1   Teams and the Transformation of Work

Teams as a Puzzle

In 1995, my research group began to follow and videotape three adjacent
work teams in a large manufacturing plant in California specializing in
high-precision machining. The company was well underway in its efforts
to organize its entire workforce into self-directed teams. The transition
was a carefully planned strategy that was to take place over a period of
several years. It was supported by some of the most prominent consultants
in the field. The company gave its teams a great deal of training, and it had
produced an impressive guidebook for the teams. The guidebook gave the
following definition of work teams:

> A work team is an ongoing team which uses the talents and skills of various
> employees in the accomplishment of work (such as product, sub-assemblies,
> or service) on a routine basis to achieve common goals and shared vision.

The guidebook defined 12 responsibilities of work teams, ranging from
"solve quality problems to achieve and maintain customer satisfaction" to
"manage their own budget" and "give and receive on-going performance
feedback."

As we started observing the teams, the largest one was meeting on
a weekly basis and making important production-related decisions. The
meetings were lively, tensions between perspectives were displayed and
resolved, and innovative ideas were produced (an analysis of these early
meetings is presented in Chapter 6).

Within 6 months, this most dynamic team stopped having meetings.
Its last meetings were marked by an atmosphere of resignation and disap-
pointment. The best management efforts did not lead to success.

At around the same time, my research group also observed a manufac-
turing plant in Finland specializing in production of prefabricated cabins

1

for large ships. Following the bankruptcy of its parent shipyard company, the plant had gone through a major reorganization a few years earlier. The CEO proudly declared that they had all but eliminated meetings and paperwork. The employees were working hands-on, with minimum administration. When we asked about work teams, the CEO stated that teams would not work in the plant; Finnish metal workers are individuals, not team players. The shop steward gave basically the same answer. When problems had to be solved, this was done on an ad hoc basis – teams would not be needed.

About a year later, the workers started a team on their own. In the final assembly department, work on an assembly line was typically divided into four or five phases. The workers responsible for each phase had different pay levels based on how demanding the particular phase was determined to be. Thus, if there was an overload and a slowdown in one phase, workers from the other phases would get annoyed but would not help. This created tensions that erupted in a crisis on one of the lines. The shop steward intervened, and in a condensed series of emergency sessions with the workers of that line he designed a proposal for a team arrangement. All the workers on the line would get the same pay level, and all would be responsible for eliminating breaks in the flow of assembly. The workers proposed that all would get the highest pay level, arguing that the arrangement would save money for the company. The CEO agreed on the condition that there would be a test period during which workers would have to show that the team would save enough money to cover the increased wages and bring a significant benefit to the company.

The team passed the test, and soon there were six teams functioning on the shop floor. Initially, management provided no help. There were no guidebooks and no consultants. Yet, the teams began to flourish.

Cases such as these are puzzling enough to create a host of questions. What is a good team and what is a bad team? What is the role of models and constraints originating from the outside and from above versus processes and patterns created from below and within the teams? What is successful collaboration, and what are its obstacles inside work teams? How can teams produce innovations and creative solutions to problems of production and work organization? What makes teams survive, thrive, and develop – or, alternatively, stagnate and die?

A New Wave of Research

In the past 20 years or so, teams have gained unprecedented popularity as forms of organizing and managing work. The success of Japanese

manufacturing has often been associated with teams. There is an abundance
of enthusiastic management literature describing the virtues of teams.
However, teams are also problematic. Peter Senge (1990, p. 24) charac-
terized the situation as follows:

> All too often, teams in business tend to spend their time fighting for turf,
> avoiding anything that will make them look bad personally, and pretend-
> ing that everyone is behind the team's collective strategy – maintaining the
> *appearance* of a cohesive team. To keep up the image, they seek to squelch
> disagreement; people with serious reservations avoid stating them publicly,
> and joint decisions are watered-down compromises reflecting what every-
> one can live with, or else reflecting one person's view foisted on the group.
> If there is disagreement, it's usually expressed in a manner that lays blame,
> polarizes opinion, and fails to reveal the underlying differences in assump-
> tions and experience in a way that the team as a whole could learn.

