From Hand Drawings to Computer Visuals: Confronting Situated and Institutionalized Practices in an Architecture Firm

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In recent years, there has been an increasing interest in practice-based studies of organizational change. Most of this research does not explicitly consider the tension between situated and sociohistorical practices that are central to the transformation of work practices associated with an episode of change. In our study of the impact of off-the-shelf three-dimensional rendering software on the daily practice of architects in a small, highly regarded firm, we explore the incompatibility between these different levels of practice. By building on the concept of contradiction drawn from activity theory, we identify patterns of challenges, reenactments, and enactments through which situated change simultaneously reproduces and questions institutionalized practices.

Key words: activity theory; contradiction; technological change; situated practices; institutionalized practices; architecture

Introduction

In recent years, there has been a growing interest in practice studies of organizational change. One of the main contributions of this research is showing how day-to-day activities and interactions continuously, and often in an emergent manner, change the structural properties of the work context. More specifically, some authors emphasize how situated practices can transform structural properties following the implementation of a new technology. However, these studies do not take into account the tensions between emergent and sociohistorical practices constituting these structural properties. To fill that gap, we explore how new situated practices confronting or supporting these diverse sociohistorical practices generate tensions and ruptures that are central to the transformation of work practices. To do so, we analyze the impact of the computerization of design, an activity that is at the heart of architecture, on the evolving work practices in a small partnership. As we will see, the profession of architecture is a setting that is particularly relevant for examining the confrontation between various sociohistorically grounded contexts. Using activity theory, a practice-based approach in which the concept of sociohistorically anchored contradictions plays a central role, we identify different patterns of interaction between situated and sociohistorical practices, as well as particular patterns of embodiment of contradictions, that influence the structuration of the work context. We also highlight the role that technology, as a sociohistorical construct, plays in that process. These findings extend our concept of situated change to address its contested and discontinuous nature. Before we describe our theoretical approach and develop the concept of contradiction, we will review the organizational literature pertaining to practice-based studies of change.

Conceptualizing Change in Practice-Based Studies

Over the last few years, organization scholars have drawn on practice-based approaches such as distributed cognition (Hutchins 1991, 1995), situated action (Suchman 1987), and situated learning (Lave 1988, Lave and Wenger 1991) to shed light on various phenomena, including organizational learning (Brown and Duguid 1991, Orlikowski 2002, Nicolini et al. 2003, Blackler and Regan 2009, Canary and McPhee 2010), strategizing (Jarzabkowski and Spee 2009, Whittington 2006, Denis et al. 2007), and organizational change (Demers 2007), which is the focus of our study.
Practice-based approaches are characterized by a conception of organizations emphasizing the situated nature of action, the importance of materiality, and the connection between situated and extended social practices that has led to the development of an alternative view of change. First, adopting a social constructionist perspective, practice studies show that people, while performing work, collectively reproduce and transform their practices, the various elements that support them and the meanings they are given. By focusing on concrete work activity in context, they highlight the importance of practical and embodied knowledge and the impact of situational factors on action (Gherardi 2008). Second, the practice lens calls attention to the role of objects and the importance of the material world in social action (Groleau 2008, Nicolini 2009). Finally, many practice approaches view situated action and social practices as mutually constitutive, thus emphasizing the links between microlevel activities and macrolevel phenomena (Corradi et al. 2010).

Practice-based studies of change can be divided into two research streams. The first group of scholars conceive change as a constant flow of adjustments taking form in context. Building on the works of Lave and Wenger (1991), Orr (1990), and Suchman (1987), Brown and Duguid (1991) were among the first to call attention to the improvisational nature of working as an ongoing process of innovation and change that is situated and social rather than cognitive and individual. Their work, especially the concept of communities of practice, has led scholars to explore issues such as the constitution and transformation of practices within and between occupational groups (Becky 2003). Also within that first stream of research, Feldman (2000), inspired by Giddens’ structuration theory (1984), proposes that the tension between the structural properties of a routine (routine in principle) and the performance of a routine in a particular context (routine in practice) are sources of continuous change. Although the works of Brown and Duguid (1991) and Feldman (2000) find their roots in different scientific traditions, their studies remain faithful to the practice-based tradition by focusing on change as emergence, unfolding through a continuous flow of incremental, situated modifications.

A second stream of research examines how work practices are redefined following a planned intervention. Here, change is not studied as the constant flow of daily modifications but rather as the emergence of new practices following a punctual event, such as the introduction of a new technology. It is to this group of studies we want to contribute. Within this literature, researchers focus on emergent situated practices while also connecting them to broader social practices as episodes of change unfold. Furthermore, because these authors study the arrival of new technologies, these practice-based studies raise the question of materiality within organizations. In the following, we will present this stream of work to highlight the contribution that activity theory, a practice-based approach, can make by conceptualizing the role of contradiction in situated change.

Examining Episodes of Changes in the Practice-Based Tradition

The literature on practice-based approaches investigating episodes of change draws on Giddens’ structuration theory (1984). This conceptual framework enables researchers to study the connection between situated and extended practices by explaining how situated action, through patterns of repetition in time and space, can both reproduce and transform structural properties that characterize social systems such as organizations. Thus, structural properties are simultaneously the medium for and the result of human action: they create the framework that guides action, but their very existence is predicated on the production and reproduction of the patterns of situated actions on which they are based. This reciprocal influence between action and structure becomes central in the study of organizational change, because emergent situated practice and structural properties mutually constitute one another as they both evolve over time.

Orlikowski (1996, 2000, 2002) has contributed significantly to this literature by proposing a model of situated change that emphasizes its emergent and improvisational dimension. She studies organizations confronted with technological change in which various parties reconfigure their situated interactions through improvisation and local adaptations. These emergent patterns of interaction initiated at an operational level start a process of mutual adjustment as various groups in the organization strive to harmonize their practice by adjusting to one another. It is this iterative process—simultaneously transforming situated practice and structural properties of the organizational context—that is at the core of this conception of change.

In an earlier study, also inspired by structuration theory, Barley (1986) studies the iterative process through which the daily and situated interactions become structural properties that, in turn, influence daily practices in two different organizations implementing the same technology. He argues that the structural properties of the organization represent a particular social context that tends to reproduce itself as change unfolds, which explains why divergent patterns of interaction take form even if the same technology is implemented in two different settings.

Thus, Barley (1986) and Orlikowski (1996) view the evolution of work practices following instances of technological change as an interactional process through which individuals develop shared practices, but they do not address the tensions that accompany this process.
Although activity theory shares the same ontology as structuration, resting on the duality between structure and agency (Blackler et al. 2000), it distinguishes itself by offering a reading of organizational change as a transformation process punctuated by contradiction. Activity theorists see organizations as constituted from various sociohistorical practices, issued from different and conflicting traditions, and embedded in situated practice. These conflicting sociohistorical contexts create conflicts that drive the transformation of work practices during episodes of change.

Although various sociohistorical contexts were described empirically Barley (1986), who discussed the organizational and professional logics at play in his study of radiologists faced with technological change, the tensions the coexistence of these logics provoke have not been conceptualized in practice-based studies of change. In the same vein, Barley and Tolbert’s (1997) view of institutions as social and historical constructs constituted through and constitutive of situated practice, although compatible with activity theory’s conception of the constitution of human practice as sociohistorically grounded, diverges in one particular aspect. Although Barley and Tolbert (1997) argue that an institution is a concept without scale that can be used to examine one or the other of more or less extended contexts such as groups, organizations, or industries, they do not address the dynamics of institutionalization following from the interaction of multiple sociohistorical contexts with the practices of a collective. For example, within organizations, sociohistorical constructs guiding practices may originate simultaneously from the professional context providing codes of conduct, the government formulating regulations constraining work behavior, and the organizational context with its particular rules, just to name a few. We want to further explore the tensions among these sociohistorical constructs in a study of evolving work practices during an episode of change.

