncover good practice in SMEs and government agencies that could be used to overcome those problems.
Phase 2 was called the phase of Developing Solutions. It was intended to use information from the previous phase to develop specific solutions to improve regulatory development and regulatory requirements for SMEs.

Phase 3 was called the phase of Implementing Solutions. The overall goal of the last phase was meant to provide practical support for a change in regulatory practice, so that SMEs and Government both benefited from regulatory activities. This was to be achieved by focusing on the broader dissemination of the regulatory solutions/tools developed in Phase 2.

The logic of the three project phases corresponded roughly to steps of the cycle of expansive learning (see figure 2.4 in section 2.1). Phase 1 of the project corresponded to step 1 of the cycle, Phase 2 of the project to step 2, and step 3 of the cycle and Phase 3 of the project to steps 4 and 5.

Against the background of the uncertainty within the project and its experimental design, it was clear for WEB and the project leader RW that this procedure might have to be changed subsequently. The following part of this subsection describes in more detail how the main steps of Phase 1 of the project were conducted. Figure 11.3 gives an overview of the steps and the overall logic of Phase 1.

Figure 11.3: Structure of Phase 1 of the SME Project
The first step conducted by WEB and the project leader RW was to initiate interaction with existing and new contacts within government agencies and SMEs in order to outline the project and its goals. This involved different kinds of meetings and setting up contact networks in each government agency to enable future access to key stakeholders to contribute to subsequent research activities. This step was so important that tools such as communications strategy (outlining key messages, key audiences, preparing material required for each audience to stay involved in the project) were specially developed for it.

As WEB had conducted many projects with different organizations in NZ (both with SMEs and government agencies), PC, RH and KW had good contacts with a large number of people in NZ which they used now to establish networks for supporting the project. PC gives one example of how earlier contact (from the ERSF project, see subsection 10.2.3) with a former client became helpful in the SME project:

One of the case studies was a Maori organization in Auckland. The chief executive of that organization [...] in which we did a case study is the Minister of small business to who we make an announcement this afternoon. He remembers us. He remembers us, because we were Europeans who came into a Maori organization and managed and worked successively with that organization. [...]. When Richard Whatman went to the minister of small business [...] he [the minister, ZB] said ‘Who is working on the project?’ and Richard said ‘We contracted this company, WEB Research, to help us. [The minister, ZB] said: ‘Oh, that is really good. I remember them, they are really good.’ So that was an important moment. (PC 02/2004a)

One section of the networks of people built up was directly included in the project. These people – owners and workers of SMEs, and representatives of government agencies – were invited to take part in a sequence of seven ‘exploration group’ meetings. The sequence of exploration group meetings represented the next step of the SME project, and consisted of 5 half-day workshops with government agencies and 2 half-day workshops with SMEs (see figure 11.3). Government agencies taking part in these exploration group meetings were the Department of Labor (DoL), the Accident Compensation Corporation (ACC), the Ministry of Economic Development (MED), the Inland Revenue Department (IRD), and Statistics NZ. The Ministry of the Environment was meant to have also an exploration group meeting, but chose not to engage in the project in this form. Exploration group meetings for the SMEs were conducted at the North Island (Auckland) and the South Island (Christchurch) to reduce traveling costs and time for SMEs.

The exploration group meetings were planned and facilitated by WEB. Each exploration group comprised a mix of management, policy and operational staff from the particular agency. Furthermore, someone from at least one of the other agencies (called ‘the visitor’) was invited. The visitor acted as a kind of tool for boundary-crossing communication. He or she was meant to provide an ‘outsider’s’ perspective, and also to help facilitate a clearer explanation of the roles and responsibilities of the agency being visited.
The aim of the exploration group meetings was to communicate the goals of the project, and gather feedback on areas of importance or concern. In these meetings, the participants investigated and discussed how their department or agency related to SMEs (when dealing with regulation), what was working well between their department or agency and SMEs in the area of regulation, as well as any key problems they could identify.

The data generated at the exploration groups was analysed by WEB Research and DoL with the aim of conducting a first step towards developing a kind of model about the government agencies-SME relations (called the ‘conceptual map’). Further central outcomes of the analysis were intended to be the key dilemmas and main examples of ‘good practice’ in the SME government relations.

Parallel to the conduct of the exploration groups, scientists from Massey University (from Wellington, NZ) were contracted to compile an annotated bibliography of literature – both internationally and from New Zealand – related to the problem in the project. The goal was to provide the SME project with significant existing models about relations between SMEs and government agencies.

The analysis of data collected in the exploration groups, and the outcome of the literature review was summarized to serve as key inputs for the next step of the project: the three full-day meetings of the Interim Design Team (IDT) (see figure 11.3).

The Interim Design Team (IDT) was established as the main project group. The role of the IDT was to analyse and reflect upon the data summarised from the exploration groups and from the annotated bibliography, using analytical models from CHAT and DWR and their personal knowledge and experience of working in the SME sector. Through this process, the IDT was meant to identify the areas of interest that could be further explored during Phase 2 of the SME project. The IDT was also tasked with working further on the model about SME-government agencies relations (the ‘conceptual map’), and also with making suggestions about leadership and management of the SME project in the further process.

The IDT emerged out of the exploration group meetings, and consisted of people from two SMEs and five government agency exploration groups, as well as of further actors from DoL and WEB. As planned, a cross-organizational team from the communities of regulatory agencies, SMEs and research had been formed. It included a high number of ‘visitors’ that had participated in more than one government agency exploration group, thereby gathering people who had already become used to changing perspectives.

To prepare Phase 2 of the SME project – which focused on the development of solutions – the scope and focus of the further process had to be defined more in detail. On the basis of processing and discussing the given material from the exploration groups as well as inspired by the reviewed literature, ‘experimental
practice fields\textsuperscript{85} needed to be identified and recommended as potential areas for more intensive developmental research.

These experimental practice fields had to contain a live and real struggle over a specific regulatory problem between government agencies and SMEs in which new ways of regulations could be developed and tested (in Phase 2 of the project), and which might be generalised to other settings and other problems (in Phase 3).

Discussions about concrete examples of problems between SMEs and government agencies that could be addressed more in detail (possibly becoming an ‘experimental practice field’ in the second phase) took place in the IDT meetings. In the first (of three) IDT meetings the later central practice field – the difficulties of SMEs in the horticultural industry in Hawke’s Bay (an area on the North Island of NZ) – came up as an issue that members of the IDT team thought should be explored more thoroughly.

PC: Let me ask you to report back from the groups […]
IDT member: […] in Hawke’s Bay in the horticultural industry […] there was an issue between education and enablement versus enforcement and penalties […] and we felt that we needed to be a little more grounded on these two concerns. (IDT meeting 1 03/2004)

The case was brought up by Dave Smith, who worked as an IT consultant – he was an SME himself – for other SMEs and who had identified the horticultural industry in Hawke’s Bay as a specific complex and tension-laden case concerning SME-government agencies-relations. The tension laden aspect – ‘between education and enablement versus enforcement and penalties’ – was about seasonal or episodic labor in the apple industry that included the practice of engaging immigrant workers without meeting the legal requirements for employment, taxation, immigration, accommodation and health and safety.

The apple industry became the first and central practice field of the SME project.

In the course of the IDT meetings two further practice fields were agreed on.

One was called ‘Simplicity in regulation’, and focused on the problems of SME with the burden of ‘form filling’ tasks that were related to regulations made by the government agencies such as IRD (the Inland Revenue Department), Statistics NZ and ACC (the Accident Compensation Corporation).

\textsuperscript{85} The term ‘practice field’ was chosen deliberately by WEB and RW. In English the term ‘practice field’ is ambiguous. The common meaning would be a space (open grassed area) where a team prepares for their next performance by practicing. But in the project the term had a second meaning related to the notion of professional practice. In English, a dentist has ‘a practice’; professionals do not go to work. So a practice field was both a space for the rehearsal of patterns of behaviour (practice) and a space in which participants in the overall regulatory system (the professionals) would reconstruct collectively their individual work practices.
The other agreed practice field was called ‘Environmental Management’ and was intended to focus on problems of SMEs with regulations from the Ministry of the Environment. This practice field remained an option in the early phase of the project.

The main outcome of the IDT process was the recommendations of the three practice fields. Other topics such as the move towards a model of government agencies-SME relations (the ‘conceptual map’), as well as suggestions about the leadership and management of the SME project were discussed, but did lead not to definite outcomes.

The process and outcome of Phase 1 as well as the plans for Phase 2 of the SME project were summarized in a report (DoL 2004). Parts of the report were used to produce communication material for the ‘Good Regulation’ Forum where the goals and early results of the SME project were presented to the broader public (see figure 11.3). The Forum took place in June 2004, and many of the people who were part of the project networks attended – among them three ministers from the NZ government. The Forum was specifically aimed at consolidating the profile of the project and gathering stakeholder support for Phase 2. This was an integral part of the methodology in the project and contained a workshop component to provide an opportunity for stakeholders to have input into the process.

At the end of Phase 1 of the SME project, specific regulatory problems between government agencies and SMEs within the recommended practice fields were selected for more detailed analysis. In these practice fields, new ways of identifying, forming and enforcing regulations were to be developed and tested. One of the practice fields was about the strained relations between apple grower SMEs and government agencies in the Hawke’s Bay area.

11.2.2 Phase 2: Developing solutions

In mid-2004, the project was intended to expand into more intensive research in the three recommended experimental practice fields. Each of the experimental practice fields contained a specific regulatory problem between government agencies and SMEs. Each practice field was seen as a ‘site’ where new ways of identifying, forming and enforcing regulations could be developed and tested, and which might be generalised to other settings and other problems (in the third phase).

However, in the early part of the second phase, before field research began, a radical break in the Department of Labor – the government agency with the leadership role in the project – took place. After changes in senior management, support of the project from the Department was almost completely withdrawn. The new senior management argued that the degree of control exercised by the Department of Labor over the resources under the Department’s responsibility was not high enough. This situation left the project leader RW – and with him WEB and the whole project – with fewer resources in personnel (person time) and other anticipated financial support. Important tasks that DoL had been intended to take care of (e.g., the communication with IDT members and other stakeholders, realization of parts of the developmental research), could no longer be realized.
According to WEB and RW it was surprising that the project continued at all after this break. What prevented the pause in the project, from their point of view, was that important resources (the main funding from the Cross-Departmental Research Pool) were independent of DoL’s budget and remained as the financial basis for the project, the growing enthusiasm of the project participants in the practice field, and last but not least, the sustained commitment of WEB and RW.

What occurred as a consequence was a radical redefinition of the project scope: Instead of dealing with the three recommended practice fields attention and resources were reallocated to conduct developmental research in one practice field – the practice field of ‘episodic’ labor in the apple industry orchards of Hawke’s Bay.

The Hawke’s Bay practice field was chosen because the people involved in the case (government agencies, SMEs from the apple industry) were under serious pressure and all parties were particularly interested in achieving a fast and sustainable solution. The intervention in the Hawke’s Bay practice field is described in detail in the following part of this subsection.

The intervention in the Hawke’s Bay practice field

More intensive developmental research in the apple industry orchard at Hawke’s Bay started in August 2004. It included three main research stages: initial scoping and fieldwork, laboratory sessions, and a kind of pilot for solutions developed in the laboratory sessions. The main interventionists were PC, RH, KW and RW. Between August 2004 and January 2005, the ethnographic fieldwork and the analysis of the historical development of the relevant systems took place. It involved groups from Hawke’s Bay’s apple industry and government agencies: growers, contractors, pack-house operators, exporters, quality controllers, horticultural consultants and government officials from central and regional agencies. Interviews, participant observation and document analysis were conducted in local orchards, pack houses and government offices.

The outcome of this first stage of developmental research was a growing understanding of the presenting problems and their cultural-historical basis.

Until the 1990s, work in the apple production process was conducted predominantly by a local workforce with a significant number of experienced workers. Owners of the apple orchards were typically families from Hawke’s Bay, who employed workers for the harvest whom they had often known for many years which guaranteed an experience-based high quality of work.

After the 1990s, this form of organizing work changed. Because of different kinds of pressures, the use of contractors emerged as a new form to secure labor and became increasingly relied upon. The deregulation of New Zealand’s labor market in 1991 was a catalyst in this process. By the 2000s, the number of available workers for the harvest (locally and internationally) became too small and workers conducting the harvest were largely brokered through contractors. Those workers consisted of visitors from overseas working in their holidays (e.g., foreign students) as well as workers from overseas on temporary immigration permits.
However, this workforce was both unreliable (there was no guarantee enough would present for employment) and poorly trained.

Furthermore, officials from the government agencies estimated that 30-70% of the seasonal labor force was illegal due to lack of residency or work permits. There were further regulatory enforcement difficulties around these workers because of the non-payment of income tax and accident insurance levies; there were no employment agreements, no holidays and many were being paid less than the formal legal minimum wage; there was often publicity embarrassing to the government around poor compliance with health and safety requirements.

By the time the developmental research in Hawke's Bay had begun, the number of legal, reliable and skilled workers employed for the harvest in Hawke's Bay was too small to bring in the harvest. The ability of employers to develop their business (e.g., the quality of products) was threatened. Foreign workers often had very low wages and worked in unsafe conditions.

The government agencies responsible for tax, immigration and insurance (e.g., DoL, ACC, IRD) were not prepared to tolerate the illegal practices in the horticulture industry. However, against the background of increasing international competition in the production of pip fruits, these agencies hesitated to apply the full extent of law and enforcement, because they feared the collapse of the apple industry.

The interventionists had first observed this dilemma for government agencies, who were caught 'between education and enablement versus enforcement and penalties', in the course of the IDT meetings (see last subsection). Now the background of this dilemma became increasingly clear to the group around PC, RH, KW and RW:

When the experiment in the apple industry started in 2004, the interests of apple growers and the government were in conflict. To survive, growers need their apples picked, and they rely on just enough seasonal workers to accomplish this annual 'harvest miracle' from any source they can find. With one of the lowest unemployment rates in the OECD, it is harder to source labor legally now and grower anxiety has induced illegal actions that the government cannot ignore. The research team believed that all parties were interested in finding a solution as an alternative to the possible slow collapse of the industry through rising international competition and poorer quality produce. (Hill et al. 2007: 361)

On the basis of this partial insight, the more intensive laboratory part of the intervention at Hawke's Bay commenced. It followed in essence the logic of the previously described 'Change Laboratory' intervention method (see section 9.2 and subsection 10.2.4). However, the focus was expanded to capture the entire relationships between SMEs and government agencies involved in the apple industry
in Hawke’s Bay. The term ‘co-design laboratory’ was coined to describe this experiment with the Change Laboratory method.86

The main interventionists (PC, RH, KW and RW) then invited a selection of those interviewed during fieldwork to take part in the co-design laboratory. The interventionists sought to ensure that all ‘voices’ from the Hawke’s Bay practice field were included. Participants were from both the apple industry (owners and different kind of workers) and regulatory agencies, and included others who had relevant knowledge (e.g., consultants to the apple industry SMEs such as Dave Smith). Furthermore, a criteria for selection was that they should be directly involved in the actual work (and not be ‘representatives’) and to have shown a high motivation to find a solution for the complex problem at Hawke’s Bay. The co-design laboratory followed a structured sequence of 12 half-day sessions in a central location in Hawke’s Bay. It took place between February and October 2005. Between 18 and 24 people attended sessions (with a high degree of consistent attendance). The sessions were planned by the main interventionists and facilitated by WEB.

In the first sessions of the co-design laboratory the focus was on discussing the current problems of apple production in Hawke’s Bay, with the aim of understanding how these problems emerged historically as well as of understanding the systemic nature of the problem with the help of models from activity theory. As described previously, apple growers, workers and government officials were agitated because of the problems of enough sourcing workers for the harvest on the one hand, and the threat of action to stop ‘illegal’ practices on the other. Against the background of the available workforce (too small, unreliable and poor in quality), and difficult market conditions, it was regarded as an annual ‘miracle’ that the harvest could still be carried out.

One way of understanding the systemic nature of these problems used in the co-design laboratory sessions is shown in Figure 11.4. In this diagram, the worker-activity system (e.g., consisting of immigrant workers without work permits who worked as pickers) is shown as a tool for the contractor system, and the contractor system (contractors offering immigrant workers jobs in the harvest, often for very little money) is a tool for the grower system (with the owners of the orchards who needed to have the harvest realized). Government agencies and departments of government agencies such as the Employment Relations Service (ERS), the Inland Revenue Department (IRD), the Immigration Service (IMMIG) and Occupational Safety and Health Service (OSH) influenced the rules of other systems by developing and applying law and policy.

86 WEB’s interventionists make use of semantic and cognitive strategies, e.g., neologisms, to disorient participants and to neutralize discourses and power relations embedded in the ordinary existing language used to describe the activity system and its elements. The terms ‘appleing’, ‘practice field’ and ‘co-design laboratory’ are examples.
After the first laboratory sessions, participants began to search for deeper causes to the existing problems – in the form of underlying contradictions that could then become starting points for thinking about a new model of work. A hypothesis for a central contradiction became the issue as to whether the entire industry was focused on quality as everybody in the apple industry said it was, or whether in their actual practices and relations, the industry had a focus on quantity (of apples, of workers, regarding the way of picking apples). While apple buyers, often from overseas, were interested in the quality of apples (and paid accordingly), and the NZ apple industry was also concerned about the quality of products and work, it emerged that the main actions and instruments of apple production were primarily oriented towards quantity. That contradiction was rendered visible in the following manner.