Michael Schrage (1995) provocatively renamed his book on "shared minds"
No More Teams!

> The concept of teams obscures, rather than reveals, the real relationship
> challenges our organizations face. Teams are a fiction, a verbal convenience,
> rather than a useful description of how people in a firm cooperate and col-
> laborate to create value. Even worse, teams make it too easy for organi-
> zations to lie, cheat, and kid themselves about the way they work. More
> often than not, a "team" is as much a political entity as a value-creating one.
> (Schrage, 1995, pp. xi–xii; see also Beyerlein, Freedman, McGee, & Moran,
> 2002)

While I appreciate the candor of Schrage's observation, I cannot avoid
noticing an irony in his crusade. In abandoning the concept of teams as one
managerial holy cow, he immediately reverts to an even older managerial
holy cow, namely, the seemingly self-evident yet extremely problematic
notion of value.[1] Rather than giving up problematic concepts for other
equally problematic ones, I intend to dig into the historical, practical, and
theoretical dynamics behind the notion of teams.

---

[1] As Womack and Roos (1996, p. 141) observed: "for any product . . . , value must flow across
many companies and through many departments within each company. Although each
entity along the route may or may not define value for the end customer, it certainly will
define value for itself – to turn a profit, to advance the careers of those in each department,
to utilize existing production assets fully, and so forth. When all those definitions of value
are added up, they often conflict or cancel out one another." For a serious theoretical
treatise on value, see Graeber (2001).

A closer look at the literature reveals that underneath the surface of general descriptions and recommendations concerning teams, there is indeed fairly little critical and original theorizing on the collaborative work and associated cognitive and communicative processes within and between teams in real organizational contexts. Traditional empirical literature consists mainly of decontextualized experimental studies on the psychological dynamics of small groups. These traditional studies were aimed at finding laws of group behavior that are independent of cultural and institutional specifics. While a number of serious studies conducted in more realistic settings have appeared (e.g., Ancona & Caldwell, 1992; Barker, 1999; Beyerlein, 2000; Beyerlein, Beyerlein, & Johnson, 2003; Beyerlein & Johnson, 1994; Beyerlein, Johnson, & Beyerlein, 1995, 2000a, 2000b, 2000c, 2001; Ciborra, 1993; Donnellon, 1996; Gersick, 1988, 1989; Guzzo, Salas et al., 1995; Swezey & Salas, 1992; Yeatts & Hyten, 1998), the overwhelming bulk of newer team literature consists of uncritical management texts, ranging from how-to handbooks to success stories of the alleged blessings of implementing teams in organizations.

Only quite recently has a new, theoretically more ambitious wave of research on collaborative work begun to emerge. Cognitive scientists, anthropologists, and sociologists have started to develop and apply approaches to work and collaboration that take the organizational and cultural contexts as integral constitutive aspects of the phenomena to be explained. This book is a contribution to this new wave of research.

The new wave is inspired by a number of theoretical and methodological approaches to workplace studies. These include pragmatism and symbolic interactionism, distributed cognition, situated cognition, ethnomethodology, conversation and discourse analysis, actor-network theory, and the cultural-historical theory of activity (for reasonably representative collections, see Engeström & Middleton, 1996; Luff, Hindmarsh, & Heath, 2000; for comparative discussions, see Lave, 1993; Nardi, 1996; Star, 1996). Such different approaches find common ground in discussions of socially distributed and artifact-mediated action and cognition in "communities of practice." This emerging new wave is also partly inspired by the new information technologies that are dramatically altering the technical possibilities of intellectual collaboration in work (e.g., Galegher, Kraut, & Egido, 1990; Greenbaum & Kyng, 1991; Heath & Luff, 2000; Nardi, 1996).