Furthermore, we think that activity theory offers new avenues to conceptualize technology within episodes of organizational change, thus responding to problems identified in studies inspired by structuration. As noted by Rose et al. (2005), it has proven difficult for structurationists to reconcile the structural properties of technology and human agency. As we will see in the following section, activity theory offers a way to conceptualize tensions between situated and institutionalized practices in episodes of change, as well as a new way to think about the role of technology.

Activity Theory: Apprehending Evolving Practice Through Sociohistorically Rooted Contradictions

Activity theory studies situated practice, considering its material and social dimensions as well as its embeddedness in multiple sociohistorically extended contexts. The use of a sociohistorical lens to investigate human practice is not unique to this framework, but its concept of contradiction, which has not been fully explored so far, allows us to see how various sociohistorical practices can conflict with situated practice, shaping the process through which work activities evolve.

Embedding Situated Practice in Sociohistorically Extended Contexts

Activity theory is an analytical framework that allows us to apprehend organizations as arenas where multiple strands of sociohistorical contexts manifest themselves in the conduct of everyday activities (Kapteinin and Nardi 2006). It is through the manipulation of a number of tools and different forms of interaction that sociohistorical constructs manifest themselves in situated practice.

According to Vygotsky (1978), the manipulation and use of tools such as words and instruments expose individuals to sociohistorical means and methods from which they draw to orient the conduct of their daily activities. He argues that “[t]he tool’s function is to serve as the conductor of human influence on the object of activity” (Vygotsky 1978, p. 55). Activity theorists depict how subjects rely on tools to act upon their environment. In organizational contexts, for example, these tools can be instruments such as technologies or more abstract entities such as signs, languages, or codes; both sustain the enactment of work practices.

Engeström (1987) also recognizes that activities require the involvement of various parties. More specifically, he differentiates two types of human participation in activity systems: as a subject and as a part of a community. Subjects are those directly involved in the conduct of the activity, such as employees and managers. Other individuals sharing an interest in and influencing the unfolding activity (clients, suppliers, competitors, governmental agencies, pressure groups, etc.) are viewed as parts of the community. The way individuals, either as subjects or members of the community, come together to take part in the activity is captured through two other concepts: rules and division of labor. Rules such as codes of conduct, management policies, etc., are constituted through a set of relations, explicit or not, involving subjects and a community, and they are sustained through their patterns of interaction. Division of labor, including job descriptions, methods, and routines, refers to the organizing process through which multiple parties strive to meet the object of the activity system. Like the tools referred to before, rules and division of labor rest on sociohistorically constructs brought into the actual context of the unfolding activity to be reproduced or contested (Groleau 2006b).

The system formed by individuals drawing from instrumental and sociohistorical constructs to perform
activities is the basic unit of analysis of this framework. Activity theory explores the conduct of collective practices, which are guided by a common orientation captured through the concept of object. The object is conceived as a project under construction, something that is given and anticipated. The object is different from a motive because it is tentative and collective, and it can be renegotiated as the activity unfolds. Furthermore, it differs from individual goals, because these goals are subordinated to the broader collective orientation captured in the definition of the object. The object can be applied to explain how activities are conducted in a variety of organizational settings. For example, in a supermarket the object is providing food, whereas in a hospital it is providing health services.

Activity systems are interconnected and rarely examined in isolation from one another. Specifically, the tools or the rules in one activity system are the outcome of another activity system. For example, in a study by Hasu and Engeström (2000), a technology was simultaneously the output of one activity system and the tool of another. It is thus possible, using activity theory, to investigate the complex organizing process evolving over time and in space as different collectives come together.

This organizing process draws on different sociohistorical constructs that interact to sustain human practice but that also conflict with one another. It is this confrontation that we will explore through the concept of contradiction.

**Contradiction: The Dynamic Dimension of Activity Theory**

Activity systems can be understood as a forum of different voices that manifest themselves through the various participants as well as through the different sociohistorical constructs that confront one another as they are actualized in the conduct of everyday practices:

> An activity system is always a community of multiple points of view, traditions and interests...the activity system itself carries multiple layers and strands of history engraved in its artifacts, rules and conventions.

(Engeström 2001, p. 136)

The interplay and confrontation of these sociohistorical logics are captured through the concept of contradiction. The sociohistorical roots of contradictions are a feature of activity theory that sets it apart from the literature on paradox and conflict that is widely referred to in the field of organizational change, outside of practice-based studies.

Activity theory presents four levels of contradiction (Engeström 1987) that have mostly been used as part of an intervention method (Engeström 2000b, 2006) and not as conceptual tools to analyze different patterns of transformation. Apart from Blackler (1993), the few organizational scholars who have used the concept analytically have collapsed the four contradictions into one generic contradiction, not exploiting the framework’s full potential (Prenkert 2006, Jarzabkowski 2003). Our aim is to build on Engeström’s different levels of contradiction to provide a practice-based model of organizational change that links situational and broader social and historical contexts.

To do so, we will now present and discuss the different levels of contradiction. According to Engeström (1987), contradictions, inherent in all human activities, are all rooted in a primary contradiction that takes a specific form in each sociohistorical regime. Inspired by Marx’s work, he frames activities in terms of the tension between their use value (i.e., the needs the products or services fulfill) and their exchange value (i.e., their commercial value). The primary contradiction finds its origins in sociohistorical arrangements that surface in situated context. When the latent primary contradiction gives form to concrete manifestations of ruptures, it leads to a cycle of transformation conceptualized through the secondary, tertiary, and quaternary contradictions as described in the following paragraphs.

The secondary contradiction is the concrete manifestation of the opposition between the two poles of the primary contradiction. Because the primary contradiction takes form in concrete settings, it creates tensions that motivate individuals taking part in an activity system to question and change their practices.

The tertiary contradiction is associated with the tensions that surface as the means to resolve the secondary contradiction are introduced in the activity system. In this step of the transformation process, an element of another activity system, seen as a source of tension relief, is introduced into the activity system facing the secondary contradiction. For example, individuals may draw from other activity systems solutions that can take a variety of forms, such as a new technology or a new quality program (Groleau and Mayère 2009). This new tool is integrated with the existing tools, rules, and division of labor to realize the object, but this new element is also embedded in its own sociohistorical context, which introduces new voices, traditions, and interests within the activity system that reinforce or question existing ones. Consequently, according to activity theorists, the integration of a new element is bound to engender other sources of tension as the old way of conducting activities gives way to a new practice.

Finally, the quaternary contradiction reflects the tension that arises from the interaction between the innovating focal activity system and its neighboring activity systems. Because activity systems are interconnected in their actual daily practice as well as in their sociohistorical roots, the enactment of a new practice affects not only the social and instrumental mediations within the activity system, but it also has a ripple effect on neighboring activity systems. For instance, the introduction of just-in-time manufacturing also affects the suppliers’ activity system.
Whereas the secondary contradiction is the trigger for change, the ternary and quaternary contradictions can be conceptualized as the realignment of the activity system following from the attempts to resolve the secondary contradiction. Thus, secondary, ternary, and quaternary contradictions are linked in one continuous process, as the transformation process attempting to dissolve the tensions associated with the trigger creates new tensions. Even if participants in the transformed activity system succeed in resolving the tension associated with the secondary contradiction, the primary contradiction will always remain. It transcends all other levels of contradiction, which means it will eventually materialize itself in a new series of tensions that will again generate innovation. This process of contradiction formation and resolution explains how activities are constantly transforming themselves.