Production output was measured in quantitative terms (e.g., by bins picked, apple trays and cartons packed, apples stored, hectares planted). There was no systematic way of measuring how much of the product failed to attract premium prices. Workers were paid according to the quantities of fruit picked. The labor needed was described in terms of the number of workers only. Quality control was actually only used to eliminate very poor quality fruit, rather than to improve the quality of the fruit at the point of harvest.

Participants in the co-design laboratory began to realize that the system of apple production in effect was grower- and quantity-focused, with labor supply problems at the centre. Apple growers (the owners of the orchards) often have 5 to 7 days only, once a year, to secure their short and medium-term future. Driven by
the apple growers the focus at the peak of the season was to get as many apples off the tree as possible.\footnote{‘I don’t care what it takes, get those apples picked’ was often the command from the growers. ‘Pick them all and the faster the more pay we get’ was the drive of the picker.}

In the course of the laboratory sessions, an important learning process took place around understanding the contradiction between quantity and quality. While at the beginning of the co-design laboratory the annual apple harvest was thought of as an ‘annual miracle’, the weaknesses of this miracle became increasingly apparent. While the harvest might seem successful (a high number of workers used to address a high number of trees to store a high number of apples) from a quantity point of view, from a quality perspective the harvest might conversely seem to be an ‘annual disaster’. Pickers, often illegal immigrants hiding from the law and suffering from difficult work conditions, were inexperienced and unmotivated and could not tell a quality apple from a poor quality apple. Consequently, many apples that might have been picked were, in fact, overlooked. As well many good apples that were picked were damaged. Many low quality apples were harvested and had to be picked out later. The change of interpretation from an annual miracle to an annual disaster was considered by the interventionists as a major and profound step towards giving up the old model and seeking a new model of apple production:

Reconceptualisation from ‘miracle’ to ‘disaster’ unlocked changes in thinking from quantity to quality, from short-term profit to long-term sustainability, from absolute numbers of orchard workers to the skills that orchard workers needed to possess, and from numbers of apples picked to the condition and value of the apples picked. (Hill et al. 2007: 367)

The small number of legal, reliable and skilled workers employed for the harvest in Hawke’s Bay was increasingly perceived as symptomatic of a system that resulted in joint problems for all groups involved in the co-design laboratory – government agencies as much as apple growers. The future system of apple production, it was realized, should be oriented around a model of a ‘reliably sustainable, legal industry focused on quality’. Not the ‘orchard’ but the ‘apple’ should be at the centre of this new system because the ‘apple’ was the shared, collective responsibility of all participants in the value chain from tree to consumer. This new, future system for the production of apples was called the ‘appleing’ system, and the term ‘appleing’ became a symbol of the co-design group for working on the vision of a new kind of apple production in Hawke’s Bay.

The new model included the idea that the relationship between grower and contractor should become more collaborative in nature. Growers should be supported to develop the means (e.g., tools to manage technical and human resources) to enable fruits to be harvested in premium condition. Orchard workers should be trained and motivated by incentives to maximize both the quantity and quality of the fruits they pick. Workers with experience and skills should be retained by appropriate incentives. Quality control should be expanded from the current prac-
tice of singling out low quality apples after picking, towards a kind of ‘field management’ capable of mentoring and training a seasonal workforce so that quality would be present at the point of picking.

In later laboratory sessions, participants in the co-design group worked on developing the vision towards a model of the new appleing system which could be applied and tested in reality. The interventionists described this work in the following way:

By the eighth session participants had designed a possible future ‘appleing system’ organised around quality production, whose collective purpose was sustainable, legal and fair production of as many high quality apples into identified, global markets as possible. The design included possible regulatory systems. The sustainable productivity of the whole system was its central organising principle - from the picker through to the consumer. All participants in the system were to be ‘business partners’, rather than members of a hierarchy of growers, contractors, workers and officials. (Hill et al. 2007: 367–368)

The outcome of the laboratory sessions (second stage of the research process in the Hawke’s Bay practice field) was an outline for a model of the new appleing system that was detailed enough to be tested in a pilot in the second half of 2005 (third stage of the research process).

By this time, participants in the co-design group had developed interpretations of the situation in the apple industry and attitudes towards each other that were very different to the oppositional and sometimes belligerent attitudes they held at the beginning of the experiment in late 2004.

There was a shared understanding that the industry would not survive in the medium- to long-term unless the following systemic contradictions identified in the laboratory sessions were resolved:

- The apple industry was reliant in an unsustainable manner on illegal labor. However, domestic workers alone were not sufficient to supply current harvest labor needs.
- Qualitatively oriented apple harvesting was a skilled job, best done by those who had gained the skills by training and/or experience. However, part of the current policies and regulation favored the use of untrained and inexperienced workers who were unlikely to return in subsequent seasons.
- Government agencies wanted the industry (contractors, sub-contractors and growers) to be more responsible in their use of temporary immigrant labor. However, the actors from the industry who cooperated with government agencies often found themselves commercially disadvantaged.
- New Zealand policy makers and implementers wanted to support the apple industry to survive despite the severe international competition. However, policy makers and implementers did not recognize the often highly prescriptive regulatory and customer demands from beyond New Zealand’s border leading to mutually exclusive regulatory pressures for the apple industry.
A consequence of the shared understanding concerning these systemic contradictions was that different parties could work on identifying those existing practices that required modification, and also they could explore solutions likely to satisfy all needs ('win-win' solutions). An increasing trust and spirit of mutual support within the co-design group was the basis for the development of the joint vision of the new appleing system, the concretization of the vision, and the first application and test of elements of the new solutions within the pilot.

The third stage of the developmental research constituted piloting elements from the new appleing model, commencing in the second half of 2005. Four areas were selected where elements of the new model should be applied. The four areas were centered around:

1. A strategy for, and system of, training (e.g., to train apple pickers in an appropriate 'pickout' standard),
2. The expansion of the research and development system in the apple industry beyond new apple varieties (also capturing production and labor practices),
3. The development of a new relationship between growers and contractors that would be based on a joint focus on the quality of work (e.g., a contract and a payment structure that would reward high-quality work), and
4. An ICT-supported strategy for sourcing, supplying, deploying and retaining labor that would be in accordance with immigration policy and improving the situation of apple growers as well as workers.

The testing of the new model of the appleing system continued after the initial pilot in the second half of 2005, and also included groups from the Hawke's Bay area who had not participated in the laboratory sessions. While the initial pilot has brought encouraging results, interventionists emphasize that the new model is still in an early test phase:

The testing of the new model of the appleing system in this next phase of the cycle of expansive learning will demonstrate whether it has real utility in solving the problems of the industry and its relationships with regulation. The question remains whether a proven pilot has the impetus to sustain change across the whole industry. (Hill et al. 2007: 374)

While the intervention in the Hawke's Bay practice field was the main event in Phase 2 of the SME project, it is also important to describe the actions that were intended for this phase of the SME project, but did not in fact take place.

As a consequence of the hiatus in the Department of Labor and the reduction in support of the SME project and the refocusing of the project scope (on only one practice field) at the beginning of Phase 2, there were no IDT meetings organized to collate results from the (planned) different practice fields and to process the results towards overall conclusions. In effect, the IDT ceased to exist as the leading project group. As a further consequence, no further work on the conceptual map
– the model about the overall SME-government agencies relations – was undertaken. The conceptual map never became fully realized. Because of the break and the project’s refocusing, no further communication symposium similar to the ‘Good Regulation Forum’ at the end of Phase 1 took place.

The interventionists commented about these difficulties as follows:

The project made early efforts to engage many government departments and agencies, but this effort could not be sustained within Phase 2 of the project. [...] However the research team treated it as a disturbance that made visible the contradictions involved in trying to conduct a ‘laboratory’ (that is a controlled experiment) in the messiness of a field environment where the field consists of multiple overlapping social systems and culturally and historically embedded habits; in using a method that attempts to develop long term systemic solutions to problems that are imposing immediate, short term and large scale political and economic impacts that create enormous pressures to respond rapidly. (Hill et al. 2005: 26–27)

At the end of Phase 2, a specific solution – a new model of ‘appleing’ in Hawke’s Bay’s apple industry – had been developed to address a specific problem of relations between SMEs and government agencies (namely, the unsustainable old model of apple production including conflicting relations between SMEs and government agencies in Hawke’s Bay’s apple industry).

11.2.3 Phase 3: Delivery of solutions

In Phase 3, the project was meant to continue with the dissemination of regulatory solutions to a broader community of NZ government agencies and SMEs on the basis of the outcomes of Phase 2 (i.e., the specific new model of appleing).

However, Phase 3 deviated even more radically from the original plan than Phase 2. There were two main reasons for this. The first was due to the consequences of the hiatus in DoL (see last subsection) over support for the project and the subsequent reduction of resources. The second reason was that the intervention in the Hawke’s Bay practice field turned out to take longer than Phase 2 was originally envisaged as requiring.

The overall consequence of the break and the extension of the Hawke’s Bay practice field was that there was almost no time for Phase 3 within the formal time horizon of the SME project.

There was no systematic Phase 3, the project was wound up on or about the point of planning what the dissemination phase would look like. (KW 08/2007)

What happened first was that the short time left in the project was used to diffuse the appleing solution within the boundaries of the horticulture industry. Secondly, some major diffusion and implementation developments related to the
SME project occurred after the formal end of the project in early 2006, i.e. were no longer driven by the ‘formal project actions’ of the interventionists.

An example of a longer-term development of implementation and diffusion of solutions that originated in the SME project is a recent decision by the NZ government to explore a change of immigration policy and practice with a view to improving the possibility of permitting legal seasonal work by residents of the Pacific Islands in the NZ horticulture industry. Initiatives for these discussions came from members of NZ government working groups who participated in the co-design laboratory process in Hawke’s Bay.

The interventionists within the SME project (later referred to as the Pure Business project, or PBP) concluded:

There are many other echoes and concrete reflections [...] of PBP co-designed solutions, which have subsequently found their way into government and industry policy and practice. The implementation of the Strategy and new immigration policy are rapidly progressing. Final outcomes will not be available for several years, but the signs are hopeful that they will result in a transformation of seasonal labour practice in New Zealand, as co-designed in the Pure Business Project. (Hill et al. 2007: 373)

A step that was envisaged for this last phase of the SME project, but which did not take place, was geared towards working with a more central group such as the Interim Design Team (IDT) on the generalization and diffusion of the specific solutions developed in the project. There had been some discussion around proposals to develop DWR-based means of conducting change programs in other areas and to teach others to use these means. The networks that were established in Phase 1 of the SME project were meant to be developed to enable interagency networks that could support such change programs and developmental activities.

The longer-term vision had been to provide practical support for a change in regulatory practice, so that SMEs and government would both have benefitted from regulatory activities. A further part of the vision had been to contribute to a ‘paradigm shift’ in understanding the role of regulation with SMEs.

Looking back, the interventionists formulated as one insight:

If diffusion within the horticulture industry is a challenge, then the prospect of using the project to stimulate and diffuse changed regulatory practice across the whole of government is much greater one. (Hill et al. 2005: 26)

However, this insight is balanced thus:

The collective realization for the participants that is original and of great value is that DWR processes can be used to overcome intractable and complex government policy and regulation problems for government and industry by a process we have called ‘practice making’. Given that many policy and regulation problems are in-
tractable and complex, this is a highly promising method for finding enduring solutions. (Hill et al. 2007: 374)

The situation at the end of Phase 3 of the project was characterized by some general consequences arising out of the specific ‘appleing’ solution (such as the previously described discussion about changing the government’s immigration policy and practice) that is affecting not only Hawke’s Bay but the whole horticulture industry. Furthermore, there was the possibility of further changes to the way SMEs and government agencies addressed the problem of relations between themselves.

When considering the overall impact of the SME project at the time of this study, only a tentative conclusion can be drawn. The SME project is regarded as moderately successful by government. There have been discussions between WEB and representatives of government agencies to consider new intervention projects that address complex problems in the New Zealand economy.

PC concludes:

Even now I would say it is too soon to say exactly what impact the project has had on public policy in New Zealand. That is still a story which is continuing. (PC 08/2007)

11.3 The development in the SME project interpreted as an expansive learning process

In the following section some of the findings from the previous section are taken up and the SME project is examined as part of an expansive learning process.

As described in section 10.3, at the beginning of its current, and fifth developmental period, WEB was in a need state when confronted by the dualism of conducting either ‘research’- or ‘consultancy’-oriented interventions. The latent need state aggravated as WEB was required to address the problem of deriving models for SME-government agencies collaboration. The SME problem needed to be treated as a historically new problem (no representation of a solution existed that could be used for guidance). As well, the newly developed solution in the Hawke’s Bay practice field (and further new solutions in the other planned practice field) was intended to serve as the basis for developing solutions for a larger number of instances of SME-government agencies collaboration. In this sense, the SME problem incorporated characteristics of historically new and historically old problems.

At the beginning of the project the old dualism between research and consultancy was a hindrance that had to be overcome. Neither a research-oriented intervention (creating an innovative solution of a historically new problem in a long-term project) nor a consultancy-oriented intervention (adopting appropriate solutions for historically old problems in a relatively short frame of time) would be adequate. A consultancy-oriented intervention would not deliver appropriate solutions. There was not enough time or resources to conduct a research-oriented
intervention that would address a larger number of practice fields (i.e., cases of SME-government agencies relations).

During debates and at decision points in the first phase of the SME project, members of WEB oscillated between the ‘research center’ model of the third developmental period and the ‘consultancy model’ of the fourth developmental period of WEB. Examples of such debates were discussions about whether the theoretical instruments of DWR were used in an appropriate and scientific way, or how effective management of the project could be accomplished without someone fulfilling a central, coordinating function (which existed in WEB before the downsizing episode in 1998).

What was the basis for resolving the research vs. consultancy (or innovation vs. dissemination) dilemma?

WEB had developed ways to conduct DWR interventions quickly (e.g., the 4 weeks Change Laboratory undertaken in the railway project in Europe). WEB had also been able to conduct experimentation oriented DWR based interventions that produced completely new solutions. In this sense WEB had developed some means (instruments, community patterns) that could be used to address the new object (to develop new models of collaboration between SMEs and government agencies in NZ).

This study argues, however, that the new way of conducting interventions was not just an amalgam of research and consultancy, but indeed an expansion of previous models of conducting interventions. There were two outstanding characteristics of the new way of conducting interventions that can be interpreted as expansive developments:

(1) The organizational foundation for conducting the intervention was not a single system but a network of actors and activities.

The core group of the project – WEB (PC, RH, KW), and the project leader RW – became a catalyst in resolving the contradictions in an expansive way. They can be interpreted as a microcosm integrating the ‘worlds’ of science (represented by RH, the research manager), consultancy/industry (represented by PC, the main facilitator) and the state (represented by RW, the employee of a government agency and advocate of the ‘public need’). This kind of new constellation of actors from science, consultancy/industry and the state had a number of practical consequences. DoL took over the coordination and project management function in the SME project and in this way resolved some tensions inside WEB. What is more important is that this initial hybrid constellation of actors opened the project’s access to a higher number of activities from different worlds (SMEs, government agencies etc.), which all contributed to the intervention process.

Conversely, as soon as the integration of the spheres of science, consultancy/industry and state were weakened by the withdrawal of support from senior DoL representatives, the project could no longer address the SME problem as a whole. In Phases 2 and 3 the problem was addressed primarily as a historically new problem in a single setting (the problem in the Hawke’s
Bay apple production) and an innovative solution was produced. There were insufficient resources to continue with the next planned phase of (innovation based) dissemination of solutions.88

This study argues that the contradiction between ‘consultancy’ and ‘research’ orientation was hardly solvable within the boundaries of one activity system (WEB), but only by relying on a more extended network (or formation) of actors and activities that had a partly shared object (improved collaboration of SMEs and government agencies) and also developed a form of agency that enabled them to address the object jointly.89

(2) The main actors, main instruments and the community were all evolving dynamically and changing according to the dynamic of the problem-solving process.

WEB + RW were described as a key group consisting of representatives from different worlds. Correspondingly, they could also be interpreted as the main new subject of an emerging new model for conducting interventions. However, this interpretation would not fully mirror what actually happened in the project. In the intervention process the main subject had not been static, but dynamic, and included different actors and activities in different phases of the project.

The dynamism of the subject was complemented by the dynamism of the instruments and the community arrangement. This characteristic of subject, instruments and the community arrangement has its roots in the dynamism

88 The withdrawal of support from senior DoL representatives was due in part to new DoL senior managers being concerned that DoL insufficient control over DoL resources and that DoL might attract criticism of its Minister if it did not ‘tidy’ up the records of the project. This main rupture and the partial reduction of the multi-activity setting can be interpreted as a symptom of a tertiary contradiction between the emerging new way and the old way of conducting interventions. The new form is characterized among other things by the integration of experiences and resources from the spheres of science, consultancy/industry and state. The old form is characterized among other things by the separation of experiences and resources, also entailing a higher degree of control by individual managers over them.

89 After 4 earlier developmental periods, and after having experimented with both research center-oriented and consultancy-oriented forms, the contradiction between ‘research’ and ‘consultancy’ (focus on either creation or reuse of solutions, on historically new or old problems) had not been resolved to the point of real integration. Furthermore, in all developmental periods the question of different ways of conducting interventions has been dependant to a high extent on broader societal developments. WEB was dependent on the dynamic of government programs – initiatives related to New Public Management or Digital Era Governance – manifesting in changes in the PPTA, the DSIR, FRST/ MRST and other organizations. From a certain point of view, the question of a viable way of conducting interventions is a question that should not be ‘reduced’ to WEB. Indeed, it is a question relating to the overall societal development and division of labor of problem-solving activities in NZ.
of the object. The SME-government agencies problem had qualitatively different 'states' at different phases of the project, requiring qualitatively different subjects, instruments and community resources. It is important to emphasize that the changing actors and activities were not just a random sequence of people. Different actors and activities had a shared object and came together to constitute a new kind of developmental or transformative agency, to analyze the shared problem and to solve it in a new way. The intervention followed the logic of a societal problem-solving process and integrated both innovation and dissemination processes.