The research presented in this book is based on cultural-historical activity theory (sometimes called CHAT for short), initiated by Vygotsky (1978), Leont'ev (1978, 1981), and Luria (1978; see also Engeström, Miettinen, & Punamäki, 1999; Wertsch, 1981). During the past 20 years, a

multidisciplinary group of Finnish researchers, now organized around the
Center for Activity Theory and Developmental Work Research at the University of Helsinki, developed an activity-theoretical approach to studies of
work and organizations called *developmental work research* (see Engeström,
1991b, 1993, 1996a, 2005a; Engeström, Lompscher, & Rückriem, 2005).
Since the late 1980s, this approach has also been used and developed in
the Laboratory of Comparative Human Cognition at the University of
California, San Diego, and in a number of other research centers around
the world.

In this book, I repeatedly use three theoretical constructs central to
activity theory and developmental work research: *activity system*, *contradiction*, and *zone of proximal development*. Here I briefly characterize these key
concepts. Their meaning and implications will be further elaborated upon
in the following chapters as they are used in concrete analyses (see also
Engeström, 1987, for theoretical groundwork).

An activity system is a collective formation that has a complex mediational structure. It is the foundational unit of analysis that I employ
throughout this book. I will give a more precise definition of this concept in
Chapter 2. Contradictions within and between activity systems are a key to
understanding the sources of trouble as well as the innovative and developmental potentials and transformations of activity. The concept of contradiction will also be discussed in more detail in Chapter 2. The zone of proximal
development is a concept originally developed by Vygotsky (1978, p. 86),
who proposed that we can understand the potential for human development
dynamically if we examine what a person can do with the help of another,
more experienced person, rather than examining the person alone, without
support and interaction. I use this concept in an expanded sense to characterize the developmental potential of collective activity systems interacting
with other activity systems, both supportive and adversarial (Engeström,
1987, p. 174). The concept of a zone of proximal development will be used
and made more concrete in Chapters 2, 3, 4, and 5.

Teams without Context and History

Teams are typically defined in a formal and self-sufficient way, without
reference to the way the overall production and work are organized:

> A team is a small number of people with complementary skills who are
> committed to a common purpose, performance goals, and approach for
> which they hold themselves mutually accountable. (Katzenbach & Smith,
> 1993, p. 45)

Even overviews of broad transformations in work systems fall into this trap:

> By self-directed teams we mean groups of workers who have substantial discretion over the work process, make changes in production methods as needed, and take on many of the tasks traditionally carried out by front-line supervisors, such as allocating and coordinating work between different employees and scheduling. (Appelbaum & Batt, 1994, p. 253)

The first definition implies that the relevant parameters along which teams should be examined are such universal features as size, skill complementarity, purposefulness, mutual accountability, and commitment. The second definition implies the equally universal parameters of discretion and autonomy. These definitions ignore qualitative differences between historical types of teams. In what follows, I will try to change this ahistorical way of dealing with teams (for previous attempts in that direction, see Beyerlein, 2000; Tubbs, 1994).

The Sociotechnical Concept

The first major wave of writings about teams came from the sociotechnical systems approach initiated by the Tavistock Institute of Human Relations in England. Trist, Emery, and other Tavistock researchers were influenced by at least three important theoretical sources: Bion's (1961) group psychotherapy, Lewin's (1947, 1951) field theory, and von Bertalanffy's (1950) general theory of open systems (for historical overviews and a comprehensive collection of publications, see Trist & Murray, 1993).

The semiautonomous, self-managing, or self-regulating work group was the central idea of the sociotechnical approach: "it seemed that the small self-regulating group held the clue to a very great deal that might be improved in work organizations" (Trist, 1993, p. 43). The first major studies were undertaken in coal mining in England (Trist & Bamforth, 1951/1993) and in textiles weaving in India (Rice, 1958). The former study concluded by recommending "restoring responsible autonomy to primary groups throughout the system and ensuring that each of these groups has a satisfying sub-whole as its work task and some scope for flexibility in work pace" (Trist & Bamforth, 1951/1993, p. 83).

In 1953–1954, Rice successfully implemented an experimental work organization based on semiautonomous work groups, each responsible for production and routine maintenance on a group of looms. In 1970, Miller undertook a unique follow-up study in the textile company. He showed that the work organization and levels of performance at one of the original sites had remained virtually unchanged over the years:

> The type of cloth woven was still the same and, as we have seen, norms of performance seemed to have persisted for 14 years. It was as though the shed had been held within a kind of stasis – a monument to the original experiment. (Miller, 1975/1993, p. 149)

However, in a newer automatic loom shed, group work had largely disappeared. This shed "was weaving the finest and most expensive sorts with a high fashion component (thus implying the need for cyclical adjustment), and these were also cloths most influenced by the company's search for new and profitable markets" (p. 152).