In contrast to activity theorists who, in the interventionist tradition, orchestrate the transformation process and facilitate a relatively smooth and linear unfolding of the different steps, we use contradictions as conceptual tools to offer an alternative reading of evolving human practice. We will examine how organizational members—on their own—identify contradictions and negotiate and implement what they believe to be solutions to resolve those tensions, and we will examine how this process forces them to confront different aspects of their sociohistorically constructed work practices. This type of analysis will allow us to capture particular social dynamics depending, for example, on how the secondary contradiction is perceived by participants and how they choose to act upon its resolution, leading to a transformative process resting on more or less concerted efforts, unexpected consequences, and power plays.

In this study, we will examine the case of an architecture firm, because architecture, as we will see, is a field marked by sets of conflicting historically embedded practices. Architecture, like other professions such as engineering and medicine studied by activity theorists (Blackler et al. 1999, Engeström 2000a), is characterized by a primary contradiction between professional and commercial poles. We will examine the links between the various levels of contradiction to see how the change process evolves as different views of the work context confront each other in the efforts to resolve tensions from the trigger to the transformation of everyday practices.

**Methodology**

Our research is based on a case study of ABC, an architectural firm founded in 1976, that has received numerous awards over the years for the excellence of its work. Apart from its domestic offices situated in two Canadian cities, the firm is affiliated with American and European firms and employed over 50 people at the time of this study. The study was conducted in its main office, composed of 12 employees. Following the research tradition of practice-based studies (Suchman 1987, Hutchins 1995), we relied on ethnographic methods, integrating observation, interviews, and discussion in real-life settings, to constitute our case study.

Through observation, which constitutes the bulk of our data, we documented the conduct of activities as they take form through daily interactions. The observation, done by the third author, covered a six-month period, two days a week, and began after the new technology had been implemented. An important part of the data was collected by observing the intern who was the only one to use the new three-dimensional (3D) software. His work often involved interactions with colleagues from the firm, including senior architects, technicians, and the founder, as well as clients. Some interactions were more formal (e.g., meetings); some were less formal (e.g., spontaneous exchanges while engaged in work activities). Other organizational members, such as technicians and senior architects, were also observed during the fieldwork. Observation notes taken in the field contained details about the conditions under which work practices unfolded, including transcripts of conversations as members of the organization interacted in context. Furthermore, methodological notes pertaining to the research process itself were taken down to subsequently reflect on issues such as the integration of the researcher within the field and the quality of the data (Burgess 1984).

If observations constitute the most important part of the empirical work, interviews were a necessary complement. They enabled us to situate observations in a broader temporal and spatial context and to understand the motivation behind computerization and the way members of the organization perceived it and the changes that followed. Apart from setting the activities in a wider frame, interviews helped us fully grasp the perceptions of the individuals taking part in the activity. Two sets of interviews were conducted during the study. First, interviews conducted by the first and third authors were semidirective and addressed the following themes: the computerization history; the perceived motivation for technological change; the technological change process; the perceptions of collective activity, its function, participants, and evolution; as well as the relationship between the subjects and the different members of the community. We interviewed the architect who founded the firm, two of his senior colleagues, the intern hired to work with the new software, and the firm’s secretary. Those interviews lasted between 90 and 120 minutes. After the fieldwork, the third author conducted two additional interviews with the founder and a senior architect. These interviews were used to clarify situations and perceptions that surfaced during the fieldwork. In addition,
the data collection was supplemented by documents produced by ABC as well as publications such as those produced by the Government of Québec and Québec’s Order of Architects or academic research to investigate the different sociohistorical contexts supporting the daily activities of architects.

Although the data collection followed the inductive tradition established in the practice-based literature, we chose to analyze our data by drawing on the concepts of activity theory. We particularly developed the concept of contradiction as an analytical tool that seemed particularly appropriate to make sense of our case study, which appeared to have numerous types of tension. Following the process suggested by Morse (1994), we first organized our data chronologically to fully comprehend the work context studied. We then synthesized the data using themes inspired by the concepts of activity theory, such as tools, community, rules, and division of labor, to reconstitute the activity system. Afterward, our analysis focused on identifying changes within the activity system. At this point, we distinguished between changes that created tensions and those that did not. It should be noted here that although not all changes in a transformation process are tension-laden, we focused on those that were because our framework seeks to explain contradictions. Following Helle (2000, p. 87), we identified “disturbances [as they] appear as errors, problems, breakdowns, ruptures of communication, obstacles, and so on.” We examined the recurrence and patterns of these disturbances. Then, we analyzed how these tensions were interpreted by the actors themselves and, drawing on sociohistorical data, formulated hypotheses to uncover the underlying contradictions within the studied activity system. These hypotheses were tested against the data in order to grasp the particular dynamics of the case. We initially focused on the architects’ decision to computerize to identify how the primary contradiction was actualized in the secondary contradiction. Next, we studied the transformation of the activity system to see how the wider sociohistorical contexts became manifest in the tertiary and quaternary contradictions and how they influenced the process through which members of the organization reconstituted their work practices.

Regarding the quality of our research, we verified the construct validity of our data (Yin 2009) by having the monograph constituted from our different data sources read by organizational members.

Contextualizing Architectural Practice at ABC

In this section, we briefly describe institutionalized practices from various contexts supporting the conduct of architecture at ABC. Naturally, the coexisting institutional contexts that can surface in situated practice are numerous, so we will focus only on those that came into play during the technological change we studied. We have distinguished four sociohistorical contexts: regulatory, sectoral, occupational, and organizational.

The Regulatory Context

The regulatory context is a broad but important one because it sets the conditions under which architecture can be practiced through a set of regulations and norms. In Quebec, as elsewhere, architecture is a highly regulated sector because consumers of architectural services are often incapable of judging the quality of the services offered (McGill Business Consulting Group 2003). Therefore, the government mandates its professional association, the Ordre des architectes du Québec (OAQ), to protect the public (Desharnais 2006) by controlling access to the profession and dealing with clients’ complaints. Among other responsibilities, the OAQ sets the standards regarding services, pricing, training, and internship requirements. Future architects must complete three years of internship, during which time they must work a certain number of hours in at least three different categories of professional activity: conception and construction documents, management of contracts, and project and office management. A significant change in the regulatory context occurred in 1989, when the government adopted an architectural integration and implementation program. This plan encourages the participation of various stakeholders, particularly citizens, in the evaluation of architecture projects in terms of the quality of the environmental integration of the design (Marquis et al. 2006).

The Sectoral Context

Apart from these regulations originating from the government and the professional order, architecture is a sector of activity that distinguishes itself by its own set of practices developed over time. It is highly cyclical and very competitive (McGill Business Consulting Group 2003). Architects can work on institutional (schools, hospitals, etc.), commercial (shopping centers, hotels, etc.), industrial, and residential projects. In Québec, institutional clients account for more than 45% of architects’ revenues, and rationalization in the public sector is increasing pressures to keep costs at a minimum (Association des Architectes en pratique privée du Québec (AAPPQ) 2004). Institutional projects are typically obtained through a call for tenders (i.e., a bidding process where a number of firms propose projects of which only one will be selected). The bids consist of a series of documents, including the presentation of the firm and technical information about the project, as well as perspective drawings illustrating the future building. The preparation of bids is a labor-intensive and costly part of the architects’ work that has an uncertain success rate. Designing, planning, and technical development represent 75% of the architects’ work; the other 25%
goes toward the supervision of construction (AAPPQ 2004). Therefore, an important part of the work is done before the firm knows whether it will have the contract.

This sector is also characterized by a large number of very small firms. In Québec, there are 1,150 architecture firms, the majority of which have fewer than three employees, and most of them are in a vulnerable financial situation (AAPPQ 2004). ABC, as is typical for architecture firms, is a professional partnership. The professional partnership is distinguished by two key features: “First, the professional partners not only own and govern the firm, but also manage it and provide professional services; second, their primary task involves the application of expertise to complex problems, which requires a significant degree of discretion” (Brock 2006, pp. 159–160). Consequently, professionals running small partnerships adopt a collegial style of management favoring consensus (Greenwood et al. 1990, Brock 2006). In a traditional partnership, professionalism has a tendency to dominate managerial concerns (Pinnington and Morris 2002).