The emerging new model of conducting interventions is characterized by a spatial expansion (related to spheres of science, consultancy/industry and state) and by a temporal expansion related to the different phases of a societal problem-solving process. It is argued here that the extended network/formation of actors and activities from different spheres and the dynamism of this formation were necessary factors in addressing the complex network of SMEs-government agencies relations. However, this view has to be elaborated by a closer analysis of the main structural elements that characterized the way the intervention was conducted.

11.4 Main elements of the model of conducting interventions that evolved in the SME project

In this section, the earlier suggestion of a possible new model of conducting interventions is explored further. The main structural elements that characterized the conduct of the intervention are analyzed.

Object

The ‘SME problem’ consisted of different and more specific instances of problems in SME-government agencies relations. It is crucial to highlight the consequences of the fact that these problems were situated between different work activities. The analysis of the case of apple production in Hawke’s Bay showed that government agencies were in a double bind situation. They could either enforce legal practices and thus destroy the industry, or not disturb the industry and allow illegal practices to continue. The SMEs involved in apple production were also in a double bind situation. They could either act legally and go bankrupt, or continue to do business illegally. These double bind situations were connected and could not be solved in isolation. In this sense, the object of the intervention could not be a single organization, but had to be a formation of interlinked activities, each with a specific inner logic.

Because of the complexity and diversity of relations between SMEs and government agencies, each of the specific problems (such as the one in the Hawke’s Bay area) contained completely new characteristics. There was no existing solution to these problems. On the other hand, certain aspects of the SME problem were repeating (among other things, due to identical regulative relations with certain
government agencies). This fact made it possible to reuse some elements of the solution from the context of apple production in Hawke’s Bay. In this sense, the SME problem contained general and specific components, providing an opportunity to create ‘germ cell’ solutions, which could contribute to processes of generalization and diffusion.

The last issue points to a central characteristic of the SME problem. The problem in the SME project is characterized by its dynamic, which is connected to the logic of the phases of the project. In its initial ‘state’ at the beginning of Phase 1, the problem can be described as the need for better models of SME-government agencies relations, and the lack of means for developing better models. This need affected a large number of potential ‘practice fields’ for investigation and development. At the end of Phase 1, the problem definition was concretized as a series of specific regulatory problems between government agencies and SMEs in the recommended practice fields: the specific problem of relations in the apple industry in Hawke’s Bay, and two other practice fields, not addressed in depth later. The initial state of the SME-government agencies problem in Phase 2 was the same as the end state in Phase 1. In the course of Phase 2, specific solutions (a new model of appleing) to specific problems involving SME-government agencies relations (apple production at Hawke’s Bay) were developed. In Phase 3, these specific solutions (the new model of appleing) became a means for addressing further cases of SME-government agencies relations especially in the horticultural sector.

There was, thus, a dynamic from a general problem definition towards the formulation of specific problems in practice fields that could be solved. Specific solutions were then used to address the problem in its initial general state, and to contribute to finding additional solutions related to the initial general problem. The last stage was planned, but only partially realized.

It is important to emphasize the difference between the problem state in Phase 1 and Phase 3. Although both formulations address a general issue – a multitude of cases involving SMEs and government agencies – in Phase 3 important knowledge existed with regard to such cases; there was now an instance of a solution. This was not the case in Phase 1. Because of differences in the kinds of relations existing between SMEs and government agencies, the solution was not a ‘prototype’ that could be applied directly to other practice fields. Some aspects of the solution, however, were used in other contexts, and were able to contribute to the development of generalizations that would be useful when addressing further problems in practice fields.

The SME-government agencies problem can be best described as a trajectory from general to specific, and back to general. There is a clear difference with previous developmental periods of WEB, where problems were mainly associated with specific phases of the societal problem-solving process. In WEB’s third developmental period the focus was on the creation of solutions for new problems. In the fourth developmental period the focus was on reusing previous experiences to find appropriate models for client activities. The SME project, however, was characterized by covering all four phases of a societal problem-solving process – although the latter two phases were not fully realized because of the rupture in the
project. The focus in the project moved from problem definition (a need for new models concerning relations between SMEs and government agencies), to innovative solutions (specific solutions such as the appleing model of production), and then to conceptualizations of the solutions that were partially diffused in a broader context (relations between the horticultural sector and certain government agencies).

Altogether the problem in the SME project can be described as a dynamic object showing characteristics of a societal problem-solving process with a life-cycle dynamic (see table 11.2).

Subject

The composition of actors in the SME project varied enormously. In the early state of the problem (before the project started formally), it could be said that the subject consisted of several different actors that articulated an interest in addressing the problem – among those were RW and other members of the NZ Department of Labor (DoL). Some of these actors began to work together as RW initiated the project and invited WEB to take part. RW, a representative of a government agency with a high interest in and knowledge about the SME-government agencies relations, and PC, RH and KW from WEB, an organization with experience about carrying out research and consultancy projects became the project’s core actors.

RW and WEB were, however, not the center of authority. In the SME case there was no single center of authority to rely on. It was an important process in the intervention to create the necessary authority and collective agency of transformation between members of different organizations. Early meetings with stakeholders, the exploration group meetings and the Good Regulations Forum were part of this process (although they also fulfilled other functions). The collaborative study of the systemic characteristics of the SME problem in the exploration groups and in the meetings of the Interim Design Team (IDT) contributed to the systematization of ‘transformative agency’. The IDT – WEB, RW and representatives of all participating government agencies, as well as representatives of SMEs – assumed a leadership role in the second part of Phase 1.

In Phase 2, the project plan was to include several interventionist teams, such as the co-design group at Hawke’s Bay, as main actor groups, and a central group such as the IDT where actors from the interventionist teams would meet and share their experiences. The overall subject would then have consisted of decentralized interventionist co-design groups and the central group. However, because of the rupture and the reduction of resources, the subject consisted of a single decentralized interventionist group – the Hawke’s Bay co-design group (including WEB and RW). No central group was established. The motivating force behind the actions of main participants in the project was to overcome the double bind situations in which the activities of the participants were embedded. The interventionists aimed at opening a space for overcoming these double bind situations. The collaborative analysis of the systemic causes of the problem concerning apple production and
the joint development of a new model created a new kind of hybrid transformative agency in which members of different ‘worlds’ acted collaboratively to carry out a transformation in the wider constellation of activities in which their own activity was embedded.

As part of Phase 3, the project plan was to have a more important role for one or more central groups such as the Interim Design Team (IDT), which would have worked on the generalization and diffusion of any specific solutions that were developed. It was also intended to have more decentralized groups which would conduct subsequent change programs. As the IDT consisted of members from different government agencies, the idea was that smaller entities of actors from some government agencies, sharing some difficulties around relations with certain groups of SMEs, would have emerged and initiated further developmental activities. However, because of the rupture, this did not happen in a formally supported or systematically developed way. Nevertheless, actors from the Hawke’s Bay co-design group (including RW and WEB, but also others) developed different initiatives for diffusing knowledge related to the appleing solution.

The main actors in the intervention project contributed to and/or made use of the problem-solving process over its developmental trajectory – from the initial general problem definition to specific solutions and diffusion of solutions. The subject changed dynamically in accordance with the dynamic of the object. However, there remained a certain coordinating, information exchanging and stabilizing core group (RW and WEB). This core group was also essential for the survival of the project when the rupture occurred. While the core group involved actors from different societal spheres, the core group and the subject would have been expanded and would have been more diverse if the project had proceeded as originally planned.

**Main instruments**

In respect of all phases of the SME project, CHAT and DWR remained the theoretical framework. The concrete methods that were used to address the problem in the project were all grounded in CHAT and DWR but fulfilled different functions.

The exploration groups and IDT sessions constituted the main methods of exploring the SME-government agencies problem and concretizing it towards more specific problems in selected practice fields. As described earlier, the exploration groups and the IDT process also had a function in constituting an expanded subject.

The Hawke’s Bay co-design laboratory was the main method for developing a single specific problem towards a specific solution. There were also proposals to develop and apply DWR-based methods for subsequent diffusion-oriented change programs. In a more systematic Phase 3, such methods might have complemented the exploration group sessions, the IDT sessions and the co-design laboratory. Instances of solutions existed concerning the problem of SME-government agencies. The DWR-based methods in Phase 3 could then have been implementation-
oriented, and faster conducted variants of the Change Laboratory method. Such faster Change Laboratory variants had already been used in the European railway case (see subsection 10.2.4).

In all phases shared tools for guiding the analysis and intervention were developed. One example of this is the basic model of the apple industry network used in the Hawke’s Bay co-design Laboratory (Figure 11.4). These shared tools made it possible to transcend the separation between the researchers’ tools and practitioners’ tools – i.e. to transcend the distinction between the role of experts that conducted the intervention and the role of ‘clients’ who might expect to remain passive in the intervention.

A theoretical instrument, the ‘conceptual map’, was envisaged as functioning as an overview model of relations between government agencies and SMEs. The ‘conceptual map’ should have been developed in the course of the project, but this was only the case to a limited extent. In other circumstances, it might have been used as an instrument for deciding what kind of intervention method (e.g., the co-design laboratory type or faster Change Laboratory variants) should be used depending on the complexity/novelty of the respective problem in a specific ‘practice field’ (of interconnected SMEs and government agencies).

A further instrument was the literature review, which was derived in Phase 1 of the project and which served as a pool for different models related to the SME-government agencies problem.

As was the case for the subject, the instruments were planned with a view to their contribution in pushing forward the problem-solving process in its full trajectory and extension – from the initial general problem definition to specific solutions and their diffusion.

Community arrangement

The characteristics of subject and community were very similar. When the project commenced there was not only a constitutive process for the subject, but also for the wider networks that would support, contribute to and make use of the project in different phases. Early meetings with stakeholders, the exploration group meetings and the Good Regulations Forum were a central part of this ‘community forming’ process.

In Phase 1, the community consisted of DoL and other government agencies, SMEs, and research institutes from NZ and abroad. In Phase 2, the community was extended to include communities based around the selected practice fields. This extension included actors and activities related to the apple industry in Hawke’s Bay and beyond – including not only apple growers and workers, but also the growers’ consultants – as well as research institutes from NZ and abroad that specialized in horticultural science.

In Phase 3, the community included the many and different activities that had been contacted in the previous phases (DoL and other government agencies, the NZ Cabinet, the horticulture industry in Hawke’s Bay and beyond, scientific community). The initial plan was to develop inter-agency networks that could support
the additional developmental activities of the project. This was achieved to a cer-
tain extent for SMEs and government agencies related to the horticultural sector
and to the regulation of immigration issues.

The project included a strong orientation towards sharing knowledge and ex-
perience openly. Its funding was based on a novel combination of sources. The
main resources came from a research pool overseen by the Ministry of Research,
Science and Technology. Further resources came from participating government
agencies, especially the Department of Labor (in personnel and other resources),
and also from SMEs. The project intended to acquire further resources in Phase 2
and 3, but this did not happen systemically due to the ‘rupture’ in DoL support.

All in all, the community included activities from many different spheres and
showed a very dynamic pattern (similar to the dynamic of the subject). The overall
community could be characterized as a dynamic formation of actors and activities
that collaboratively addressed the SME problem.

Table 11.2 summarizes the analysis of the previously described components,
including both planned and vaguer elements (in italics).

Table 11.2: Characteristics of WEB’s way of conducting interventions in the SME
project

<table>
<thead>
<tr>
<th>Phase</th>
<th>Phase 1: Understanding issues</th>
<th>Phase 2: Development of solutions</th>
<th>Phase 3: Delivery of solutions</th>
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<tbody>
<tr>
<td>Problem</td>
<td>The need for better models of SME-government agencies-relations and the lack of means to achieve this</td>
<td>Specific regulatory problems between government agencies and SMEs in the recommended practice field (unsustainable model of apple production)</td>
<td>Specific solutions (the new model of appleing) of specific SME-government agencies problems as means for addressing further cases of SME-government agencies- relations</td>
</tr>
<tr>
<td>Addressed work activities</td>
<td>High number of SME-government agencies-practice fields</td>
<td>Specific practice field of apple production activities in Hawke’s Bay</td>
<td>Relatively high number of SME-government agencies practice fields where knowledge from Hawke’s Bay appleing solution could be used</td>
</tr>
<tr>
<td>Phase</td>
<td>Element</td>
<td>Phase 1: Understanding issues</td>
<td>Phase 2: Development of solutions</td>
</tr>
<tr>
<td>-------</td>
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<td>-------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td><strong>Subject</strong></td>
<td>First: RW and other actors (encountering problem) Then: RW and WEB (planning and starting project) Later: IDT (including WEB and RW)</td>
<td>First: IDT Later: Hawke’s Bay co-design group (including RW and WEB) Planned: 3 co-design groups as well as IDT as central group</td>
<td>First: Hawke’s Bay co-design group Later: single actors and parts of co-design group with different initiatives Planned: First: 3 co-design groups as well as IDT as central group Later: More central groups such as the IDT, but also further decentralized groups to conduct subsequent change programs</td>
</tr>
<tr>
<td><strong>Main instruments</strong></td>
<td>CHAT and DWR as overall frame 7 Exploration Group sessions and 3 IDT sessions Conceptual Map of SME-government agencies relations Literature overview</td>
<td>CHAT and DWR as overall frame Hawke’s Bay co-design laboratory Planned: 2 more co-design laboratories Further developed Conceptual Map</td>
<td>CHAT and DWR as overall frame No systematized use of further methods Planned: Further diffusion methods and tools Further developed Conceptual Map</td>
</tr>
<tr>
<td><strong>Community (in narrow sense and wider sense)</strong></td>
<td>DoL and other government agencies, SMEs, research instuctive from NZ and abroad (Helsinki, London) Open sharing of knowledge experience Hybrid co-financing from research pools, government agencies and other sources</td>
<td>DoL and other government agencies, actors and activities related to apple industry in Hawke’s Bay and beyond, research institutes from NZ and abroad with knowledge about horticulture Open sharing of knowledge and experience Hybrid co-financing from research pools, government agencies and other sources (severe limitation of resources after rupture)</td>
<td>DoL and other government agencies, NZ cabinet, horticulture industry in Hawke’s Bay and beyond, scientific community Open sharing of knowledge and experience Hybrid co-financing from research pools, government agencies and other sources (severe limitation of resources after rupture)</td>
</tr>
</tbody>
</table>
11.5 Relation between the empirically encountered model and the historical forms of conducting interventions

Section 11.3 claimed that the way of conducting interventions described in this chapter was based on a qualitatively new foundation (not a single system but a dynamic network/formation of actors and activities following the logic of a societal problem-solving process). The previous section elaborated this claim by discussing the characteristics of the main elements of the new way of conducting interventions in the SME project. In the following, this study considers whether this new way of conducting interventions does indeed contribute to the overall discussion of this study. A link is made between the identified empirical way of conducting interventions and the previously derived historical types of conducting interventions.

Object

Chapter 8 concluded that ‘industrial’ forms of conducting interventions were oriented on either context breaking or balancing problems as well as on either historically new or old ones. It was argued that complex networks of actors and activities and post-industrial problems would emerge. The qualitatively new problems were characterized as being located between existing activities.

The example of interrelated SMEs and government agencies displays clearly the characteristics of complex networks. As described in the last section, the actual instance of the problem in the SME project contains characteristics of historically new and historically old (repeating) problems. In the last chapter, the problem was also described as containing context breaking and context balancing characteristics. The SME problem is situated between work activities (government agencies and SMEs) and affected a higher number of users. To this extent, the problem of new models of collaboration between SMEs and government agencies can be clearly interpreted as a post-industrial problem.

The SME-government agencies problem does not contain characteristics of historically new problems and historically old problems in a clear cut and stationary way. The overall problem consists of a series of more specific problems regarding new models of collaboration between SMEs and government agencies. The proportion between historically new and historically old aspects of the problem in the SME project, changes over the course of the development of specific solutions such as the ‘appleing’ solution in the Hawke’s Bay area. The SME project follows the dynamic of a societal problem-solving process. During the phases of the problem-solving process the actors and activities are not separated as in previously

90 The complexity and diversity of relations between SMEs and government agencies has its root in the New Public Management period. In a sense, the problem is related to the attempt to offset some of the defects of New Public Management; however, due to new ICT-related possibilities, it also opens up an entirely different context.
described historical societal problem-solving processes. To improve SME-government agencies relations is a shared object addressed by interconnected actors in a condensed societal problem-solving process (see figure 11.5).

Figure 11.5: Sketch of the qualitatively new problem associated with an instance of a post-industrial form of conducting interventions

Subject

Previously described historical findings suggested that the industrial forms of conducting interventions were oriented around different types of problems and different types of supporting transformation. The subjects of intervention projects were predominantly experts with a specific disciplinary background (e.g., engineering, management, ICT, social sciences) and a specific way of using knowledge (following a business or scientific logic).

The empirical case clarified that double bind situations existed within SMEs and within government agencies. These double bind situations were connected and could not be solved separately. Before the SME project commenced, there were many different actors who were interested in dealing with the SME-government agencies problem; however, these actors did not cover all of the relevant activities and interest groups.