These findings suggest that a sociotechnical system of semiautonomous work groups may function well and survive in a stable, almost static environment but not necessarily in a more turbulent and innovative environment. As Miller (1975/1993, pp. 153–154) approvingly points out, Rice wanted to achieve "a quasi-stationary equilibrium" aimed at "minimizing the chances of disaster." There seems to be a built-in conservatism in the very design of this system. What exactly is the nature and source of this conservatism?

To examine the issue further, I will consider the experiences gained in Sweden at the Kalmar and Uddevalla plants of the auto maker Volvo. Already in 1976, Emery had discussed the design of Volvo's plant in Kalmar as a pathbreaker in creating a viable alternative to the assembly line:

> The most striking outcome was the discovery that, in an appropriately skilled and sized work group, all the key parameters of mass flow production could come together and be controlled vis-à-vis each other at that level. Picturesquely, this was labeled "a lot of little factories within a factory." (Emery, 1976/1993, p. 209)

Sociotechnical versus Lean Production Teams

Volvo's plants in Kalmar and Uddevalla became, in a sense, the culmination of four decades of sociotechnical experiments. They were idolized for their human-centeredness and criticized for their inefficiency. Volvo's 1992 decision to close the two plants was echoed by an international debate on the merits and limitations of these experiments. The debate goes to the heart of the different conceptions of teams.

In Uddevalla, the more advanced and radical of the two plants, the assembly line with its 1-min repetitive work cycles was eliminated. Instead, 48 parallel stationary teams consisting of eight members each assembled whole cars with a work cycle of around 2 hours (see Sandberg, 1995). Instead of the traditional model, where about 700 workers put together a car, this

was done by 8 workers in Uddevalla. This meant that the workers had to master a very broad range of tasks and skills. As Ellegård (1995, p. 54) proudly declared, one Uddevalla worker's "basic competence equals the competence of at least 60 workers taken together in a plant with an assembly line."

In their influential comparative analysis of auto manufacturing, Womack, Jones, and Roos (1990) coined the term *lean production*. The authors called Volvo's experiments *neocraftsmanship*, whose aim is to go "back toward an era of handcrafting as an end in itself" (p. 102):

> Simply bolting and screwing together a large number of parts in a long cycle rather than a small number in a short cycle is a very limited vision of job enrichment. The real satisfaction presumably comes in reworking and adjusting every little part so that it fits properly. In the properly organized lean-production system, this activity is totally unnecessary. (p. 102)

In 1993, Adler and Cole critically compared Volvo's Uddevalla plant and the Toyota–General Motors joint venture NUMMI plant in California. NUMMI also had teams, but the whole operation was based on the model of lean production. According to the authors, Uddevalla was not within striking difference of NUMMI's productivity and quality:

> Uddevalla workers . . . had detailed information on their work cycle performance, but as this cycle was some two hours long, they had no way to track their task performance at a more detailed level. This problem was exacerbated by the craft model of work organization that encouraged Uddevalla workers to believe that they should have considerable latitude in how they performed each cycle. . . . Moreover, as the variety of models produced in a given plant increases, it becomes increasingly difficult for workers to recall the right procedure for each job, and shorter cycle times with well-defined methods help assure quality. (Adler & Cole, 1993, p. 89)

Adler and Cole continue:

> Although Uddevalla had a bonus system that encouraged work teams to improve performance continually, the teams had neither the focus on the kinds of microscopic *kaizen* opportunities that drive NUMMI performance (because of Uddevalla's long work cycle) nor the tools to capture these opportunities (because they lacked standardized work processes). To the contrary, in fall 1991, we were informed that there were [sic] no detailed documentation available to workers describing how to perform each work task and specifying how long it should take . . . without a well-documented, standardized process, it is hard to imagine how these people could have spotted improvement opportunities or shared them across the teams. You

cannot sustain continual improvement in the production of products as standardized as automobiles without clear and detailed methods and standards. (p. 89)