Quality of design, defined in both aesthetic and technical terms, is the fundamental value and an integral part of the architect’s professional identity (Cuff 1991). However, on the commercial side, quality in architecture also means building to specifications (in terms of fitness of purpose, levels of finishes, etc.) and efficiency in terms of service delivery (budget, delays, program parameters, etc.). Whereas the quality of conception is evaluated mostly by the architect’s professional peers, specifications and service delivery are evaluated by the client (Winch and Schneider 1993). This requires architects to please both their clients and their peers.

The Occupational Context

As an occupation, architecture is also characterized by particular institutionalized practices and norms. For instance, architects share a visual culture resting on the drawings and sketches that play an important role as thinking tools (Henderson 1995). To develop their architectural concept, architects start with rough sketches and end with the preparation of perspective drawings (Fraser and Henmi 1994). It is important to distinguish between the two types of drawings used in architecture: the more technical two-dimensional drawings through which architects, engineers, and contractors exchange information, and the perspective drawings that are specific to architects and have existed for centuries (Henderson 1995). Perspective drawings are 3D illustrations of the projected building, traditionally hand-drawn by architects to convince the client of the merits of their design. They follow certain aesthetic rules and are expressive visuals that are also described as tools of manipulation (Fraser and Henmi 1994). Whereas the other drawings present a more technical, depersonalized vision, perspective drawings are evocative, presenting the building from the point of view of an individual looking at it. Both types of drawings are included in the call for tenders and in presentations to clients. Although the fine arts culture still dominates architecture, the increasing importance of computer technology has sparked an ongoing debate between those who favor computer visuals and those who feel that computers encourage a machine-like and conformist trend, as opposed to an artistic tradition, in architecture (Bruegmann 1989, Yetton et al. 1994, Pérez-Gomez 2007).

The descriptions of these various sociohistorical contexts help us understand how they shape the division of labor, the rules, and the tools that constitute architecture as an activity. For example, in the regulatory context, the founding principles of the division of labor are contained in the norms through which the OAQ characterizes the work of interns as well as of senior and junior architects. In the case of the small partnership, the roles played by the professionals who manage this type of firm help us understand the division of labor at ABC. The rules, as sociohistorical constructs linking subjects (architects) to the community (clients, peers, and stakeholders), are present in a variety of contexts. For instance, in the regulatory context, the OAQ provides guidelines through which architects and clients interact by setting, among other things, the services and prices deemed acceptable within the profession. The architectural integration and implementation program is another set of regulations that constitutes rules through which architects come to collaborate with various stakeholders. Finally, in the occupational context, we see another type of interaction involving tools such as pencils, crayons, and paint through which the artistic tradition characterizing architectural drawing takes form in practice. We will now turn to the description of ABC to describe its own set of practices as well as offer an overall picture of the change that will be analyzed in the following section.

The Organizational Context

At the time of our study, ABC’s main office had 12 members. It was run by four senior architects, including two partners, and also employed junior architects, technicians, an intern, and an administrative secretary. Raymond, the founding partner, dealt with existing and future clients. He prospected to find new contracts and made sure the clients were satisfied with their work. He was often out of the office but had a good relationship with the employees. He saw himself as an artist and always carried a sketchpad in his briefcase. Like the other three senior architects, he also spent a lot of time on concept development. At ABC, senior architects were mainly involved in the design tasks as well as the preparation of perspective drawings; each of the senior architects also had his own area of expertise. Two of them managed large contracts with important clients.
The fourth one, André, carried out projects while supervising the work of the other employees. Although he sometimes went out to meet clients, he spent most of his time in his office, where, through a tinted window, he could watch the interns and the technical staff working in the workshop. He took his supervisory role seriously and was often under pressure to meet deadlines.

Junior architects, under the supervision of their senior colleagues, were responsible for smaller contracts. Technicians prepared the technical drawings for the various projects, and the administrative secretary answered the phone, prepared documents, and took care of accounting. Interns were also hired to assist the architects. The firm tried to do everything in-house and to outsource as little as possible; thus each employee’s workload was very heavy. However, the atmosphere was good in the office. People helped each other out, and the junior architects, the intern, and the technicians often lunched together.

We will now turn to the relationship the firm had with its clients to better grasp the practices constituting the rules within the firm’s activity system. Although it got work from private clients, ABC gained most of its contracts from institutional clients. Raymond, the founder, believed that the more tenders they responded to, the more chances they had of obtaining work. Consequently, they produced as many bids as they could and tried to distinguish themselves by the quality of their visuals. ABC was very client-centered, and Raymond, who followed the trends and developments in his sector, felt that to remain competitive, an increasing number of perspective drawings would have to be submitted with their bids and proposals. Although clients had not yet formally requested it, he wanted his to be one of the first architectural firms to invest in 3D rendering software to increase the production of these visuals.

A few years previously, the introduction of AutoCAD to produce technical plans had gone smoothly; however, the founder expressed mixed feelings about the second step of computerization. He thought the 3D rendering software was costly and produced visuals of poor aesthetic quality compared with hand drawings. However, encouraged by his senior colleagues who felt the firm did not have a choice, he acquired the software package form·Z and hired Kevin, an intern, who would become their 3D computer specialist. During architecture school, Kevin had been part of a pilot project using form·Z; some of his projects were even used in advertising material for form·Z. Everyone in the firm thought he was very creative and productive. Kevin was well integrated socially, talked a lot, and liked to joke around with everybody. He was the only one who could use the new software because training the other architects was considered too complex and not useful enough to invest time and money.

The introduction of the new tool, the 3D software, was considered a success. Bids and proposals were now presented with numerous drawings that would have been very demanding and expensive to produce by hand. The architects were proud to have made the change because the trend they had foreseen was actually occurring. However, as the following analysis will show, the computerization of 3D drawings raised numerous questions regarding work practices.

**Computerizing the Design Activity of ABC**

In this section, we will analyze the transformation process using the different levels of contradiction (see Table 1 for a summary). For each one of the contradictions, we will follow the evolution of work practices by contrasting situated practices with institutionalized practices taken from the different contexts described previously. We will subsequently analyze the patterns through which situated practices either replicate or question institutionalized practices. More specifically, we will introduce the notions of enactment, reenactment, and challenge to distinguish the diverse relationships

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**Table 1 Application of the Four Levels of Contradiction to the Case Study**

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<th>Different levels of contradiction</th>
<th>Application to our case study</th>
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<td><strong>Primary contradiction</strong></td>
<td>Latent opposition between sociohistorical arrangements</td>
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<td>Opposition between use value and exchange value</td>
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<td><strong>Secondary contradiction</strong></td>
<td>Tensions and ruptures among the social and material mediations constituting the activity system</td>
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<td><strong>Tertiary contradiction</strong></td>
<td>Tensions surfacing within the activity system as a result of the introduction of new means or methods attempting to alleviate the secondary contradiction</td>
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<td>Tension with clients and their stakeholders as the expertise of architects is appreciated through the realism of computerized drawings</td>
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between the situated and extended institutionalized practices as the change unfolds (see Table 2 for a summary).

The Primary Contradiction: The Latent Tension Between Professional and Commercial Logics

As mentioned earlier, the primary contradiction is inherent and rooted in sociohistorical arrangements that surface in a situated context. Based on the portrayal of architecture practice in the regulatory and sectoral contexts, we show how this latent contradiction between use value (professional pole) and exchange value (economic pole) transpires in the sociohistorical constructs constituting the activity.