This ‘state of separation’ of the relevant actors changed over the course of the project. A formation process began, using the exploration group and IDT workshops as methods, which led finally to the constitution of a subject that could contribute to the problem-solving process across its full trajectory and extension. This subject changed dynamically in response to the dynamic of the object. The evolving subject integrated actors from different spheres (industry, science, state), who were used to following different logics for problem-solving (innovators, re-
searchers, consultants, state representatives, users of new knowledge). While the subject was dynamic, it contained a coordinating, information-exchanging and stabilizing core group. The variety and the change of intervention actors, on the one hand, and the integrative engagement in developmental agency, on the other, were key characteristics of the subject. This is a qualitative difference to the specialized subjects of previous types of conducting interventions.

Main instruments

Chapter 8 concluded that the industrial forms of intervention made use, predominantly, of representations of either context breaking solutions or context retaining solutions. Furthermore, sophisticated solution management/dissemination tools, as well as frames for identifying and proliferating solutions were drawn on. In Wartofsky’s sense, these instruments were characterized by a ‘secondary’ and also a ‘primary’ level (see figure 11.6). The industrial forms of conducting interventions were further characterized by leaving ‘tertiary’, radical innovation creating instruments outside intervention projects, with the particular exception of the social science-oriented problem-solving centers.

In the empirical case of the SME project, it was not possible to find examples of solutions that would serve as a guide for dealing with the problem of SME-government agencies relations. It was not possible, either, to rely simply on experiences of WEB’s research-oriented interventions instruments (CHAT and DWR). Instead, it was necessary to begin an experiment with a new kind of intervention methodology, one that would allow the participants to create continuously new representations of solutions by relying as much on previous innovative solutions as possible and simultaneously conducting as much research/development as necessary. This experiment led finally to a multilayered, dynamically changing set of instruments as the means to push forward the problem-solving process across its full trajectory and extension.

These instruments consist of an integrating layer (CHAT and DWR as overall theoretical and methodological instruments), as well as a layer of methods for focusing on specific phases of the problem-solving process (the exploration groups and IDT workshops and the co-design laboratory; the planned dissemination-oriented methods). The dynamic layer of DWR-based methods made it possible to address historically old and historically new problems in an integrated manner. In contrast to the industrial ‘external division of labor’, where qualitatively different instruments were part of different activities, the combination of different DWR-oriented methods in the SME intervention constitutes an ‘internal division of labor’.

Furthermore, a ‘theoretical’ layer of instruments (the ‘conceptual map’ and the literature overview) existed which was not fully elaborated and used. These instruments might have complemented the layer of DWR-based methods, serving as a theoretical guide for deciding what kind of intervention method – e.g., the co-design laboratory type or a faster Change Laboratory variant – should be used. Usage would have depended on the degree of complexity and novelty of the specific ‘practice field’ (specific instances of networks of SMEs and government agencies).
The instruments used in the SME case were based on previous knowledge about a tertiary instrument (DWR), one that had the potential to address context breaking and retaining problems. The expanded object – that contained aspects of both historically new and historically old problems affecting a larger number of users – made further development of the instruments necessary. The main instruments became multilayered and dynamically changing, according to the dynamic of the object and the corresponding emphasis on creation or dissemination (see figure 11.6).

![Figure 11.6: Sketch of main instruments in an instance of a post-industrial form of conducting interventions](image)

**Community arrangement**

Previous findings demonstrated that main industrial forms of conducting interventions were characterized by different kinds of community arrangements. The main contrast was between hierarchical consultancy firms that followed a business logic and research centers that followed academic rules and a corresponding division of labor. The foundation of both types of conducting interventions was a single organization. The only forms which had a broader foundation and involved many activities were the state organized systems of TWI and the Baldrige award (termed 'state-academia-industry solution proliferating systems', see figure 11.7). These forms of conducting interventions were characterized by state interventions, supported by a cooperation-oriented community pattern that consisted of activities from state, academia and industry. However, the inclusion of many activities was only possible in combination with an orientation to the dissemination of highly standardized representations of solutions.
In the SME case, the process to constitute the community commenced at the beginning of the SME project, resulting in a large number of different actors and activities being involved in the intervention. The community included actors and activities from different spheres (industry, science, state). There was a pattern of open collaboration between participating actors and activities and hybrid co-financing from research pools, government agencies and other sources.

Considering the dominant activities (government agencies, SMEs, WEB), the way in which the project was financed (research and government agencies’ resources), and the cooperative logic, the community arrangement identified in the SME project showed many parallels to the state-academia-industry solution proliferating systems. These state interventions were organized and financed predominantly by government agencies, but were also strongly supported by actors and activities from industry and science. That kind of collaboration was motivated by certain societal emergency situations such as World War Two and the decrease of competitiveness of US corporations in the 1980s and 1990.

In the NZ apple industry, the scenario prior to the intervention came close to a crisis situation and so a corresponding broad support for the problem-solving endeavor existed a priori. Given the concerns about the overall question of SME-government agencies relations, there was an existing desire for better collaboration between SMEs and government agencies in NZ (the overall objective to ‘enable SMEs to thrive’), but there was no self-evident societal emergency situation comparable to World War Two or the decrease of competitiveness of US corporations in the 1980s and 1990. This is part of the explanation as to why it took time to organize the SME project, why so much of the main actors’ (RW, WEB) time was invested into subject and community forming processes, and why the project was confronted by the described rupture (the withdrawal of support of a senior member of DoL, the project-leading government agency).

The key difference between the new community arrangement and that of consultancy firms and research centers is that the new community arrangement transcends the boundaries of a single organization and relies on a dynamic network of activities that carries out the intervention. By enabling the integration of expertise from different kinds of spheres, the new community arrangement also goes beyond the focus of alliances between different types of consultancies (e.g., Management consultancies and IT consultancies). While the community arrangement in the empirical case came close to the type of ‘state-academia-industry solution proliferating systems’, the central difference to the state type is that the dynamic network followed the logic of an entire societal problem-solving process and integrated dissemination and innovation into the intervention (see figure 11.7).
11.6 Conclusions: the possibility of overcoming the research logic vs. business logic dilemma

The objective of this chapter was to study the contradictions and experiments in the SME project, as well as to investigate the relation of the developmental process in the SME project to the overall development of forms of conducting interventions as previously discussed.

The development in the SME project was analyzed in accordance with the dynamic of the problem in the SME project. The developmental process in the project – which was hypothesized as potentially leading towards a qualitatively new model of conducting interventions – was studied as an expansive learning process. The emerging new model of conducting interventions was analyzed and related to the concepts that were set in Chapter 8, to characterize the overall historical development of forms of conducting interventions.

The object of the intervention project was the transformation of a complex network of SMEs and government agencies (to increase the possibility for SMEs ‘to thrive’). Analysis revealed that the SME-government agencies problem could clearly be characterized as an instance of the qualitatively new type of post-industrial problem. Moreover, the state of the SME-government agencies problem was dynamically changing. It displayed a trajectory, characterized by the different phases of societal problem-solving processes, however without the clear-cut separation between historically new and historically old aspects of societal problem-solving processes analyzed earlier.

Having to address the complex network of SMEs and government agencies led to an expansive development in WEB’s way of conducting interventions. The
A qualitatively new foundation for conducting interventions was no longer a single system (WEB) but instead, a network/formation of actors and activities. The network/formation was not static but dynamic and involved various activities during different phases of the project. The dynamic of the intervention process corresponded to the logic of a societal problem-solving process, and thus, included both innovation and dissemination processes.

These characteristics were visible in all elements of the new model of conducting interventions. The subject was dynamically shifting in accordance with changes in the dynamic of the problem-solving process; however, it also contained a coordinating, information exchanging and stabilizing core group (WEB+RW). The main actors came from different spheres (industry, science, state), and had previously followed different logics of problem-solving (innovators, researchers, consultants, state representatives and SMEs making use of new knowledge). The main instruments remained within the frame of DWR (previously characterized as a ‘tertiary’ instrument), however they became multilayered and dynamically changing in accordance with the dynamic of the object of the intervention. In the SME case, the community arrangement transcended the boundaries of a single organization and integrated different types of activities, expertise and resources.

The new model of conducting intervention showed many parallels to the ‘state-academia-industry solution proliferating systems’ with the crucial difference being that in the new model, research and development was fully part of the intervention. The new model of conducting interventions is an outline based on the analysis of the intervention in the SME project. Empirically, it is not consolidated, and even less established as a form of conducting interventions. Nevertheless, from a theoretical point of view, the empirical case can contribute answers to the research question of this chapter:

*How does the experience of a specific project where a new model of conducting interventions was developed enrich the historically based comprehension of a zone of proximal development of forms of conducting interventions?*

Post-industrial forms of conducting interventions were previously characterized in an indirect manner. They were defined as demonstrating a more effective way to resolve the industrial contradictions:

1. Either focusing on historically new problems and creation of solutions or focusing on historically old problems and dissemination of solutions;
2. Either focusing on context breaking problems and fundamental change of the model of work organization or focusing on context balancing problems and transforming partial aspects.

During the course of seeking concrete examples of characteristics concerning such post-industrial forms, DWR was interpreted as an instrument that contributed to resolving the industrial contradiction between context breaking problems and fundamental change on the one hand, and context balancing problems and trans-
forming partial aspects on the other hand. The next task was to identify an example of an adequate community arrangement that had contributed to the resolution of the contradiction of innovation vs. dissemination.

However, neither the business logic of consultancies (business-oriented solution disseminators), nor the academic logic of research centers (social science-oriented problem-solving centers) offered a way of resolving this latter contradiction. It seemed to be difficult to escape the dualism of academic logic and business logic.

This chapter, however, argues that the dilemma of having to choose between academic logic and business logic can be resolved by transcending the boundaries of single organizations and carrying out interventions on the basis of a dynamic network/formation of actors and activities (figure 11.8). The dynamic network/formation of activities followed the logic of a societal problem-solving process, which implies that both, creating innovative solutions and disseminating solutions, were part of the intervention. Innovation and dissemination were not understood as separate processes, but instead as interrelated and concurrent.

Figure 11.8: Outlined instance of a post-industrial form of conducting interventions against the background of the industrial types of conducting intervention

The example of a new community arrangement (the dynamic network/formation) and the previously described instrument (DWR) should not be interpreted as separate parts that are now ‘assembled’. The instruments of the new model of conducting interventions also altered radically; they became multilayered and dynamically changing. The subject comprised actors with different types of expertise that addressed a shared object and were involved in ‘developmental agency’ to transform this object. In this sense, all of the main elements (subject, instruments
object, and community) of this new model of conducting interventions are inter-
connected.91 A 'contraction' of one element (e.g., focusing with main instruments
on the creation of solutions only) would entail the loss of the new quality of the
entire model. This is exactly what happened as the project was confronted by the
described break (the withdrawal of support of a senior member of the project-
leading government agency). The new way of conducting interventions lost much
of its potential for disseminating solutions.

The terms 'network' and 'formation' were chosen to describe the foundation of
the instance of a new model of conducting interventions. However, the outlined
instance shows a number of characteristics that are not fully captured by using the
term 'network'.

Actors and activities that carried out the intervention were not just a random
set of people, but instead were consciously and jointly contributing to a complex
problem-solving process. The 'spatial expansion' towards the integration of actors,
instruments and resources/communities from the spheres of state, science and in-
dustry was complemented by the dynamism of subject, instruments and the com-
community arrangement. Only through the high level of collaboration of actors and
activities (a kind of 'conscious dynamism') could the expertise of different societal
spheres be 'moulded' and utilized in developmental activity.

These characteristics of the instance of conducting interventions come close to an
activity pattern described by Yrjö Engeström as 'knotworking':

This is clearly not an activity system in the sense of having a relatively stable object,
motive, community, and division of labor. The half life of the knot was far too short
for such systemic infrastructure to evolve and stabilize. On the other hand the knot
is not just a singular action either. It performed a bundle of tightly interconnected
actions. More importantly, it deliberatively organized and dissolved itself to per-
form and terminate these actions. [...]

Knotworking is not reducible to a single knot or a single episode. It is a temporal
trajectory of successive task-oriented combination of people and artifacts. (Enges-
tröm et al. 1999: 352)

The outlined instance of a post-industrial form of conducting interventions dis-
plays a remarkable congruence with Engeström’s pattern of ‘knotworking’. The
example of a new way of conducting interventions had a rather long ‘half life’. The
dynamic object of the outlined form of conducting interventions constituted not
only knotworking actions, but a knotworking activity.

91 The described interconnection between main elements of the new model can be also
described by a complementing level of complexity of instruments and the community
pattern. Previously, DWR was interpreted as a tertiary instrument in the sense of War-
tofsky (see section 8.3 and subsection 9.2.5). The outlined instance of a post-industrial
form of conducting interventions is also characterized by a high-level pattern of col-
laboration in the sense of the model Fichtner/Raeithel (see section 8.3).
The instance of a new form of conducting interventions can be described as a kind of hybrid of established industrial forms. However, industrial forms of conducting interventions themselves originated in other types of activities (science, engineering, banking, accountancy, etc.) and were characterized to a high extent by the respective logics of these original activities. In contrast, the outlined post-industrial form, following the logic of an entire societal problem-solving process, establishes an activity of its own. Correspondingly, the outlined new form can be seen as an example of intervention activity in the full sense of the term activity.92

This chapter has emphasized how the example of a post-industrial form is far from being consolidated. This fact became clearly discernible through the ‘break’ in the project, which was interpreted as a tertiary contradiction between the emerging new community pattern and the previous community pattern(s): integrating and sharing expertise and resources from the spheres of science, consultancy/industry and state vs. dividing and controlling expertise and resources.

This example of a tertiary contradiction can be connected to broader societal processes in the Computerization wave. Carlota Perez (2005/2007: 34) emphasizes that a central challenge in the currently emerging later period of the Computerization wave is to make social, organizational and institutional innovations possible that would entail the full utilization of the new possibilities of the ICT revolution. She highlights that more integrative and balancing state interventions would play a central role in facilitating these non-technical innovation processes. However, she also notes that ‘state intervention is still recalled as an obstacle for the free exploration of the ICT revolution’.

Post-industrial forms of conducting interventions could prove to be a useful means of creating and disseminating social, organizational and institutional innovations, which would support a more integrative utilization of new possibilities of the ICT revolution. The development of post-industrial forms and, to an even larger extent, their wider application, still seems to be at an early stage. Nevertheless, the conclusions in this chapter are intended to provoke not only thinking about possible new forms of conducting interventions, but also to encourage experimentation with new forms in practice (see subsection 12.3.3).

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92 Engeström (1987: 92–95, 124–125) distinguishes, in a similar manner, between learning actions carried out by systems and institutions such as schools, science and work on the one hand, and learning activity as an independent system on the other hand.
12 Conclusions: Looking back, looking forward

This study began by asking what forms of conducting interventions could most effectively address emerging post-industrial problems (located between different actors and activities, as well as encompassing both historically new and historically old/resolved problems). Existing forms of Management consultancy and IT consultancy on the one side, and research centers on the other, appear to have different foci – placing emphasis either on repeating problems or on new problems. These forms, in reference to their potential for addressing post-industrial problems, seem to display complementary limitations.

These observations prompted a detailed investigation of forms of conducting interventions that address organizational problems in work activities. The general research question of this study was:

**What forms of conducting interventions are needed to address post-industrial problems effectively?**

A condensed answer to this question is as follows:

Intervention activity has its roots in societal problem-solving processes – that is, innovation and diffusion processes – associated with periods of radical change in work and organizations, such as those occurring during technological revolutions. In the Electrification wave as well as in the Motorization wave, we observed a clear-cut division of labor between established types of conducting interventions. However, with the emergence of post-industrial problems in the Computerization wave, the need increased for forms that could combine the focus on creating innovative solutions with the focus on adapting and disseminating solutions as well as combine the focus on fundamental change of the logic of work organization with the focus on balanced transformation (with regard to social/human processes). Possible main characteristics (instruments, subject and community arrangement) of such ‘post-industrial forms’ were identified and discussed, by analyzing historical and empirical cases of conducting interventions. Creation of solutions can become more disseminative and dissemination of solutions more creative, if intervention activity is not organized within the boundaries of one consultancy firm or research center. Instead, intervention activity needs to be carried out by a network or even by a dynamic formation of actors and organizations that contribute to a joint problem-solving process.

The following section examines how key findings have emerged over the course of this study. Sections 12.2–12.4 address the implications of these findings for discussions about intervention theory, new forms of conducting interventions as well as methodological issues. In sections 12.5 and 12.6, the focus will shift to questions of the validity and the limits of the findings, as well as to the implications for possible future research.
12.1 Looking back: Research process and key findings that emerged

In Chapter 2, a cultural-historical methodology was developed that aimed to investigate the need for forms of conducting interventions that could address post-industrial problems effectively by tracing the past, present and future development of forms of conducting interventions.

Engeström’s cycle of expansive learning serves as the heuristic guide in the methodological procedure. However, the usual phases of the overall expansive learning methodology were extended to include two relatively independent methodological ‘miniature cycles’. A ‘dialectical miniature cycle’ took the study from a delineation and historical analysis of forms of conducting interventions to a comprehension of the current state of forms of conducting interventions – representing the historical-analytical part of the study. An ‘expansive learning miniature cycle’ took the study from the comprehension of the current state to a discussion of a qualitatively new form of conducting interventions – primarily encompassing the practical-experimental part of the study. In a certain sense, the methodology aimed at combining Engeström’s ‘early’ (dialectical cycle-oriented) methodology, as applied in his study of 1987, and his ‘later’ (expansive learning cycle-oriented) methodology, outlined in his study of 1987 (see figure 2.5).