We can summarize the key criticisms of lean production proponents against the sociotechnical or *neocraft* concept in three points:

1. Sociotechnical teams such as those in Uddevalla were based on autonomy in performing long work cycles. This autonomy tends to lead to *isolation*: "the teams were left to their own devices" (Adler & Cole, 1993, p. 90).
2. The long cycles and the associated philosophy of holistic learning led to a *neglect of standardization* of detailed procedures. This neglect prevented learning and continuous improvement based on deeper knowledge of the process: "you cannot identify the sources of problems in a process you have not standardized." This is also connected to isolation: "you cannot diffuse what you have not standardized" (Adler & Cole, 1993, p. 92).
3. Finally, the long cycles and lack of standardization led to an emphasis on *individual learning at the cost of organizational learning*: "little thought was given to how work groups might learn from one another to facilitate continuous improvement" (Adler & Cole, 1993, p. 92; see also Adler, 1993; Wilms, Hardcastle, & Zell, 1994).

Berggren (1994) responded to Adler and Cole by pointing out that during the last year of the plant's operation, the management of Uddevalla took important steps to overcome these problems. He did not, however, deny that the fundamental concept of whole-car assembly behind Uddevalla was modeled on the ideal of craft work and thus was dramatically different from that of lean production (see also Adler & Cole, 1994).

If the three points previously listed are limitations of the sociotechnical team concept, what is the alternative offered by the model of lean production? The first key is elimination of buffers and breaks in the production. In a just-in-time production and delivery system, there is no room to store inventories, and the need for rework at the end of production is eliminated by installing continuous quality control in every step of the line. Womack et al. (1990, p. 99) define the idea further as follows:

The truly lean plant has two key organizational features: *It transfers the maximum number of tasks and responsibilities to those workers actually adding value to the car on the line, and it has in place a system for detecting defects that quickly traces every problem once discovered to its ultimate cause.*

This, in turn means teamwork among line workers and a simple but comprehensive information display system that makes it possible for everyone in the plant to respond quickly to problems and to understand the plant's overall situation.

A recent Scandinavian attempt in the sociotechnical tradition goes under the rubric of *democratic dialogue* (Gustavsen, 1992; see also van Eijnatten, 1993, pp. 68–75). Robert Cole (1993) compared the Japanese quality improvement movement and the Swedish notion of democratic dialogue. This comparison is helpful in pointing out some of the crucial differences between teams in lean production and teams in a sociotechnical scheme.

We have seen that to create communicative competence the [democratic dialogue] approach envisions a gradual joint shaping of vision and development among all participants through a democratic dialogue. . . . Unlike the production of visible quality improvement in Japan, however, it is more difficult for management to directly see such efforts as leading to bottom-line results in quality and productivity improvement. There is also no guidance per se provided by democratic dialogue on the substance of the proposed development. The use of quality as a common language cutting across organizational levels and functions does not directly challenge managerial control as does democratic dialogue. But it does have a very specific and concrete content in terms of tools, approaches, and objectives.

. . . the improvement programs of the Japanese have a concrete substance: they rest on the tools, methods, and objectives of the quality movement involving all employees and using quality as common language. There is in short an engine here that is totally lacking in the use of democratic dialogue as a generative force for change. (Cole, 1993, p. 124)

Cole depicted grave consequences for teams:

The work team is typically portrayed as "context-less." That is, it is not embedded in the work flow and not tied to a customer. Given the lack of linkage to the work process, management support for participation fades because participation is seen as a peripheral activity. (p. 126)

Autonomy versus Quality as Object

At the general ethical and political levels, I am sympathetic to the democratic ideals of our Scandinavian colleagues working within the sociotechnical tradition. Yet, my own approach requires that we put the arguments of the two schools just discussed in a critical historical perspective.

Expressed in the conceptual framework of activity theory, sociotechnical teams and lean production teams have very different *objects* and