As described in the regulatory context, architecture is characterized by a fundamental tension between the right of the public to competent and affordable services and...
the right of the professional to earn a living by providing his specialized services. Architects are highly trained professionals who possess a particular expertise that is difficult to evaluate by the public. As a consequence, their professional order is mandated by the government to regulate their practice through a set of norms regarding training, services, and pricing that aim to protect both the clients and the profession. Thus, rules emanating from the community translate, for architects working in private firms such as ABC, into a primary contradiction between professional (providing the best expertise) and commercial (providing profitable services) logics.

In the sectoral context, institutionalized practices and norms regarding the evaluation of architectural work also reflect this inherent tension. As mentioned earlier, to develop and maintain their reputation, architects must devote time and resources to the quality of their design, which is evaluated by their peers in terms of creativity, aesthetic judgment, and technical expertise. However, their work is also evaluated by clients with a different set of criteria, such as budget, building specifications, and service delivery. Thus, the community, through division of labor (who evaluates) and rules (how they evaluate), requires architects to simultaneously address professional and commercial requirements that are often divergent.

We will now see how this primary contradiction, implicit in different aspects of architecture, manifested itself concretely at ABC.

The Secondary Contradiction: The Identification of a Threat Leading to a Decision to Change

As explained earlier, the secondary contradiction is the first step of the transformation process, during which tensions and ruptures surface concretely as the primary contradiction is actualized in the firm, motivating individuals to take action. Consequently, we will first examine how the tension was experienced and then how the decision to computerize was made, as recounted by ABC’s architects.

In a very competitive environment, where more and more institutional contracts were given through a call for tenders, ABC’s senior architects perceived that there would be an increasing demand from clients for visuals included in the bids. They believed this trend would disrupt practices that had given them a competitive advantage. They felt a tension between the need to produce more visuals to satisfy clients and the need to produce visuals of excellent artistic quality to maintain their professional image.

On the one hand, as mentioned previously, the managers’ strategy was to prepare as many bids as possible to ensure ABC’s economical survival. This rule had guided their interactions with clients for a long time. In a context of increasing demand for visuals from clients, the practice sustaining this rule was becoming difficult to maintain because the hand-drawn visuals usually integrated in their bids demanded a lot of time and resources. On the other hand, the managers made it a point to distinguish themselves, as an organization, by the artistic quality of the visuals that represented their projects for clients. For them, this meant perspective drawings prepared through the mediation of tools such as pencils, pastels, and paint in the long-established fine arts tradition dominating the occupation.

According to the ABC’s architects, perspective drawings were crucial because they helped clients see their projects and thus helped the firm obtain contracts: “The client is someone who has a need and who is in a hurry…. There are many who cannot visualize their projects.” They were aware of the importance of these visuals as sales tools, but they also felt that they were works of art that expressed the essence of a building. Raymond said that traditional hand-drawn perspectives “sold a dream.” He compared these to the wrapping of a gift; they created excitement around the project: “It’s a bit like a gift, it is wrapped… and all of a sudden. Wow! It is a surprise when you unveil it. I think that is what architecture is about.”

In this case, the primary contradiction became manifest in the secondary contradiction as an opposition between perpetuating the artistic tradition in drawings (professional logic) and preparing as many bids with as many drawings as possible with limited resources (commercial logic).

It is interesting to note how, despite their ambivalence, the senior architects using a collegial style of management, typical of small partnerships and their particular division of labor, collectively faced this difficult decision threatening them both as professionals and managers of the firm. The founder of the firm was reluctant to integrate the new tool, but his partners encouraged him to further computerize the work process:

I was going against my will when I purchased the machine. I was going against myself…. My partners told me, “Come on, Raymond, we need machines.” I said, “Yes. Let’s go!” But by introducing computers, we lost hand drawings produced on paper. The visuals will never be as good.

In response to this threat, they decided to acquire a 3D software package that allowed them to increase the number of visuals included in bids and that could also be used to produce various presentation drawings for clients during different phases of the building project. With the new tool, architects could rapidly produce different views of the project or propose different options of the same building project. Thus, it allowed them to enforce their rule by sustaining the production of as many bids as possible:

Our clients do not give us $25,000 to produce 3D visuals…. It’s an added value in our service offer…. 
Our prices are competitive. A perspective drawing could cost about $750 and required a lot of materials such as paint and pastels. But Kevin, in one week, on an hourly wage of $50, can do a lot of things.

(André, senior architect)

Computers helped us incredibly because, with all the bids, I do not know how we could do all of them without them. We could not make it without computerization.

(Raymond, founder)

However, although computerization allowed them to integrate more visuals in their bids, which attenuated the economic threat they had perceived, they realized that it also required them to compromise on the quality of drawings. As mentioned earlier, senior architects were aware that giving up hand drawings would mean their “visuals will never be as good.” This decreased quality of their drawings materialized itself, as one senior architect explained:

3D modeling is only half of the work, the other half is finishing the presentation (drawing) so that the building is attractive to look at. It takes lots and lots of time. This is what is difficult: how you give the total feel of a project. We don’t have the fees to do it. We have to say, okay, that is acceptable. The client will understand.

In conclusion, the decision to computerize, collegially made by architects, allowed organizational members to perpetuate existing practices, sustaining their rule of producing as many bids as possible. Computerization thus resolved the economic threat senior architects had perceived, but it also disrupted some practices linked to their professional identity as artists. We will see in the upcoming sections how this preoccupation with the visual aspect of the architects’ work, as materialized in their drawings, became central and raised questions about the essence of their professional practice.

The Tertiary Contradiction: Transformation Through Emergence and Confrontation

As argued by activity theorists, the integration of new elements to resolve the secondary contradiction is bound to generate other tensions as new voices, interests, and traditions come together within the existing activity system. In our case study, the introduction of the new technology and the arrival of the intern, both coming from different activity systems (i.e., a software company and a university), initiated a series of transformations through which the conduct of activity was redefined. During that phase, some of the changes generated tensions that were quickly resolved, whereas other changes created tensions that endured. We will examine two examples taken from our data that document each type of change and that show how these new situated practices were interpreted as reproducing or confronting long-standing practices.

The Emergence of a New Division of Labor. In our first example, we describe new patterns of interaction that led to an emergent division of labor that questioned the way tasks were traditionally distributed in the organization but which were accepted by ABC’s members.

This example concerns the sequence of tasks involving idea generation, concept development, and perspective drawing: the most valued activities for architects. Before at ABC, during idea generation, an architect would explore various concepts to select one that he would flesh out in the concept development phase. Finally, the fully evolved concept would be visually represented in a drawing called a perspective. As explained to us by senior architects, this process was previously one long set of interconnected and sequential tasks that were performed through the preparation of sketches and various drawings by one of the firm’s senior architects. Other architects in the firm were invited to comment on sketches and drawings, but the senior architect kept control over the project by deciding whether to integrate these suggestions into their drawings.

We observed a very different way of doing these tasks that emerged unexpectedly, according to organizational members, but that became repeated frequently enough to create a new practice. The idea generation task, often done by senior architects on their own time, was still accomplished through sketches, but they were subsequently digitalized to be developed using the 3D software package. For example, André described how he worked:

The ideas, I often have them at home, with my pad. You know, it’s a part that’s fun. So, sometimes on a Saturday night, I have to find an idea for some project. I will do it then. Once the idea has simmered a little bit, it takes one hour and it’s done. Then, once at the office, you use the computer tools.