The historical-analytical part of the study began by gathering existing scientific knowledge about forms of conducting interventions (Chapter 3). The study then investigated the origin and emergence of forms of conducting interventions with a unit of analysis for the further procedure as an outcome (Chapter 4). The unit of analysis served as the basis for the analysis of some selected past and contemporary forms of conducting interventions (Chapters 5–7). This led to comprehension of the historical dynamic of forms of conducting interventions, including a historical hypothesis of a zone of proximal development (Chapter 8).

While the hypothesis of a zone of proximal development of forms of conducting interventions outlined contradictions, which were used to define post-industrial forms of conducting interventions, it did not point to the specific characteristics held by such ‘post-industrial’ forms. The identification of possible concrete characteristics of a post-industrial form commenced by analyzing a theoretically interesting form of conducting interventions that had a particular focus on innovation (Chapter 9). The empirical chapters provided further data about a possible example of a post-industrial form of conducting interventions. First, the historical development of the empirical case was traced and its experiments to find viable ways of conducting interventions analyzed (Chapter 10). Subsequently the most recent experiment of the case was reexamined. This most recent experiment was associated with finding a way of conducting an intervention that could address an example of a post-industrial problem (Chapter 11).

93 The term ‘miniature cycle’ is used here to emphasize the existence of a more fundamental logic than the logic of the ‘miniature cycle’ (the logic of an overall expansive methodology), and to highlight that miniature cycles fulfil a certain function within the more fundamental logic. It does not mean that ‘miniature cycles’ can be conducted over a short period of time or with little effort.
The main results of the theoretical, historical and empirical chapters are summarized as responses to research questions.

Research question 1: How do previous studies contribute to a comprehension of past, present and future forms of conducting interventions? (Chapter 3)

The analysis of studies concerning forms of conducting interventions showed that the elements necessary for studying and comprehending the phenomenon under investigation seemed to be scattered across different theoretical fields. Scientific knowledge exists about different generations of ‘rational’/ ‘technical’ or ‘normative’/ ‘human’ intervention concepts and methodologies for dealing with general problems in work activities (described in the models of Barley and Kunda (1992) and Adler (2001)). Overviews are available, which relate to different generations of consultancy businesses specialized in addressing particular problems (described in Kipping’s model of 2002). Scientific knowledge exists about the role of science and innovation in addressing general problems that emerged in subsequent techno-economic waves linked to technological revolutions – described by Freeman and Louçã (2001), and Perez (2002). While no common theoretical ground for discussing new forms of conducting interventions existed, it turned out that the analyzed research traditions revealed elements of the phenomenon of conducting interventions. These provided an overview, which served as a guide for the further steps in this study. The ‘overview model’ (table 3.7) places individual pieces, provided by different research traditions, next to each other, although without providing any guiding concepts as to how those different scientific contributions might be integrated. However, the model suggests that groups of conducting interventions can be linked to historically changing social and organizational problems that emerged in periods of radical transformations, associated with technological revolutions and corresponding techno-economic waves.

Research question 2: What were the preconditions for the emergence of forms of conducting interventions, and how can the context of the emergence be captured as a unit of analysis for the further study of forms of conducting interventions? (Chapter 4)

The purpose of this chapter was to determine the conditions of the origin of forms of conducting interventions as a specific form of activity, and to conceptualize these conditions in order to generate a theoretical unit of analysis for the entire study. Following the emergence of the hypothetical object of forms of conducting interventions (social/organizational problems associated with radical transformations), problem-solving processes in the early industrial era were analyzed.

In an early phase of industrial development, there was a comparatively low degree of exchange and dissemination of knowledge concerning problem-solving. At the beginning of the industrial era (in the period of the first technological revolutions), this degree increased. The problem-solving process related to the use of steam engine as a power source, which took place in the 1st and 2nd techno-economic wave (associated with the mechanization of industry), was examined. Based
on that examination, several central observations were made and the elaboration of key concepts was possible.

(1) A process of ‘societal problem-solving’ was observed and conceptualized as consisting of 4 phases: problem emergence and definition; innovative solution; conceptualized solution; diffusion/dissemination. The process can be described as a trajectory moving from a more general stage of the problem towards a more specific stage, until a specific problem can be solved. The core of the innovation then becomes a kind of ‘germ cell’ for a new system, that spreads and evolves whilst becoming more varied and complex. This concept of societal problem⁹⁴ in its life-cycle dynamic became a central instrument for the subsequent analyses of complex problem-solving processes.

(2) Actors or activities (e.g., James Watt) were identified, which addressed the societal problem in the course of this ‘life-cycle. A dynamic formation of actors and activities that address the societal problem in a discourse-like way and develop it towards a general solution which is diffused in society was taken as the theoretical unit of analysis. The societal problem-solving formation can be understood as containing the cultural-historical knowledge that enables work activities to deal with the societal problem they encounter in the course of radical transformations of the economy.

(3) Two forms of specialized problem-solving activities, embedded in the dynamic formation of actors and activities, were identified: Boulton and Watt’s form of selling Watt’s invention and the Cornwall collective invention system. Both relied on the same cultural-historical knowledge (Watt’s model of the steam engine), but had a very different focus – on the further development of the innovative solution or on the licensing and exploitation of intellectual property. The contrast between the two forms was also interpreted as a specific expression of the contradiction between the use value and the exchange value of the knowledge utilized in problem-solving activities. These new forms of problem-solving activities – specialized on supporting the transformation of work activities—seemed, in one sense, to be part of the overall problem-solving formation, but in another sense, were separate or even competing systems.

While forms of conducting interventions that addressed social and organizational problems did not emerge in the analyzed problem-solving process in the Mechanization wave, a unit of analysis was derived that was the basis for subsequent historical analyses of societal problem-solving process and related forms of conducting interventions.

⁹⁴ The concept was derived by Seidel (1976) and elaborated by the author of this study.
Research question 3: What were main forms of conducting interventions in the Electrification wave, and what were main characteristics of these forms? (Chapter 5)

The theoretical unit of analysis was applied to an analysis of the main problem-solving processes in the early and later periods of the 3rd techno-economic wave – the Electrification wave.

During the early period of this wave, there was a tense coexistence between the logic of implementing new technologies (e.g., new types of machines), in order to achieve a higher speed and quantity of output, on the one hand, and elements of the logic of the old craft-based production form, on the other. The utilization of new possibilities was constrained by the remaining manual tasks and the system of decentralized division of labor. Through his experiments at steel factories, the inventor Taylor developed a way of optimizing machine use, a method of deriving standards for manual tasks by time and motion studies and also a means of enforcing standards through his incentive wage system. Time and motion studies as well as the incentive wage system became the main instruments of the integrated Scientific Management methodology, which was used to deal with obstacles (the 'efficiency problem') towards the establishment of a qualitatively new production system. As the logic of mass production became increasingly dominant in later decades, the technological possibilities that were emergent in the Electrification wave became fully realizable and exploitable.

From today’s perspective, the mass-production logic was established at the shop floor level – that is, in production activities in a narrow sense of the word. A typical form of organization for work activities was the factory. Main actors in the problem-solving process were mechanical engineers.

The two main forms of conducting interventions associated with the described problem-solving process were those of Taylor and Bedaux. Taylor worked at a company associated with the ‘core industries’ of the Electrification wave (Midvale Steel Company). He took part in defining the societal problem and subsequently developed and conceptualized Scientific Management, an integrated solution that he then disseminated through his books and by conducting interventions in factories. Taylor’s form of conducting interventions treated problems as historically new, and focused on a compact repetition of the process that had led to his innovative solution. Scientific Management was a compact system derived from Taylor’s earlier methods and tools. Intervention projects conducted by Taylor and his pupils focused on factories such as the Watertown Arsenal, which were also part of ‘core industries’ in the Electrification wave. At these core industries, the societal problem had aggravated from a relatively early stage (‘early users’).

Bedaux had taken part in the same problem-solving process as Taylor, but only during the diffusion phase. He built his form of conducting interventions – a consultancy firm – upon the already existing conceptualized solution of Scientific Management. He did not focus on repeating an entire innovation process, but instead, focused on applying a reduced variant of the Scientific Management solution that led to relatively quick results, and which he and his employees used for a large number of clients from a wide circle of industries (majority of users). His
consultancy used an elaborated system of training new employees and of realizing projects. This system enabled the Bedaux consultancy to conduct interventions with many organizations from different industries (and later even in different countries) that needed to deal with the 'efficiency problem'.

The qualitative difference between Taylor’s and Bedaux’s forms, on the one hand, and Boulton and Watt’s problem-solving activity, on the other, is linked to the degree of complexity of the object (social/organizational vs. technical problem) and of the key instruments (Scientific Management vs. the steam engine model).

Scientific Management was a complex methodology for new production and management forms. It could not be implemented without a series of partial innovations and new ways of acting. Because of the solution’s complexity and its organizational and social nature, the assistance of external specialists was needed to implement it. Therefore, Taylor’s and Bedaux’s forms of conducting interventions are interpreted as the first forms of intervention as an activity.

In the later part of the Electrification wave, problems such as high turnover and low morale emerged/aggravated as dysfunctional side-effects of the wider application of Scientific Management solutions. At a later phase of the corresponding societal problem-solving process, these problems were termed ‘Human Relations’ problems. Main actors associated with this problem-solving process were social scientists and personnel managers.

Together with members of Western Electrics (AT&T), social scientists Mayo and Roethlisberger developed and conceptualized the solution of ‘personnel counseling’. This solution consisted of a method, through which supervisors might influence individual workers to hold a higher degree of ‘harmony’ with and in the company. Personnel counseling already constituted a reduced component of the entire innovative solution, and was then further processed and objectified as a training concept. The last stage was conducted in the context of the state-organized intervention system of Training Within Industry (TWI), which disseminated the training to a high number of US-factories. TWI was a state-subsidized, non-profit intervention system that brought together a high number of actors and activities (among others, personnel managers, researchers on Human Relations, union and company representatives), with a view to distributing knowledge in training forms to US-organizations, in order to improve production capacities during the Second World War.

The researcher Kurt Lewin developed another form of conducting interventions to deal with the societal problem associated with the later part of the Electrification wave. Treating problems as historically new, he integrated creation, conceptualization and application of new solutions by using Action Research as a methodology and different kinds of group dynamic concepts. Based on his research-oriented intervention model, Lewin and his students conducted interventions, in which the causes of problems were analyzed and ways of reaching a better form of social collaboration were developed.

The forms of conducting interventions in the Electrification wave this study has taken into consideration, demonstrated a division of labor as depicted in figure 12.1.
Research question 4: What were main forms of conducting interventions in the Motorization wave and what were main characteristics of these forms? (Chapter 6)

The early period of the Motorization wave was dominated by an early form of mass production that was oriented to large-scale production and stable markets. Ford represents the paradigmatic example of this early form. New developments in the Motorization wave (e.g., the rise of the automobile industry, the rise of oil as a core input, networks of motor highways) entailed new opportunities as well as new needs for companies. Markets have grown (becoming international), however, they have simultaneously become more turbulent. As the stability of markets vanished, inner contradictions of the early form of mass production (oriented around stable markets) became increasingly visible.

A famous example of where this problem aggravated was General Motors, a prominent member of the carrier branch of the Motorization wave – the automobile industry. For Alfred Sloan, the societal problem appeared to be linked to the chaotic accumulation of organizational units and products against the background of a turbulent market and virtually bankrupt company. Sloan developed an innovative strategy and structure for General Motors, which became the basis for a new variant of mass production. Drucker generalized and elaborated the innovative solutions and derived management concepts that could be deployed for redesigning the strategy and structure of almost any corporation. These concepts were instrumental in establishing a dynamic market-oriented form of mass production, through which the new possibilities of the Motorization wave became fully exploitable.
Main actors in the problem-solving process were managers, management scholars and management consultants. Drucker acted as an individual interventionist. His conceptualization was essentially a representation of the General Motors model. Consultancies such as McKinsey focused on the dissemination of ‘strategy and structure’ concepts to a large number of corporations from a wide circle of industries.

McKinsey only took part in the societal problem-solving process’ diffusion phase. Adopting the rule of ‘don’t reinvent the wheel’, the firm developed a form of conducting interventions that disseminated previously developed solutions such as Sloan’s and Drucker’s. McKinsey relied on a huge store of ‘best practice solutions’ and a powerful knowledge management instrument. The consultancy operated a highly elaborated system of training new employees, an elaborated hierarchy of consultants and a broad network of clients, which enabled it to conduct interventions with many organizations from different industries, and subsequently from different countries.

In the later part of the Motorization wave, the diffusion of strategy and structure solutions led to the aggravation of ‘inner problems’ – poor quality, lack of cooperation, political games – within corporations.

Solutions to the quality problem find their origins in the innovations associated with the Toyota Production System. These innovations were studied by different authors such as the quality gurus Juran, Deming and Ishikawa, and were taken as an inspiration in developing key concepts for addressing the problem of quality. The quality gurus’ concepts served as the foundations for structuring best-practice solutions within the Baldrige quality award system, which represented the main intervention system associated with quality issues.

While the Baldrige Award system neglected the creation process of solution (possessing no instruments for developing innovative solutions), its instruments and community of dissemination were highly elaborated. It captured different areas of quality for different types of organizations. A large number of actors and activities (including interested US corporations and quality specialists from science) seek to participate in the system, resulting in the identification (awarding) of best-practice solutions concerning quality. These best-practice solutions were shared with many others.

The Baldrige system arose from a similar ‘national emergency situation’ background – new superior Japanese competitors during the 1980s and 1990s – and had the same orientation to solution proliferation, as did the TWI system.

A further significant problem in the later part of the Motorization wave was the problem connected to lack of cooperation. This issue was – among other things – addressed by smaller consultancy organizations using systems theory to develop solutions for better cooperation in corporations. The fundamentals of the innovative solution were developed in the course of the work of systems theory scholars such as Luhmann and Selvini Palazzoli. These early contributions can be seen as the basis for later application and dissemination. Nonetheless, the small systemic consultancy organizations retained an orientation to create and generalize systems theory-based intervention methodologies, which were used to deal with problems of weak cooperation in various organizations.
The forms of conducting interventions in the Motorization wave taken into consideration in the study, display a division of labor similar to that in the Electrification wave (depicted in figure 12.2).

**Figure 12.2: Division of labor for analyzed forms of conducting interventions in the Motorization wave**

**Research question 5: What were main forms of conducting interventions in the early part of the Computerization wave and what were main characteristics of these forms? (Chapter 7)**

The Computerization wave is still unfolding. The opportunities and risks of the current technical, social and organizational developments are being discussed in various disciplines. There is no agreement concerning the final outcome of the ongoing processes. Pessimistic and optimistic attempts to characterize the evolving new context have been made. This chapter did not focus on the newest developments in the Computerization wave, but predominantly on problem-solving processes and forms of conducting interventions from the early part of the Computerization wave (the last decades of the 20th century).

The early period of the Computerization wave was dominated by late forms of mass production. Globally operating large corporations attempted to utilize ICT (e.g., to elaborate their communication infrastructure) without changing the basic logic of their organizational form. However, from the late 1980s onwards, attempts to find new organizational logics increased. The mass production paradigm gradually lost the almost complete dominance of prior times. The organization model that was the basis for General Motors’ success for the most part of the 20th century was no longer considered appropriate role models. Instead, networks became the
new paradigmatic organizational form. They were considered more effective in supporting the increasing focus on high technology, innovation and the knowledge-intensive design processes.

A preliminary outline of the context of emerging societal problems was: Identifying a profitable way of production (in the widest sense) at a time when inner contradictions in work activities, dominated by the mature mass-production paradigm, become increasingly visible against the background of new possibilities related to ICT.

There have been several different societal problem-solving processes that have led to new concepts and change initiatives. However, none of these concepts signified a genuine breakthrough – at least not in the sense that Taylor’s or Sloan’s organizational innovations once did.

One of the first main problem-solving processes in this period was related to Business Process Reengineering. Practitioners such as Olson and Sieloff, as well as McCaig and Glover, developed innovative solutions at Hewlett-Packard and Mutual Benefit Life. Scholars such as Hammer and Champy as well as Davenport and Short, conceptualized these solutions. This was achieved by either generalizing the new practice model as a new prototype (as in Hammer and Champy’s case), or by embedding the generalizations into a theoretical frame (as in Davenport and Short’s case). IT consultancies such as Andersen/ Accenture developed a very sophisticated form of conducting interventions. They created highly elaborated instruments (highly sophisticated knowledge management instruments, IT-supported methods of conducting intervention steps, modules of ready-made solutions), as well as a highly elaborated community system (a higher number of consultants and a more elaborated division of labor than McKinsey), which allowed for very rapid adaptation of solutions.

The pattern in the early period of the Computerization wave is somewhat contradictory. As was the case for actors in the Electrification wave and in the Motorization wave, scholars such as Davenport became entrepreneurs and worked as interventionists. Large IT consultancies, such as Accenture, developed forms of conducting interventions enabling them to disseminate solutions in large numbers to clients. Both mass production and the dissemination-oriented type of conducting interventions (including Bedaux, McKinsey, Accenture) have developed their hitherto most elaborated form. On the other hand, problem-solving processes no longer exhibit clear cut divisions and oppositions. Mass production increasingly loses its dominance. Networks become the new paradigmatic organizational form. The manner in which large consultancies such as McKinsey or Accenture address complex networks is increasingly criticized. The forms of conducting interventions from the early part of the Computerization examined in this study are depicted in figure 12.3.
Research question 6: What is a historical hypothesis of a zone of proximal development of main forms of conducting interventions in the course of the shift from the industrial era to the post-industrial era? (Chapter 8)

This study argues that the original function of forms of conducting interventions is to mediate the organizational transformation of work activities in periods of radically changing contexts. Forms of conducting interventions can be understood as being linked to the innovation and diffusion processes in the paradigm-breaking installation periods and the paradigm-balancing deployment periods of techno-economic waves. They contribute to the social assimilation of new possibilities made available by technological revolutions in the techno-economic waves.

In the Electrification wave and the Motorization wave, a clear-cut division of labor between established forms of conducting interventions was observed. The characteristics of such ‘industrial’ forms of conducting interventions were condensed by referring to ideal types: those of (innovator-)scholar-entrepreneurs (e.g., Drucker, Hammer or Davenport), business-oriented solution disseminators (e.g., McKinsey or Accenture), social science oriented problem-solving centers (e.g., Lewin’s research center) and the state-academia-industry solution proliferating systems (e.g., the Baldrige quality award system).

The industrial ideal types can be understood as the ‘extremes’ (or ‘poles’) of two central industrial contradictions (see figure 12.4). These were

(1) Either focusing on historically new problems and creation of solutions or focusing on historically old problems and dissemination of solutions;

(2) Either focusing on context breaking problems and fundamental change of the model of work organization or focusing on context balancing problems and transforming partial aspects.
The discussion of the current processes in the Computerization wave suggested that continuous innovation and continuous change have become central characteristics of the world of work. Work activities are evolving towards increasingly complex network organizations. These developments signify the emergence of a qualitatively new type of problems: ‘post-industrial’ problems. Such ‘post-industrial’ problems were described as encompassing the characteristics of historically new and old, context breaking and balancing problems.

The two industrial contradictions were used to characterize the hypothetical zone of proximal development of forms of conducting interventions. It was argued that the ‘industrial’ forms of conducting interventions (e.g., McKinsey and Accenture), which focused on a part of post-industrial problems only (e.g., historically old, context breaking problems), would have to negotiate certain kinds of disturbances when encountering complex network organizations (i.e., the qualitatively new type of problems).

The central historical hypothesis of this study was that the two ‘industrial’ contradictions must be overcome. Dissemination of solutions has to become more creative and the creation of solutions more disseminative. Intervention needs to integrate the fundamental change of the model of work organization with balanced transformation that would not neglect partial (e.g., social/human) processes. Post-industrial forms of conducting interventions were defined as emerging new forms of conducting interventions, which would be more effective in resolving the contradiction between innovation and dissemination as well as the contradiction between fundamental change of work activities and transforming partial aspects.
The suggested outline of post-industrial forms had to be enriched by concrete examples of instruments, subject and community arrangement of these forms. The study argued that post-industrial forms would not be associated with one particular industrial form, but would rather be a kind of hybrid of different earlier forms. The study elected to continue the investigation by focusing on the forms of conducting interventions, which historically integrated innovation to the highest extent: research centers (‘social science oriented problem-solving centers’).

*Research question 7: How does the experience of an innovation-oriented form of conducting interventions enrich the historically based comprehension of a zone of proximal development of forms of conducting interventions? (Chapter 9)*

A form of conducting interventions which had a particular focus on creating innovative models of entire work activities was selected for further investigation: the form associated with the methodology of Developmental Work Research (DWR), which was developed at the University of Helsinki.

Since the 1980s, the developers of DWR have contributed to critical discussions about the mass production paradigm, as well as to discussions about overcoming the separation between traditional (disciplinary and analytic) science and work activities in need of solutions for their everyday practice. Yrjö Engeström created and conceptualized an intervention methodology for addressing inner contradictions in work activities and supporting practitioners to create new models of work. DWR was applied in several intervention projects. Condensed DWR adaptations such as the Change Laboratory method were derived. A permanent form of applying DWR was established at the Helsinki based Center for Activity Theory and Developmental Work Research.

This study concluded that DWR can be used as an instrument to address the entire model of work organization. The observed transformation of work activities, based on DWR, was not limited to rational logic (such as in BPR) nor to human logic (such as in Lewin’s research center). The unit of analysis of DWR (network of activity systems) and the methodological tool (the cycle of expansive learning) are not limited to partial elements or processes of work activities (e.g., social, managerial or technical processes). DWR can be interpreted as an intervention instrument that contributes to the resolution of the industrial contradiction between either focusing on context breaking problems and transforming the entire model of work organization or focusing on context balancing problems and transforming partial aspects.

DWR is predominantly applied by academic institutions. Academic DWR, however, does not focus on the dissemination of solutions. The community arrangement of the DWR-oriented problem-solving center is similar to the community arrangement displayed in Lewin’s research center, both displaying academic rules and a division of labor oriented to the creation of innovative solutions. The use of DWR in academic settings is time consuming. However, more recent developments point to endeavors to develop more ‘disseminative’ variants of DWR usage. These developments are taking place in Finland and other countries. The
analysis of academic DWR posed the question as to whether hybrid types are possible, which would combine the strength of research centers (innovation facilitating instruments such as DWR) with a different type of community arrangement, which would contribute to dealing with the unresolved contradiction between innovation and dissemination.

Research question 8: How does the experience of a specific case experimenting with finding a way of conducting interventions enrich the historically based comprehension of a zone of proximal development of forms of conducting interventions? (Chapter 10)

The empirical case of the New Zealand based organization WEB was selected for further investigation, as WEB has experimented with hybrid ways of conducting interventions. The analysis of the empirical case revealed that WEB’s activity consisted of several historical layers of conducting interventions, and was deeply connected to existing cultural-historical knowledge about problem-solving processes and forms of conducting interventions.

In the first two developmental periods, WEB acted in a manner of an Action Research-oriented problem-solving center, a typical example of forms of conducting interventions that addressed historically new, context balancing problems. These periods were characterized by their connection to the cultural-historical knowledge from the Human Relations and Organizational Culture and Quality traditions. In the third period, WEB developed the form of a DWR-oriented problem-solving center addressing historically new, context breaking and balancing problems. The way of conducting interventions in this period had much in common with the DWR-oriented research center in Helsinki.

In the fourth period, WEB developed a more business-oriented way of conducting interventions (termed ‘DWR-oriented problem-solving company’). WEB’s interventionists were involved in many smaller and shorter projects. More often historically old, context breaking and balancing problems were addressed. It became possible to deal with problems involving many actors and activities (albeit historically old ones) in a relatively short frame of time. The fifth period seemed to be related to post-industrial problems. It was assumed that it might lead WEB to a new model of conducting interventions. An outline of WEB’s overall development is depicted in figure 12.5.
Figure 12.5: Outline of the overall dynamic of WEB’s ways/models of conducting interventions against the background of previous types.

As an alternative to the classic academic community arrangement, WEB developed a hybrid model: one that followed a business logic to a higher degree. However, this community arrangement had other limitations, such as radically reducing the time available for research and experiments. In WEB’s case, the conclusion was that neither the business logic of consultancies, nor the academic logic of research centers offered a way of resolving the contradiction between innovation and dissemination. The dualism between academic logic and business logic was difficult to escape from. Yet, the analysis of the final developmental period of WEB seemed to offer a way out of the dilemma.

Research question 9: How does the experience of a specific project where a new model of conducting interventions is developed enrich the historically based comprehension of a zone of proximal development of forms of conducting interventions? (Chapter 11)

WEB’s SME (small and medium sized enterprise) project was analyzed to further enrich the comprehension of the zone of proximal development of forms of conducting interventions. The problem of developing the complex network of SMEs and NZ government agencies was an example of a post-industrial problem. Earlier, post-industrial problems were described as challenging for both ‘research’- and ‘consultancy’-oriented interventions, and that connected the SME project to the question of an example of a community arrangement for a post-industrial form of conducting interventions.
Having to address the complex network of SMEs and government agencies led to an expansive development in WEB’s way of conducting interventions. The qualitatively new foundation for conducting interventions was no longer a single organization (WEB) but instead a dynamic network/formation of actors and activities, that followed the logic of a societal problem-solving process and correspondingly included both innovation and dissemination processes (see figure 12.6).

Figure 12.6: Sketch of an instance of a post-industrial form of conducting interventions

The subject of the new model of conducting interventions was changing dynamically in concert with the dynamic of the problem-solving process; the subject also contained a coordinating, information exchanging and stabilizing core group. Main actors came from different spheres (industry, science, state). Main instruments remained within the frame of DWR, but became multilayered and dynamically changing in concert with the dynamic of the object of the intervention. The community arrangement in the empirical case transcended the boundaries of a single system and integrated different types of activities, expertise and resources.

The new model of conducting intervention displayed many parallels with the ‘state-academia-industry solution proliferating systems’. The crucial difference was that in the new model, research and development were a fully integrated part of the intervention. The dynamic, object-oriented combination of people and instruments in the new form suggests that the new form can be characterized as a ‘knotworking’ activity (Engeström et al. 1999).

This study claimed that it had finally encountered an example of how the opposition between academic logic and business logic (i.e. integrating innovation
without disregarding adoption and dissemination of solutions) could be resolved. This was not only made possible by a new community arrangement, but by an entirely new logic of actors, instruments and community, which transcended the boundaries of the ‘industrial’ forms of conducting interventions.

The instance of a new form of conducting interventions can be described as a kind of hybrid of established industrial forms of conducting interventions. Industrial forms, in turn, had their origin in other types of activity and were characterized to a large extent by the respective logics of these original activities. The post-industrial form, however, established an activity of its own, which follows the logic of an entire societal problem-solving process. Accordingly, it can be described as an example of intervention activity in the full sense of the term activity.

### 12.2 The findings inspiring the elaboration of intervention theory

One of the central findings of this study is the ‘cultural-historical perspective’ on the development of forms of conducting interventions, as derived in Chapter 4 to Chapter 8. Forms of conducting interventions can be understood as having their roots in societal problem-solving processes associated with periods of radical change in work and organizations, such as the ones occurring in installation and deployment periods of the techno-economic waves.

The essential characteristics of forms of conducting interventions were captured by referring to two industrial contradictions:

1. Either focusing on historically new problems and creation of solutions or focusing on historically old problems and dissemination of solutions;
2. Either focusing on context breaking problems and fundamental change of the model of work organization or focusing on context balancing problems and transforming partial aspects.

Industrial forms (e.g., McKinsey or Accenture) of conducting interventions were connected to ‘extremes’ (or ‘poles’) of the industrial contradictions. Post-industrial forms of conducting interventions were characterized as emerging new forms of conducting interventions, which resolve the contradictions in a more integrative way.

How does this understanding relate to other scientific understandings of the phenomenon of intervention – in particular to those discussed in the context of key scientific knowledge about interventions in Chapter 2? Barley and Kunda’s (1992) as well as Adler’s (2001) work, was used to gain an overview of the development of intervention concepts and methodologies. Kipping (2002) and proponents of the ‘critical consulting’ tradition, such as Clark and Fincham (2002), contributed to the understanding of the development of consultancy businesses. Freeman and Louçã (2001) as well as Perez (2002) contributed to the understanding of longer-term techno-economic developments; Etzkowitz (1998) and others have addressed the changing role of science and innovation in such developments.
The following discussion is not a comprehensive presentation and critique of the theories. Rather, these theories constitute important discussion partners that help to situate and shape the argument concerning the strength and weaknesses of the ‘cultural-historical perspective’ on forms of conducting interventions developed in this study.

12.2.1 Relation to intervention concepts and methodologies

According to the revised version of the model of Barley and Kunda (Kunda and Ailon-Souday 2005), managerial discourse appears to have alternated repeatedly, like a pendulum, between ideologies of normative control (Industrial Betterment, Human Relations, Organizational Culture), and rational control (Scientific Management, Systems Rationalism, Market Rationalism). Barley and Kunda were the first to connect managerial and organizational problems and discourse to the different periods of techno-economic waves.

Adler (2001) presents alternatives to the concepts ‘rational’ and ‘normative’ control: those are ‘control’ and ‘commitment’. Contrary to Barley and Kunda, he does not interpret the ongoing dynamic of discourse as a pendulum movement, but instead points to tendencies of integrating these opposing needs of management. In the long run, Adler argues, there is a tendency towards the integration of both needs towards ‘collaborative interdependence’.

Barley and Kunda's and Adler’s description of dilemmas (rational/technical vs. normative/human, or control vs. commitment) correspond to what this study sees as the first industrial contradiction – the focus on ‘context breaking’ problems/fundamental change vs. the focus on ‘context balancing’ problems/transforming partial aspects. In this regard, the models of these figures and those of the ‘cultural-historical perspective’ coincide to a certain extent.

However, by using the pendulum metaphor in describing the dynamic, and by selecting rational/technical vs. normative/human as principal opposing elements, Barley and Kunda seem to over-generalize the experiences from the Electrification wave and the Motorization wave. According to the present study’s findings, the problem-solving processes – which include the topic of Barley and Kunda’s model (managerial discourse) – in the Computerization wave are no longer that clear-cut, nor do they follow a pendulum-like movement. In contrast to Barley and Kunda, Adler has developed a dialectical model that includes the possibility of the integration of earlier contradictions. Adler exemplifies this by referring to Champy and Hammer who, within two or three years of publishing a text about the ‘rational’ concept of business process reengineering, published new books that stressed the importance of the human factor.

A further point of discussion is how the dilemmas of Barley and Kunda, and also Adler, are termed and understood. This thesis argues that societal problem-solving processes need not to be characterized by the ‘rational’ vs. ‘human’ contradiction, although this was probably the most visible distinction in the Electrification wave and Motorization wave. The ‘context breaking’ organization/management concepts of the installation periods were indeed balanced largely by interventions
addressing ‘human’ aspects (aiming at ‘commitment’). However, this is not a necessity. In one of the cases this study discussed, ‘context balancing’ problems were related to ‘quality issues’, which has as much a ‘rational’ dimension as a ‘human’ one, and is as much related to ‘control’ as it is to ‘commitment’.

This study argues that the dialectical contradiction between context breaking problems and fundamental change on the one hand, and context balancing problems and transforming partial aspects on the other, has the potential to provide more convincing explanations of newer developments than previous interpretations of tensions/dilemmas. An example is the relation between Business Process Reengineering and Knowledge Management (see section 7.2). Knowledge Management can be partly interpreted as balancing Business Process Reengineering (which often had the negative side-effect of decreasing innovation-generating potential). On the other hand, Knowledge Management was also an independent context breaking approach, making use of new possibilities that arose in the Computerization wave.

Barley and Kunda’s and Adler’s models do not cover the second industrial contradiction concerning the orientation to historically new problems/innovation vs. the orientation to historically old (appropriation) problems/dissemination. Both models focus more on the discourse and definition of problems of management/organization, and less on the creation and implementation of solutions. In this sense, this second contradiction might not be as central to their models as the first one. On the other hand, if the interpenetration of phases in problem-solving processes increases (as argued), then it seems difficult to separate the content of problem definitions from the manner, in which problems are addressed (e.g., as historically new or old).

12.2.2 Relation to consultancy research

Kipping (2002) identified three major generations of consultancies that emerged in the course of the 20th century. These were characterized tentatively as Scientific Management-related (with Bedaux as an example), organization and strategy-related (with McKinsey as an example), and related to IT-based networking (with Accenture as an example). Kipping claims that the emergence – and also decline – of different waves of consultancies is closely linked to major historical changes (of management ideology and practice) in client companies.

Kipping’s emphasis on consultancy generations deviates considerably from the focus of other scholars of the critical consultancy tradition (Fincham and Clark 2002). Instead of seeing consultants as professional helpers, from a critical perspective, consultants’ claims of professionalism are viewed as part of rhetorics and power games that are used to enhance consultant authority and credibility. Fincham and Clark refer to Abrahamson (1996), who claims that management ideas and techniques – such as Total Quality Management or Business Process Reengineering – are often subject to swings in much the same way as are clothing styles. As a fashionable technique becomes older, there is pressure on managers to move on to the next technique – leading to a management fashion cycle. Actors and ac-
tivities such as management consultants, management gurus, business schools and mass media organizations are involved in these shorter-term fashion cycles, competing to become management fashion setters in a particular managerial area.

The ‘cultural-historical perspective’ might possibly contribute to the discussion about longer-term developments, on the one hand, and shorter-term cycles and the importance of rhetorics and fashions, on the other. Roughly speaking, the emphasis on longer developments and shorter-term cycles corresponds to two aspects of the development in the Computerization wave. We can discern a change from an old to a new generation of societal problem-solving processes and forms of conducting interventions. This shift from the old paradigm of the Motorization wave to the new paradigm of the Computerization wave corresponds with Kipping’s focus. On the other hand, there is also a development towards societal problem-solving processes that are less clear-cut than they were in previous techno-economic waves. This pattern of partially interrelated societal problem-solving processes corresponds to the shorter-term cycle view of the critical consultancy tradition. Additionally, the increasing importance of rhetorics and power games can be interpreted as symptoms of a growing contradiction between the new object (complex network organizations that entail the emergence of post-industrial problems) and the old way of conducting interventions offered by consultancies (focusing on historically old problems and standardized solutions).

The consultancy studies previously mentioned predominantly separate the discussion of consultancies’ use of solutions from the process of creating and conceptualizing solutions (i.e., how historically unresolved problems are addressed). Furthermore, they do not discuss differences between context breaking problems/fundamental change and context balancing problems/transformation of partial aspects. As a consequence of this view on intervention, Human Relations interventionists are interpreted as an extension of Scientific Management consultancies (by Kipping 2002), and Organization Development research is seen as an overly benevolent view of consultancy activity (by Fincham and Clark 2002). A further consequence is that consultancy studies largely exclude research-oriented and state-organized forms of conducting interventions from their discussions. This view might lead to limitations in the discussions of new forms of conducting interventions (see next subsection).