From the moment the sketches were digitalized, a variety of options were tried to test the ideas during the concept development and finishing phases. With the new technology, we observed that the creation process, which was sequential and unidirectional, became reversible, allowing architects to explore an infinite number of alternatives at all times. Furthermore, because senior architects did not know how to use the 3D software, they relied completely on the intern to manipulate the computer tool and provide the desired output in electronic form. We observed numerous instances where senior architects and the intern exchanged ideas in front of the screen while developing a concept. At other times, Kevin received the architect’s requests through e-mail; he often included his own suggestions in the drawing, which were then validated (or not) by the senior architect. In the finishing steps of the perspective drawings, Kevin became even more active in his participation, often responding to a broad request from a senior architect, such as “It has to look like a champagne cocktail at 5 o’clock.” Thus, the creative process previously controlled by senior architects with some invited input from other colleagues was now done collaboratively with the intern.
The intern’s central role in the concept development process put him in a very particular position, because design tasks were a privilege traditionally reserved to experienced architects in ABC’s context. Yet this change—although seemingly important and potentially tension-laden—because of the conflict between the emergent situated practice and the institutionalized organizational practice, did not raise any questions.

In our data, we found explanations to make sense of this situation. First, André downplayed Kevin’s participation in the design process, saying it was only temporary: “Now Kevin does everything, but Judy, a technician, has just finished her training in 3D and she will start doing simple things soon.” Consequently, the division of labor among architects would eventually return to what it was because Judy, a technician, was not trained to undertake design tasks. Second, for senior architects, Kevin’s status as an intern made it acceptable for him to play such a role. As explained earlier, the intern had a set number of hours to accomplish the required training within an organization. Concept development was one of the various tasks he had to carry out according to the norms set by the professional order. André, for example, highlighted the economic benefits of this way of doing business:

Our specialist in perspective drawing is 28 years old…. He is an intern. He, thus, has the salary of an intern. Usually, it takes a long time to start drawing perspectives, doesn’t it? It’s long, very long. Those I know who work in other firms, they are 45 years old. Their salaries are not the same. They are professionally more mature.

Raymond, for his part, saw the intern as a future architect: “Young people, like Kevin, will give their ideas. When Kevin enters the drawing in the computer, as an architect, he will think in architecture terms…. For him, the computer is his pencil.” Hence, Raymond saw himself as a mentor leading Kevin to develop an important skill characterizing the profession.

In this example, we see that the emerging practice, because of the way the intern’s role was interpreted by the senior architects and because his central place within the firm was seen as temporary, did not compromise in a persistent manner the usual practices within the organizational context and was in tune with the institutionalized practices prescribed by the professional order. Moreover, it was convergent with both the professional and the commercial logics.

The Coexistence of Two Conflicting Aesthetics. The new 3D software, and its use by the intern, also introduced a new aesthetic that the founder quickly realized would create a rupture with the type of visuals traditionally created within the firm. In this second example, we examine how the emerging practice confronted the long-standing organizational and occupational practice of preparing visuals within the artistic tradition, based on specific tools and norms.

As noted in the occupational context, perspective drawings—specifically, those prepared to present the project’s end result to nonprofessionals—were part of a long-standing tradition that framed them as artwork. At the organizational level, the drawings were also conceived as part of this tradition, emphasizing the fine arts conventions and the expressiveness of the artist who produced them. As Raymond told us,

If you look at paintings, they don’t present the real building as in a photograph. Otherwise, you only have to take a photograph and frame it…. Depending on the colors he chooses, the painter has the capacity to give a dream-like quality to his drawings. Some will paint the sky blue, others will make it yellow or pink…. It’s the same thing in architecture. It’s exactly the same….

This artistic flair mediated through the artist’s expressiveness disappeared, to be replaced by a new realistic-looking aesthetics resulting from the intern’s use of form-Z and other software programs. It was not only the computer software that led to this result but also how Kevin used this software. Kevin’s typical way of working, using scanned photographs, emphasized the “realistic” look of the perspectives. For instance, while working on a perspective drawing of a train station, Kevin finished the drawing in Photoshop by adding people and cars. He had data banks of photographs that he scanned from magazines; he labeled them “men,” “women,” “children,” “groups,” “objects,” etc. He searched through his banks to find images to place in the drawing. He worked for a long time, changing the size and location of the people and the cars to make the drawing look real. He added trees and shading to his drawing because “it looks more realistic.” In some cases, he went out and took his own pictures, which he then used in his work.

What we see here is how the situated practice involving Kevin working with the computer software emphasized the “photographic” realism of computer visuals and conflicted with the sociohistorical norm of what a drawing should look like within the firm and the architecture tradition.

ABC’s senior architects, who saw the economic benefits of digital drawings, attempted to reconcile the two different aesthetics in different ways. For example, we observed André, who, looking at some computer visuals, commented negatively on their aesthetics:

For example, here the lawn looks like a carpet imitation of grass…. We found some 3D grass, but it’s very difficult to work with. [Looking at another visual] Here it’s very dense, and here it looks like its 5 feet tall…. And when you work on a building where landscaping is important….at the level of the feeling, the comfort, the vibration…. It could be better than that.
He believed that, like hand drawings, computer visuals needed to follow the precepts of fine arts culture:

The wedding between arts and technology has not occurred yet. Those who use technology are too “technological.” I call that a “Black and Decker” aesthetics. And those that are within the artistic sphere are not familiar enough with the computers. If I was 20 years old, the brushes and painting and all of that, I would look at them but I would not take part in it, I think. I would start over with machines but using a different culture… a fine arts culture, the computer would then just be a tool.

Raymond also lamented the lack of expressiveness of computer drawings:

By introducing computers, we lost hand drawings produced on drawing paper. The visuals will never be as good. I have never seen a (computer) visual as nicely drawn as one done with an H, 2H, or 3H pencil… The different thicknesses, the sensitivity… That is what I liked…

However, he saw the potential of bringing the two types of visual together:

It is a good element even if some things are missing, like expressiveness… There are even some architecture firms I know in the United States that will use water color, actually putting it on computer visuals… I think it is beautiful when you can succeed in mixing the two.

Apart from senior architects, other members of the organization were also concerned about the aesthetics of computer visuals. One of the technicians told us, “It is not enough to know the computer commands of 3D software. You need to give the drawings an artistic flair, something that few can do.”

According to Raymond, this discomfort with the new aesthetic was widely felt in the profession. After mentioning the case of American architects who hand draw over their digital visuals, he talked of his European partners: “They (Europeans) have a lot of difficulty taking this turn. They are very good at drawing and they want to keep the hand drawings. Ricardo (my partner) is very computer savvy, but, like me, he always has his little pencil.” This tension, which could be argued to be circumstantial or generational, surfaced in a variety of contexts, as recounted by Raymond and as reflected in the long-standing debate in architecture between the modernist approach (promoting digital visuals) and the dominant artistic approach (defending hand drawings).

In contrast to senior architects, Kevin found that not enough resources were devoted to the development of more aesthetically sophisticated visuals. Although he resented this situation, he complied: “I do not try to defend my aesthetic choices because they have no money… I am only there to execute.” During our observation, he also complained that the work done in the firm was too technical, and not enough time was spent on the conceptual development of the projects.
implementation program, which favored the involvement of different groups in the evaluation of architectural projects. This meant that in an increasing number of projects, once the client had selected the firm they would work with, another level of approval was added to the ones that existed before. Within the client firm, this implied that the number and diversity of people participating in the evaluation of all aspects of architectural projects was increased; as André noted, “The people who are on the selection committees are not necessarily architects. They can be accountants or lawyers, etc. They are not necessarily convinced by the same things as architects.”

In this context, the arrival of the intern and the new computer tool generated a new type of interaction with clients and their stakeholders, which for the architects had far-reaching consequences. Because of the realistic look of the drawings and the ease with which they could be modified with computer commands, the clients felt at ease to intervene more frequently with suggestions about the look of the visuals. In numerous observations, we saw how certain elements that were sensitive to clients and, in particular, their stakeholders—elements such as the environment (e.g., the surrounding area, trees in an urban area, asphalt, people, and cars displayed) and the building’s finishes (e.g., the color of bricks and windows)—became very important in the drawings because these came to be taken for reality. For instance, a contractor working with the intern on the finishing touches of a visual asked him to replace the woman in the drawing who had a summer dress with one who was dressed more properly. The contractor argued that it might distract his client.