Authors such as the German scholar Walger (1995) have described the manner in which large consultancies conduct interventions as ‘expert centered’. Heckscher and his colleagues (2003: 108–110, 128) distinguish between expert-centered and process-oriented approaches of conducting interventions. The distinction between expert-centered and process-oriented/procedural approaches corresponds to the second industrial contradiction – between focusing on historically new problems/creation of solutions and focusing on historically old problems/dissemination of the solution. However, ‘procedural’ approaches (e.g. Lewin’s way of conducting interventions) are no less expert-driven than those adopted by consultancies. This study argues that the distinction can be better understood by focusing on the question as to whether knowledge is created or applied. Furthermore, this difference should not be viewed as a question of different approaches, but as one that is close-
ly related to how the form of activity is organized economically. It is ‘easier’ for a research center to engage in the creation of new knowledge than for a consultancy business, which has to produce a profit by selling knowledge.

From the ‘cultural-historical perspective’, the studies mentioned in this subsection do not address both contradictions that were fundamental to describing key differences of forms of conducting interventions. In the case of the consultancy studies, this might lead to an overly-narrow focus, when discussing the newer developments in consultancies.

12.2.3 Intervention as an activity situated on the intermediate of industry, science and state

A widely discussed model in science and innovation research is the ‘triple helix’ presented by Etzkowitz (1998, 2003). The triple helix describes the increasing overlap between previously separate spheres of academia, industry and state (see figure 3.5). Traditional relations to knowledge change in the overlapping area: The academic relation to knowledge (‘extension of knowledge’) and the industrial relation to knowledge (‘capitalization of knowledge’) become more and more integrated.

The characterization of ‘industrial’ forms of conducting interventions, gained by the analysis of 20th century developments, were condensed to four ideal types. Those four ideal types could fulfill the same function as the triple helix model of Etzkowitz and facilitate discussions about the integration of previously separated phenomena. In the case of the four ideal types that would be the discussion of new, hybrid forms of conducting interventions emerging under the new condition of the 21st century. The four ideal types are: (innovator-)scholar-entrepreneurs (e.g., Drucker, Hammer or Davenport), business-oriented solution disseminators (e.g., McKinsey or Accenture), social science oriented problem-solving centers (e.g., Lewin’s research center) and the state-academia-industry solution proliferating systems (e.g., the Baldrige quality award system).

The historical types were used as a guide to stimulate thinking about hybrid forms of conducting interventions. Usually, intervention scholars focus only on 1 or 2 of the ideal types (predominantly consultancies, sometimes also research centers) when they discuss future forms of conducting interventions. Among consultancy scholars, discussions about future developments point to a change in the landscape of consultancies. Fiona Czerniawska predicts that client demands on consultants will grow and satisfaction will fall (1999: 30–33). This will entail a higher orientation to innovation and will also lead to differentiation and specialization among consultancies. Specialization, in turn, will lead to an increasing need for knowledge sharing and collaboration among interventionists, finally resulting in a tendency towards networks and alliances:

As clients’ needs become more specific and fast-moving, and as intellectual capital becomes more specialized, consulting firms will have to forge alliances (with other consultancies, and with non-consultancies) in order to survive. (Czerniaw ska 1999: 32)
Thomas Armbrüster and Matthias Kipping (2002: 35) discuss current major changes in the consultancy market structure. They argue that pressure to change is stronger among ‘traditional strategy-and-organization consultancies’ (‘TSOCs’; e.g., McKinsey) than among the increasingly dominant IT consultancies (e.g., Accenture). They formulate three main alternatives for TSOCs to react to this pressure:

1. TSOCs could stick to their traditional orientation on strategic advice, but risk becoming a niche player;
2. They could try to gain a larger share of IT consultancy segments; and
3. They could engage in networks of firms with complementary services.

Armbrüster and Kipping call the latter alternative the ‘alliance strategy’:

(…) another idea would be to engage in networks of cooperation or joint ventures with firms or other knowledge types such as IT consultancies, investment banks, and management training and coaching firms (…) This way, TSOCs’ value proposition to clients could be considerably enhanced by an integrated service that TSOCs cannot provide on their own. (Armbrüster and Kipping 2002: 34)

Czerniawska as well as Armbrüster and Kipping hold similar views of the future development of consultancies. They both emphasize the importance of specialization and building of alliances. The findings in this study, to a certain extent, lead to a similar conclusion: Different kinds of specialists unite their expertise to facilitate transformation of work activities collaboratively.

However, this study had a more radical view concerning the diversity of specialists, concerning the level of collaboration as well as concerning the quality of transformation. This study argues that post-industrial forms of conducting interventions might integrate expertise from the sphere of industry/consultancy, science/research and state. Not simply interventionists from different sectors (such as IT consultancy, strategy consultancy or coaching) would be needed, but also different kinds of creators of innovation (from the sphere of science) and users of innovation (from the spheres of industry and state). The required level of collaboration would not only capture the management and coordination of distinct services being offered by firms with different specializations. Instead, previous boundaries of organization and expertise would be transcended, enabling a joint problem-solving process where different types of actors and activities would collaborate to solve a complex problem. Finally, the transformation of work activities would not only be comprehended as the application and adaptation of solutions, but as the structural integration of research and experimentation with the fast adaptation and dissemination of solutions. Creation/innovation would become more disseminative and dissemination more creative.
12.2.4 Potential and limitations of the ‘cultural-historical perspective’

This study suggests that an understanding of forms of intervention from a cultural-historical perspective contributes to an integration of previous scientific knowledge about forms of conducting interventions – knowledge that previously existed largely in separate studies of intervention methodologies, of consultancy as well as of science and innovation. The discussions in subsections 12.2.1 and 12.2.2 show that the models of Barley and Kunda, and Adler can be interpreted as addressing one of the two industrial contradictions, and the model of consultancy researchers such as Kipping, as addressing the other industrial contradiction.

The integration became possible because of the unit of analysis – ‘actors and activities addressing a societal problem in its dynamic from its emergence towards the diffusion of solutions’. The unit of analysis was derived from an analysis of relatively simple processes found in the early industrial period (the first and second techno-economic waves). Based on this (germ-cell type of) framework it became possible to study increasingly complex processes in the later periods of the industrial era. A resulting strength of the unit of analysis is that it captures the different foci of Barley and Kunda’s, Adler’s, and Kipping’s models: managerial discourse (Barley and Kunda) corresponds with problem definition (unit of analysis); work place innovations (Adler) with innovative and conceptualized solutions (unit of analysis); dissemination of knowledge (Kipping) with diffusion/dissemination of solutions (unit of analysis).

On top of this, the unit of analysis and the overall procedure of this thesis made it possible to ground the new perspective in fundamental societal processes related to Freeman and Louçã’s and Perez’s understanding of the techno-economic development in the Kondratiev waves. This study argues that forms of conducting interventions were often related to processes of innovation and diffusion that shaped the paradigm in techno-economic waves. In this respect, the findings in this study might contribute to the further development of the above-mentioned authors’ theory.

The connection to fundamental societal processes is seen as one of the cultural-historical perspective’s key strengths. Forms of conducting interventions are seen as contributing to the social assimilation of new possibilities in the techno-economic waves – as shaping and being shaped by techno-economic paradigms. On the other hand, this connection to cycles of techno-economic waves can be seen as a limitation. Clearly, Freeman and Louçã’s and Perez’s theory does not cover all contemporary developments relevant to understanding societal problems and forms of intervention. A phenomenon such as global warming is related to the growing emission of CO$_2$ – a cumulative development. Societal problems such as AIDS go beyond technical and economic spheres. To integrate phenomena such as global warming and epidemic diseases in a comprehension of societal problem-solving processes and forms of conducting interventions is an important task for the future.
12.3 The findings inspiring discussions about new forms of conducting interventions

The overall objective of the study was to enable the discussion of forms of conducting interventions that have the potential to address post-industrial problems effectively. The post-industrial form of conducting interventions that was outlined in Chapter 11 represents a key contribution of this study. The form was characterized as a dynamic network/formation of actors and activities following the logic of a condensed societal problem-solving process.

How is this outlined new form related to other suggested new forms of conducting interventions?

In principle, nearly all of the academic traditions discussed in Chapter 3 have developed new approaches of conducting interventions (e.g., Bunker and Alban 1997 from the OD tradition and Midgley 2000 from the systemic interventions tradition; see section 3.2). They are all potential discussion partners. In this section, two examples of new approaches have been selected based on their objective to integrate earlier approaches. The first is the contribution of Beer and Nohria (2000; see subsection 3.2.6), who describe an attempt to integrate ‘rational’ and ‘normative’ approaches (termed approaches oriented around ‘Theory E’ and ‘Theory O’ by Beer and Nohria). The second contribution is from Heckscher et al. (2003), who have developed the ‘full engagement’ approach (see subsection 3.3.3), which contains elements from different intervention traditions.

12.3.1 Combining an orientation on economic value and organizations’ human capabilities

Beer and Nohria (2000) propose to combine approaches oriented to ‘Theory E’ (with the purpose of creating economic value) with approaches oriented to ‘Theory O’ (geared towards developing organizations’ human capabilities). They illustrate the integration of Theory E and Theory O in the case of Asda, a major British grocery chain. At the beginning of the 1990s, Asda acquired many superstores from a rival company and was subsequently embroiled in a financial crisis. Led by a new CEO, Asda went through a period of radical restructuring that took into account both economic value (e.g., a top-down implementation of new financial strategies developed by McKinsey) and organizations’ human capabilities (e.g., a bottom-up development of a different organizational culture). After successful restructuring, Wal-Mart acquired Asda in 1999, for eight times its 1991-value (see a detailed description in subsection 3.2.6).

Asda was an established company in an established industry that acquired a competitor and had to overcome a financial crisis, by increasing its competitiveness. The problem addressed in Asda’s case – that is, reorganizing a grocery corporation to prevent economic ruin – can be interpreted as a historically old problem. It is a problem typical of the Motorization wave, when concepts of ‘strategy and structure’ and ‘organizational culture’ were used to support the reorganization of corporations (see section 6.2 and section 6.3).
The approach to addressing the problem is interpreted by the authors as a simultaneous application of Theory E and O. The distinction between E and O comes relatively close to Barley and Kunda’s as well as Adler’s distinctions (rational vs. normative; control vs. commitment) which, as demonstrated in section 12.2, were linked to the industrial contradiction of fundamental change vs. partial transformation. However, while the authors view their approach as an integration of the rational and the normative models of change, the interpretation in this study is that it is a combination of rational and normative concepts and techniques.

The rational and normative concepts and techniques (e.g., top-down and bottom-up; new financial strategies developed by McKinsey, but also a different organizational culture) adopted in Asda have not been qualitatively changed. This study argues that a real transition to a qualitatively new, post-industrial form of conducting interventions did not take place. This was not required because the problem in Asda was an ‘old’ ‘strategy and structure’ problem where negative side-effects (‘organizational culture’ problems) were anticipated and addressed almost before they emerged.

12.3.2 Full engagement approach

Charles Heckscher, Michael Maccoby, Rafael Ramirez and Pierre-Eric Tixier (2003) developed a joint intervention scheme, which they call the ‘full engagement’ approach (see section 1.1 and a detailed description in subsection 3.3.3). According to Heckscher and his colleagues, a new approach became necessary as the old stakeholder relations in companies such as AT&T, FS, Lucent and EDF were partly replaced by a completely new regime of stakeholder relations (‘post-industrial relations’), characterized by many new actors and qualitatively different economic forces:

We began by trying to change aspects of the large companies with which we worked – more participation, improved strategy, and deeper cooperation. Over time, however, we have come to see that the challenges they face require not incremental improvements but a fundamentally new system of stakeholder relations and involvement to replace one which is in decline. We reached this point because narrower definitions of the problem have not worked. (Heckscher et al. 2003: 11; emphasis by Heckscher et al.)

The problems described by Heckscher et al. can be seen as exhibiting many dimensions of post-industrial problems. The consequence was that Heckscher and his colleagues developed a qualitatively new approach of conducting interventions containing ‘interactive’, ‘sociodynamic’ and ‘systemic’/ ‘full engagement’ aspects. The ‘interactive’ aspect of the new approach means that the interventionists must help clients define their own problems, without imposing predefined ‘expert’ solutions on them. Lewin’s and Argyris’ ways of conducting interventions are mentioned as examples. This aspect of the new approach corresponds with forms of conducting intervention that were oriented to historically new, context balancing
problems (the ‘social science-oriented problem-solving centers’, see Chapter 8). The ‘sociodynamic’ aspect of the new approach adds cultural-historical knowledge from social systems theories that were used in Selvini Palazzoli’s center, and by systemic interventionists in Germany, Austria and Switzerland to address dysfunctional patterns (see section 6.3).

What is cultural-historically new is what Heckscher et al. term the ‘systemic’ or ‘full engagement’ aspect of their approach: that is, to involve a large number of old and new actors, connected by new kinds of relations, aiming at holistic reconfigurations of different levels and stakeholder groups. Their approach attempts to overcome earlier ‘top-down’ or ‘bottom-up’ focuses, by constantly scanning different parts of the entire client organization for ‘openings’ for action.

This ‘systemic’ or ‘full engagement’ aspect of the approach is interpreted here as an attempt to integrate the focus on historically new problems with the focus on historically old problems. This was necessary because of the qualitatively new form of problem. This approach resembles, in part, one aspect of the outlined instance of a post-industrial form of conducting intervention developed in this study: the dynamic change of subject/community that was necessary to address post-industrial problems in the SME project. Heckscher and his colleagues’ pattern corresponds to the idea of involving many actors and activities in an intervention project, the idea of a more distributed form of agency and a high level of collaboration.

While it is argued here that the ‘full engagement’ aspect stands for a qualitatively new way of addressing historically new and historically old problems, a further interpretation is that the approach remains in the old context of ‘human’ or ‘normative’ (context balancing/ partial transformation-oriented) forms. It remains unclear whether the means exist within the approach that would lead to a context breaking definition of the problem (and corresponding creation of solutions), a definition beyond the context of improved ‘Human Relations’ or improved ‘cooperation’. How are new structural models of the respective client activities created? The approach does address ‘rational’ (context breaking) aspects, among others by using the ‘7s’ framework of Peters and Waterman (1982). However, this addition of rational elements corresponds with a recombination, and not an integration, of rational and normative (context breaking and context balancing) ways of addressing problems and conducting interventions.

It seems that the approach of Heckscher and his colleagues does not include instruments for making the creation of entirely new models of work possible (‘tertiary instruments’ in Wartofsky’s sense). It seems that the integration of means for addressing context breaking problems and producing innovative solutions that entail the fundamental change of work organization seems not to be completely accomplished in the full engagement approach.
12.3.3 From combination of intervention approaches to qualitatively new, post-industrial forms of conducting interventions

Based on the discussions in the previous subsections, the study argues that a post-industrial form has to move qualitatively beyond ‘combining’ prior ‘industrial’ approaches. The development of the full engagement approach was associated with the emergence of ‘post-industrial relations’. The approach went beyond ‘combining’ older approaches as it addressed a larger number of interrelated new and old types of actors (and corresponding qualitatively new relations).

The full engagement approach is not the only approach that suggests addressing a large number of users who have encountered historically new problems, thereby developing some kind of dynamic change of subjects/community. New approaches from the OD tradition (e.g., large group interventions; Bunker and Alban 1997) and from the systemic interventions tradition (e.g., multi-agency interventions; Midgley 2000) show a similar orientation. This thesis argues that the expanded focus of these new approaches is an indicator of a more fundamental development associated with the emergence of complex network organizations and post-industrial problems.

However, the study also noted that the full engagement approach remained primarily within the old context of ‘human’ or ‘normative’ (context balancing) approaches. This study argues that qualitatively new forms need instruments that go beyond a predefined and constrained problem area (e.g., social processes between groups in organizations, the structure or the IT system in an organization) and a correspondingly clear-cut solution area. In the empirical case, Developmental Work Research (DWR) represented precisely such an instrument that could create new models of work beyond clear-cut areas or processes of work activities (e.g., social, managerial or technical processes). It is not argued here that post-industrial forms of conducting interventions have to be based on DWR. Instead, this study argues that, for addressing complex network organizations, it is crucial to integrate the means of addressing multiple activities/high number of users (as applied in the full engagement approach) with the use of intervention instruments that could create entire new models of work.

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95 Approaches that are connected to ‘extremes’ (or ‘poles’) of the industrial contradictions and do not resolve them in a more integrative way.

96 The discussion of intervention approaches should not neglect community arrangements (or ‘business models’) of new forms of conducting interventions. In the empirical instance of WEB the new community arrangement was described as a dynamic network/formation of actors and activities. The example of WEB strongly supports the argument that models of financing interventions and basing them on specific community arrangements influence fundamentally the logic of forms of conducting interventions.
While the empirical case gave an example of such integration, it might be instructive to give a further sketch\(^{97}\) of an intervention, attempting to use elements associated with a ‘post-industrial’ form of conducting interventions.

The client of this intervention is a large university comprising many different faculties. Prior to the intervention, the university had evolved from being a bureaucratic organization towards being a more network-like one. The organizational units and main actors have changed considerably over time. The number of foreign students in the university has increased enormously in recent years. As a consequence of this increase, disturbances have become visible in each faculty. Complaints from foreign students concerning the teaching system have increased just as have the complaints from lecturers concerning foreign students. A large number of foreign students left the university after attending for only a short time. It is assumed that the roots of the problems are associated with contradictions between two main systems: the system of the new foreign students (expecting a high degree of student-oriented care and teaching) and the system of the professors (expecting the students to show a high degree of independence and self-organized studying).

However, this rough hypothesis is only useful as an initial position. Each of the university’s faculties has its own manner of dealing with foreign students. Some faculties have specialized offices for foreign students, others not. Some faculties’ foreign students were predominantly part of a structured foreign student program; other faculties have a majority of ‘free-movers’ among their foreign students. Teaching practices differed considerably from faculty to faculty.

The problem of foreign students-faculty relations can be interpreted as containing the characteristics of a post-industrial problem. The observed disturbances involve different actors and activities and cannot be resolved by one system alone. The context of the university is very specific and it seems unlikely that a ready-made solution for the problem exists. Partial solutions can be found, of course (e.g., concepts and methods about improving intercultural communication). In this sense, the problem contains some characteristics of historically new and historically old problems. Among many stakeholders at the university, there was doubt that radical rational solutions (e.g., to force teachers or students into certain behavior by establishing a new university-wide system of teaching and studying) would lead to an effective resolution of the problem.

This chapter argues that an effective manner of addressing the problem of foreign students-faculty relations could be a large intervention project with multiple interrelated Change Laboratories (at least one for each faculty). Some of the faculties could act as ‘forerunners’ by developing specific innovative solutions of the specific problem in their respective work context. Other faculties could decide to attempt to adopt some of the developed solutions. The faculty-based Change Laboratories could act relatively independently, but would meet periodically to

\(^{97}\) This is a real case in which the author of this study has recently started to act as an interventionist and to make use of the findings of this thesis.
exchange solutions and to develop new boundary-crossing initiatives. Each Change Laboratory would be facilitated by a pair of interventionists comprising a faculty member and a specialist in the methodology. The whole intervention project could be facilitated by a group that would push the overall problem-solving process forward. The group’s tasks could include the training of interventionists, enabling the fast adoption of innovative solutions, facilitating cross-faculty Change Laboratories, integrating new actors and initiatives, and managing the relationships with important stakeholders (see figure 12.7). The final outcome of the overall intervention would not only be a set of solutions for each faculty, but an overall new model of university-foreign student relations.

**Figure 12.7: Setting of multiple interrelated Change Laboratories**

12.4 The findings inspiring discussions about the methodological background (CHAT and DWR)

The basis for being able to discuss the characteristics of an instance of a post-industrial form of conducting interventions was the ‘cultural-historical perspective’ on forms of conducting interventions. The basis for deriving the ‘cultural-historical perspective’, in turn, was the methodological procedure that was based on using and elaborating concepts from CHAT and DWR. What kind of new perspectives on CHAT and DWR does the study then make available?

Two interconnected ideas were important preconditions for being able to derive the ‘cultural-historical perspective’ and the outlined new form of conducting
interventions: The idea of interconnected dialectical and expansive learning miniature cycles as well as the idea of deriving a specific unit of analysis for analyzing forms of conducting interventions.

‘A formation of actors and activities addressing a societal problem in its dynamic from its emergence towards the diffusion of solutions’ as a unit of analysis made it possible to capture processes, actors and activities that have previously been part of separated theoretical domains (e.g., managerial discourse, consultancy, science and innovation). The unit of analysis is both a process and a structural model. When functioning as a structural model, it captured multiple actors and activities that contributed to the development of forms of conducting interventions. This, in turn, led to the discussion of more complex community arrangements of forms of conducting interventions such as dynamic networks. When functioning as a process model, the unit of analysis captured a societal problem-solving process, which made it possible to discuss the possibilities of integrating innovation and dissemination processes.

The unit of analysis can be seen as a contribution to more recent developments in activity theory that address weakly bounded phenomena and runaway objects (see Engeström 2006). While the unit of analysis used in this study might prompt further ideas, it is not intended to become some kind of ‘prototype’ for units of analysis in future studies. In contrast, the study argues that the strength of the unit of analysis is that it was derived by targeting the essential characteristics of the phenomenon under investigation – forms of conducting interventions. This issue points to the second main methodological idea developed in this study.

The cycle of expansive learning was the heuristic guide for the methodological procedure. The overall expansive learning methodology was extended to consist of two relatively independent ‘miniature’ cycles. A dialectical miniature cycle carried the study from a delineation of the phenomenon towards a unit of analysis and further towards the historically based comprehension of the current state of forms of conducting interventions (the largely historical-analytical part of the study). An expansive learning miniature cycle carried the study from the comprehension of the current state to the empirically based discussion of main characteristics of a possible new model (the largely practical-experimental part of the study).

This unit of analysis was derived by analyzing relatively simple societal problem-solving processes and types of activity in the early industrial era. The comprehension of these simple processes and activities opened up the comprehension of increasingly complex societal problem-solving processes and activities in the later periods of the industrial era. The comprehension of these complex problem-solving processes and activities, in turn, made it possible to select an empirical case which was theoretically interesting. Thus, the combination of historical-analytical research and practical-experimental research proved very helpful in this study. This idea of a dialectical miniature and a connected expansive learning miniature cycle might be fruitful for further studies of phenomena with uncertain locus and limits.

The combination of dialectical analysis (and historical data) and expansive modeling (and empirical data) might also contribute to the recent discussion of the under-representation of the dialectical method in DWR (e.g., Roth and Lange-
This chapter argues that the dialectical method (in the sense of Iljenkov 1982; see Chapter 2,) is a fundamental part of DWR-methodology and can be made an explicit part of the research process, as it was accomplished in this study by using the dialectical miniature cycle.

The idea of methodological miniature cycles can be generalized in the sense that different phases of the overall expansive methodology (e.g., the phase of application and generalization of new models) can be guided by different expansive miniature cycles (with a correspondingly differing focus). Future DWR projects that are envisaged as addressing a higher number of interrelated but nevertheless different empirical cases, might find it fruitful to have an ‘internal division of labor’ between interventionists that focus on the creation of new solutions, and interventionists that focus to a higher degree on the testing and application of new solutions. The intervention project outlined in subsection 12.3.3 can be seen as an example of such a DWR project.

The last idea points to a question with implications beyond a discussion of DWR as a (scientific) methodology. A key finding of this study is, that it is problematic to separate the analysis of methodologies of interventions from the overall logic of the activities that serve as the basis for the conduct of interventions. Consequently, the finding of this study might lead to further discussions of a new community arrangement that functions as an adequate ‘carrier’ of future DWR-based interventions.

### 12.5 Evaluation of the research

The main findings of the study – the methodological procedure, the ‘cultural-historical perspective’ of forms of conducting interventions, and the outline of a post-industrial form of conducting interventions – were developed in the course of following the first three phases of the expansive learning methodology. This means that the focus was on developing the comprehension of the phenomenon of conducting interventions by reconstructing its historical-genetic development from a very simple form in the early industrial period towards its diverse complex forms in the emerging post-industrial era.

The empirical case was an integral part of this procedure. WEB, a NZ-based research/consultancy hybrid, was selected as a theoretically interesting case, even though it is located ‘at the edge of the world’. The reasons were that experiments in WEB with regard to balancing ‘research’ and ‘consultancy’ offered a theoretically promising context. NZ is a country that has been characterized by radical experiments in work and the organization of work in the public and private sectors since the early 1990s. The significance and generalizability of this study – including the substantive empirical part – lie not in its empirical representativeness but in its theoretical richness (see Engeström 1995, Tolman 1999). Section 12.2 argued that the theoretical foundation of this study was enriched by connecting the ‘cultural-historical perspective’ to fundamental societal processes related to Freeman and Louça’s and Perez’s understanding of the historical developments in the techno-economic waves.
The question of external validity is mainly related to the question of generalizability. The overall logic of this study was aimed at deriving a theoretical comprehension of the phenomenon, in this respect having a specific understanding of external validity. The research process in particular chapters considered also took questions of internal validity into consideration. In the historical chapters (Chapters 4-7 and Chapter 9), there was a critical review of the sources that examined their original purpose and function (‘source criticism’, see Renvall 1983 and Kalela 2000). Primary and secondary sources as well as sources from authors with different areas of interest were used as far as available, in order to ‘triangulate’ the historical sources. In the empirical chapters (Chapters 10-11), the dangers of ‘anecdotism’ and the problem of multiple interpretations were addressed by juxtaposing different kinds of methods and data (see Denzin 1989), and also by separating the descriptive and analytical parts (see Poole et al. 2003). A further central strategy for considering validity was to seek dialogue with the participants of the empirical case in different phases of the data collection and processing.

This study was intended to include as much cultural-historical knowledge about forms of conducting interventions in the investigation as was possible. However, some selectivity concerning the cases was unavoidable. The selection of cases for this study was based on a broad overview of scientific knowledge about intervention (see table 3.7, the ‘overview model’). This overview and the extended unit of analysis (societal problem-solving processes and formations) led to the integration of ‘unexpected’ forms (such as Training Within Industry) into the discussion of this study. Nevertheless, it would have been desirable to include more historical examples (e.g., socio-technical systems, Schein’s and Argyris’ form, or even Habermas’ theory of communicative action to name just a few). Similarly, the analysis of more empirical examples of conducting interventions would have been very interesting. However, this must remain a task for the future.

Finally, the strength of being grounded in Freeman’s, Louçã’s and Perez’s understanding of techno-economic processes can be also seen as a limitation. It might very well be the case that societal processes, such as those taking place in the Linux or Wikipedia communities, offer interesting contributions to the further development of forms of conducting interventions. An attempt to integrate knowledge about societal problems, problem-solving processes and interventions originating in spheres very different from industry, science and state (e.g., art, leisure, health/well-being) may be seen as an important task for the future.

12.6 Looking forward

In this study, the research process moved from a delineation of the phenomenon towards the comprehension of the current state of forms of conducting interventions. The process then progressed from the comprehension of the current state to an empirically based discussion of an instance of a post-industrial form. As described, it would be desirable to test and elaborate the findings developed in this study by studying more cases, and by endeavoring to extend to entirely different spheres, such as art and leisure.
Moreover, it would be fascinating to contribute to research associated with the logically next phase of the cycle of expansive learning – to take part in developmental research associated with the further application of post-industrial forms of conducting interventions. If one follows Carlota Perez’s vision (2005/2007) concerning the deployment period of the Computerization wave, there might be a need for precisely this kind of research:

The ‘other’ globalization, fully compatible with the paradigm and capable of unleashing a worldwide steady expansion of production, markets and well being, is waiting to be formulated. It would be production-centered and-led; pro-growth and pro-development; with dynamic, locally differentiated, enhancing national and other identities. But it will be not the creation of any invisible hand; it will work with the market but will require plenty of human imagination, ample participation, intense negotiations, much determination and collective political will. (Perez 2005/2007: 35)
References


## Appendices

Table A.1: Identified forms of conducting interventions and their main instruments

<table>
<thead>
<tr>
<th>Context breaking problem-solving process</th>
<th>Context balancing problem-solving process</th>
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<tbody>
<tr>
<td>Historically new problem affecting early users in core industries of wave</td>
<td>Historically old problem affecting majority of users in wider circle of industries</td>
</tr>
<tr>
<td>Historically old problem affecting majority of users in core industries of wave</td>
<td>Historically new problem affecting early users in core industries of wave</td>
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### Electrification

<table>
<thead>
<tr>
<th>State of problem when it was addressed</th>
<th>Identified example of conducting interventions</th>
<th>Main instrument(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner contradictions of old craft production paradigm vs. new possibilities in Electrification wave</td>
<td>Taylor</td>
<td>Scientific Management as integrated system including experimenting</td>
</tr>
<tr>
<td>Efficiency (of work operations)</td>
<td>Bedaux efficiency consultancy</td>
<td>Reduced and standardized Scientific Management tools</td>
</tr>
<tr>
<td>Dysfunctional side effects of Scientific Management based form of mass production</td>
<td>Roethlisberger; Lewin’s research center</td>
<td>Representation of Personnel Counseling solution</td>
</tr>
<tr>
<td>‘Human Relation’ between ‘manager and the worker’</td>
<td>TWI system</td>
<td>Actions research methodology with integrated group dynamic concepts and methods</td>
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</tbody>
</table>

### Motorization

<table>
<thead>
<tr>
<th>State of problem when it was addressed</th>
<th>Identified example of conducting interventions</th>
<th>Main instrument(s)</th>
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<tbody>
<tr>
<td>Inner contradictions of early form of mass production vs. new possibilities in Motorization wave</td>
<td>Drucker</td>
<td>Strategy and structure</td>
</tr>
<tr>
<td>Strategy and structure</td>
<td>McKinsey Management Consultancy</td>
<td>Dysfunctional side effects of strategy and structure form of mass production.</td>
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<td>Quality improvement</td>
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### Identified example of conducting interventions

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<th>Identified example of conducting interventions</th>
<th>Main instrument(s)</th>
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<tr>
<td>Electrification</td>
<td>Scientific Management as integrated system including experimenting</td>
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<tr>
<td>Motorization</td>
<td>Strategy and structure</td>
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### Main instrument(s)

<table>
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<th>Electrification</th>
<th>Motorization</th>
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<tr>
<td>Scientific Management as integrated system including experimenting</td>
<td>Strategy and structure</td>
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<tr>
<td>Reduced and standardized Scientific Management tools</td>
<td>Dysfunctional side effects of strategy and structure form of mass production.</td>
</tr>
<tr>
<td>Job Relation Training as one day training tool as part pf a larger system for disseminating production improving solutions</td>
<td>Quality improvement</td>
</tr>
<tr>
<td>Main instrument(s)</td>
<td>Representation of decentralized structure and corresponding strategy solution at General Motors</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Computerization</strong></td>
<td><strong>State of problem when it was addressed</strong></td>
</tr>
<tr>
<td>Identified example of conducting interventions</td>
<td>Davenport</td>
</tr>
<tr>
<td>Main instrument(s)</td>
<td>BPR principles based on representation of specific solutions at HP and MBL</td>
</tr>
</tbody>
</table>
### Table A.2: Community models of identified forms of conducting interventions

<table>
<thead>
<tr>
<th>Community in narrow sense</th>
<th>Community in wider sense (societal problem-solving formation)</th>
<th>Motorization</th>
<th>State of problem when it was addressed</th>
<th>Community in narrow sense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrification</td>
<td>Inner contradictions of old craft production paradigm vs. new possibilities in Electrification wave</td>
<td>Efficiency (of work operations)</td>
<td>Dysfunctional side effects of Scientific Management based form of mass production</td>
<td>'Human Relation' between 'manager and the worker'</td>
</tr>
<tr>
<td>State of problem when it was addressed</td>
<td>Community of founder and pupils who are oriented on further application and elaboration of methodology</td>
<td>Community of managers and consultants who are trained to use tools for a fast conduction of multiple projects</td>
<td>Individual actor</td>
<td>Community of personnel managers, unionists and scientists oriented on cooperative proliferation of knowledge</td>
</tr>
<tr>
<td>Community in narrow sense</td>
<td>Community of managers and consultants who are trained to use tools for a fast conduction of multiple projects</td>
<td>Factories in different industries in USA and Western Europe</td>
<td>'Early user'-factory (AT&amp;T), Harvard, state Social scientists, partners from companies and public organizations</td>
<td>Community of experienced systemic interventionists within consulting company</td>
</tr>
<tr>
<td>Community in wider sense (societal problem-solving formation)</td>
<td>'Early user'-factory (Midvale Steel); mechanical engineers, Harvard, public</td>
<td>'Early user'-factory (AT&amp;T), Harvard, state Social scientists, partners from companies and public organizations</td>
<td>State, science and industry in societal emergency situation (WWII)</td>
<td>Community of quality experts from US industry and science oriented on cooperation and fast dissemination of quality solutions</td>
</tr>
<tr>
<td>Motorization</td>
<td>Drucker</td>
<td>McKinsey</td>
<td>Quality gurus; Systemic consultants</td>
<td>Baldrige system</td>
</tr>
<tr>
<td>State of problem when it was addressed</td>
<td>Inner contradictions of early form of mass production vs. new possibilities in Motorization wave</td>
<td>Strategy and structure</td>
<td>Dysfunctional side effects of strategy and structure form of mass production.</td>
<td>Quality improvement</td>
</tr>
<tr>
<td>Community in narrow sense</td>
<td>Community of managers and consultants with elaborated hierarchy and an elaborated recruitment, training and rule system to use instruments for fast conduction of multiple projects</td>
<td>Individual actors</td>
<td>Community of small group of experienced systemic interventionists within consulting company</td>
<td>Community of quality experts from US industry and science oriented on cooperation and fast dissemination of quality solutions</td>
</tr>
<tr>
<td>Community in wider sense (societal problem-solving formation)</td>
<td>'Early user'-corporations (e.g., General Motors), management scientists, management consultancies</td>
<td>Corporations in different industries as well as public organizations in USA and Europe (later world wide); academia as source for employees and new concepts</td>
<td>Early user-companies (e.g., Toyota), science, state</td>
<td>State, science and industry in societal emergency situation (Decrease of competitiveness of US corporations in the 1980s and 1990s)</td>
</tr>
<tr>
<td>Community in narrow sense</td>
<td>Individual actors/managers in consultancies with further consultants</td>
<td>Community of managers and consultants with highly elaborated hierarchy and highly elaborated recruitment, training and rule system to use instruments for fast conduction of multiple projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community in wider sense (societal problem-solving formation)</td>
<td>'Early user'-companies (e.g. Hewlett-Packard), management/IT scientists, IT consultancies</td>
<td>Network companies in different industries as well as public organizations (world wide); academia as source for employees and new concepts</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>