For ABC’s architects, it was less the realism of the drawing than the representation of the complete architectural ensemble that was important, as the following example illustrates. The intern had drawn an architectural fence (designed to hide an installation and cut out the noise) for a public utility. In his drawing, he had removed the trees in front of the building to give a better view of the finished architectural project. During a meeting, the client, anticipating protest from stakeholders such as shop owners and residents, asked the intern to reintegrate the trees for the final drawing that would be presented to these stakeholders. Later on, one of the senior architects, Marc, stopping in front of the intern’s screen, suggested that he make the trees transparent so as not to hide the building too much. In this case, there was a compromise to try to satisfy all parties. We also observed conversations in which contractors, discussing the realistic look of presentation drawings, argued that they were a “good sales argument” because they looked more “professional” to the stakeholders involved.

These examples illustrate that drawings serve different purposes for different parties working together. More specifically, within their activity system, architects strived to make their project explicit through visuals. For stakeholders, such as the public utility firm, it was not so much the characteristics of the building that mattered but rather the presence of trees to show that it respects environmental norms. to the various groups who will judge the building project. Thus, a set of drawings was used by different parties each in their own activity systems distinguished by their own objects and, consequently, having their own reading of these visuals.

The ways nonexperts equated the realistic outlook of drawings with the professional quality of architecture worried the organizational members we met. This became problematic because it modified the criteria used to evaluate the architects’ work in a variety of settings, questioning the boundary, discussed in the sectoral context, between what is evaluated by peers (the professional quality of design) and by clients (project specifications, time frame, budget, and reputation). Moreover, the new pattern of interaction—giving nonexperts a stronger voice in the development of a project—undermined the spirit of the norm guiding the mandate of the OAQ, which recognizes that architects possess a special expertise that is hard to evaluate.

Although senior architects of the firm had acquired this new software to meet their clients’ need to visualize projects, they had not foreseen that the realism of these images would come to play such an important role for such a wide variety of parties, with many of which they were not directly involved. Raymond felt that the 3D software, because it produced images that were more realistic and more precise, was “one of the best machines to create false impressions. It is virtual reality. It resembles reality, but it is not reality.” This preoccupied the senior architects who were afraid that computer visuals would deceive clients because they seemed so realistic. Raymond in particular expressed his worries regarding the consequence realistic visuals could have on the appreciation and preservation of the architects’ professional expertise. To illustrate this problem, he gave us the example of a project under construction:

One example is the XYZ Center. If you look at the visual of the XYZ Center, it is virtual. Wait till they finish building it.... You will see the visual and the end result will not be the same.... It becomes graphic design, downloading the architectural fundamentals, and that is really unfortunate.... People are good at concealing things.... When you don’t know how to finish something, you put a tree in front of it and you hide it.

As we can see, situated practice, following the implementation of the 3D software, led to a new dynamic between clients and architects, where the realistic look of computerized visuals was now used as a criterion to evaluate an architect’s expertise. Although the view of representational drawings as a potentially manipulative device was not new in the profession, what was changing was the clients’ perception of professionalism based
on this new, realistic aesthetic. This worried the firm’s architects because they felt that client decisions could be made with a sense of false competence and that some of their colleagues had already started to take advantage of this possibility, thus hurting the profession.

Although they resented this trend in their industry, in their own practice, architects invested a lot of time and energy to satisfy their clients and accepted the clients’ growing involvement in their work. Finally, although architects expressed concerns about its impact on the professional pole of their work (i.e., the recognition of their professional expertise based on the aesthetic judgment of peers), the change described in the quaternary contradiction clearly favored the commercial logic by giving clients a stronger voice.

**Linking Situated Practices with Institutionalized Practices: Challenges, Enactments, and Reenactments**

We will now build on the analysis of the four levels of contradiction presented in the previous section to present patterns through which situated practice either replicated existing institutionalized practices or questioned them.

We identified three different patterns of interaction between situated and institutionalized practices; we label these as challenges, enactments, and reenactments. At this point, to simplify our argument, we present them by taking examples linking a situated practice with institutionalized practices from each context.

A *challenge* occurs when newly created patterns of interaction are deemed incompatible with existing institutionalized practices and norms. For example, the emerging pattern of interaction with the new computer tool generated a new aesthetic that was viewed as threatening the traditional organizational practice of producing drawings with a particular set of tools and methods in the fine arts tradition.

Apart from challenges surfacing in the clash between situated and institutionalized practices of different contexts, we noted during our fieldwork that some challenges were anticipated, as recounted by the architects we interviewed. An *anticipated challenge* is a perceived, as opposed to an actual, threat to an existing institutionalized practice. In one case, for example, senior architects foresaw that their ability to produce an increasing number of calls for tenders would be threatened as clients demanded more visuals. Because of their limited resources, they saw that one of the rules defining their organizational practices would become problematic in the future. In a similar way, at the end of the study, architects expected that the institutionalization of practices favoring the production of realistic visuals would threaten the recognition of their exclusive expertise by clients and thus challenge rules embedded in the regulatory context.

In contrast, an *enactment* occurs when a new practice (i.e., a situated change) that is compatible with an existing institutionalized practice emerges. More specifically, improvisation and local adaptation can lead to new patterns of interaction that, even if they are new, can reproduce practices of existing institutionalized contexts. For example, a new pattern of interaction emerged between the intern and senior architects as they worked together on the creative process with the new technology. In relation to the regulatory context, this emerging division of labor can be seen as an enactment because it remains within the bounds of institutionalized practices, regarding the role of an intern by the professional association.

A *reenactment* occurs when a situated practice reproduces an institutionalized practice. Existing institutionalized practices of different contexts were reproduced in various situations during our field study. For example, one of the organization’s rules was to submit as many bids as possible; this practice was reenacted during our study through the decision to computerize 3D design. In the same way, the division of labor leading to the collegial management style of small partnerships, described in the sectoral context, was reenacted by ABC’s senior architects as they collectively decided to undergo a new phase of computerization.

Table 2 articulates the various patterns of interaction between situated and institutionalized practices, synchronically and over time, and relates them to the different levels of contradiction. Through the simultaneous challenges, reenactments, and enactments of different existing sociohistorical practices, we observe how the activity system is questioned and redefined in this episode of technological change. Through enactments and reenactments, change reproduces existing institutional practices, even in what seems to be improvised or emergent practices, such as the reallocation of design tasks among senior architects and the intern. Although our analysis focused on tension, we note that reproduction is also a part of organizational change.

In our analysis of the different levels of contradiction, we observed that multiple challenges surface in each step of the transformation process as the tensions between the professional and economic poles take different forms. Even if some of these challenges are resolved, others surface or persist during the whole process. Activity systems are thus constantly evolving, because they are constituted through practices drawn from various institutionalized contexts that are constantly in tension with one another. The efforts of organizational members to alleviate these tensions contribute to the reconfiguration of the set of institutionalized practices, as a new situated practice solves some challenges but creates new ones.

**Discussion**

In this section we highlight the contributions following from our analysis of contradictions in an episode
of technological change. First, we introduced the concepts of challenges, enactments, and reenactments to grasp more precisely the particular dynamics between situated and extended practices as change unfolds. We will now address questions raised during our analysis concerning the conditions under which challenges, giving form to contradictions, are resolved or persist. Second, our analysis of contradictions revealed particular social dynamics that became manifest as organizational members attempted to resolve tensions associated with contradictions. Using our case study and existing literature on contradiction within activity theory, we will discuss the patterns through which poles of contradiction are embodied to explain the social dynamics in change episodes. Finally, we will examine the implication of examining technology as mediators of sociocultural logics that can confront other institutional logics as they are integrated in collective work practices.

**Challenges: Emergence, Resolution, and Persistence**

One of our main contributions is to introduce the concept of challenge. This intermediary concept facilitates the investigation of contradiction by offering an analytical tool to highlight patterns of confrontation between situated and institutionalized practices. Conceptualizing challenges led us to envision the dynamics of change as a process of challenge resolution and/or persistence.

Our case study revealed different patterns of challenge resolution. During the transformation process, we observed three ways in which challenges were resolved: integrating a new tool, viewing the challenge as temporary, and framing the challenge as reproduction.

The first case, the integration of a new tool to resolve a secondary contradiction, is already referred to in activity theory. However, its empirical exploration remains mostly associated with cases where, in the interventionist tradition, researchers themselves come up with the means, such as a new tool, to dissolve tensions. By examining in context how actors themselves recognize and act upon tensions to resolve contradictions, we discovered dynamics that extend activity theory. For instance, our case study highlighted a particular situation in which organizational members acted on challenges associated with the secondary contradiction that were not yet actualized. Thus, we observed that to generate a reaction, the secondary contradiction can rest on an anticipated challenge, adding to our understanding of the conditions under which organizational members choose to initiate change.

The two other modes of challenge resolution illustrated in our case study, framing challenges as temporary or as reproduction, allowed us to see new avenues through which organizational members deal with tensions associated with new work practices as they emerge following organizational change. For example, our data revealed circumstances in which a new practice involving interactions between the intern and senior architects in the concept development of a project is presented as temporary and therefore not a persistent challenge to institutionalized practices. In this case, the new practice is viewed as a punctual accommodation. However, the same practice is also interpreted as reproducing existing practices of internship in the regulatory context.

These two modes of challenge resolution, which could be found in other organizational settings, imply different patterns of institutionalization of situated practices. For example, a challenge solved by making the new practices temporary implies that these practices will never be institutionalized. On the other hand, resolving challenges by referring to the situated practices’ compatibility with the regulatory context immediately validates their reproduction. This suggests that various modes of challenge resolution could be linked with particular dynamics of institutionalization of situated practices.

It is also interesting to note that our case study contrasts with other research done within the activity theory tradition (Groleau 2006a), in which organizational members, by introducing a new computer tool, aggravated the secondary contradiction that they were attempting to resolve. Consequently, we see that the integration of new means, such as a new tool, does not always resolve the secondary contradiction.

Although some of the identified challenges punctuating the change process are resolved, others persist during the change episode. Our findings suggest that challenges that are linked to broader sociocultural contexts, such as the conflict between different types of aesthetics challenging the occupational context as well as the new role played by clients challenging the sectoral context, are more difficult to resolve. In these cases, ABC’s architects, as individuals or at an organizational level, have a limited capacity to change the broader institutionalized practices in the occupational, sectoral, or regulatory contexts. It is probably only through concerted efforts from individuals and organizations at both the sectoral and occupational levels that, over time, such issues could be raised and that these institutionalized practices could potentially be acted upon collectively. However, as Barley and Tolbert (1997) argue, it is difficult to capture empirically such a wide-ranging cycle. As illustrated in Table 2, although our study revealed that situated practices simultaneously raised challenges to different institutionalized practices during the tertiary and quaternary contradictions, we feel that further studies are needed to explore the impact the linkages between these various institutionalized practices are likely to have on the persistence of these challenges.

Finally, viewing an episode of change as a series of simultaneous and sequential challenges, enactments, and reenactments provides an alternative reading of the
phenomenon by breaking it down analytically and conceptually in a different way. Whereas most situated studies of organizational change capture the transformation of work from the moment technology is implemented (Orlikowski 1996, 2000), we explain the evolution of work practices from the moment challenges bring about interactions on change surface. The investigation of challenges, including those prior to the actual technological change, allows us to observe how challenges evolve in time and how those that motivate change are intimately tied to those challenges that surface as change actually unfolds. For instance, although the arrival of a new aesthetic could be viewed as an unintended consequence, if we looked at the transformation of work following the arrival of the technology, in our reading it is a challenge that was anticipated, shifting the source of tension from the economical survival of the firm to one associated with the architects’ professional practice. As discussed earlier, challenges can be resolved or unresolved through the implementation of a new tool, but the sequence of challenges, enactments, and reenactments characterizing the secondary, tertiary, and quaternary contradictions ties the actual change in practice following implementation to tensions and interactions preceding that change. Whereas Barley (1986) also documents institutionalized contexts prior to the arrival of change to contextualize the particular experience of radiologists at the occupational level and to explain the two distinct patterns of interactions following from the episode of change in the studied hospitals at the organizational level, we integrate institutional contexts differently. We investigate how different institutionalized contexts, each resting on their own sets of rules, means, and interests, conflict with one another as situated practices unfold through the whole change episode—from its initiation to the transformation that follows from it.

Our analysis of challenges has further implications for the literature on situated change. For instance, Orlikowski (2000, pp. 409–410), comparing case studies of technology implementation, argues that the structural properties of technology, which she labels “technology-in-practice,” are enacted through recurrent social practices involving groups’ ongoing situated use of technology. She suggests that three types of enactments of technologies-in-practice—inertia, application, and change—can be distinguished in terms of their consequences for organizational change. She proposes that certain institutional conditions can facilitate change, whereas others inhibit it. Using our framework, we view what she labels application and change as instances of enactments and reenactments, whereas we see inertia as deriving from challenges that persist, thus preventing the institutionalization of situated practices. Therefore, our conceptualization allows us to investigate the process of challenge emergence, resolution, and persistence as an integral part of the transformation of work practices.

**Embodying Contradictions: Capturing Social Dynamics as Change Unfolds**

We also develop the concept of embodiment of contradictions to better explain the social dynamics of organizational change. We observed in our fieldwork that both the professional and commercial poles of the contradiction were internalized by architects. On the other hand, Blackler et al. (1999), also drawing on activity theory, empirically observed an opposition between two groups, managers and engineers, who each adhered to one pole of the contradiction. Whereas their study describes an episode of change characterized by open conflicts between managers and engineers, our case shows that when both poles of the contradiction are internalized by organizational members, there is no open conflict, but tensions are collectively experienced and managed through a more collegial process. In organizations such as professional partnerships, where one occupational group both provides services and manages, contradictions can be internalized. Consequently, we show that sociohistorically rooted logics, such as that of the professional partnership drawn from the architect’s sectoral context, inform the pattern through which tensions manifest themselves among organizational members, leading to particular change processes. For instance, professional partnerships and bureaucracies can exhibit different patterns of contradiction embodiment because of the different sociohistorical traditions that influence interactions, statuses, and roles. Consequently, studying the different patterns through which poles of contradictions are embodied, drawing from various contexts and their specific institutionalized practices, can enrich our understanding of change by revealing the various modes through which tensions are expressed, recognized, and addressed.

**Technology: Integrating Material Sociohistorical Constructs in Situated Practices**

Our case study also allowed us to observe that the use of the technological tool led to particular sets of enablements and constraints that facilitated the performance of creative tasks but also created visual outputs that were contested by architects. This conceptualization of technology as a set of enablements and constraints taking form in the specific setting in which it is implemented resembles in many ways the conceptualization of technology-in-practice proposed by Orlikowski (2000). Activity theory adds another layer of explanation by defining tools as material sociocultural constructs that carry with them logics and traditions that can surface in the activity in which they are integrated.

In our case study, we examined how interactions between the intern and the technological tool involved a new sociocultural construct—in this case, architecture’s modernist tradition—that challenged some of the institutionalized traditions supporting work practices in the
firm. The situated work practices revealed the new sociocultural traditions that were brought in through the use of the tool and the difficult integration of these new traditions with the existing institutionalized practices.

Furthermore, technological tools are also material artifacts that change the sensitive experience of work, which, again, can engender tensions through which sociohistorical constructs are questioned and challenged. In our fieldwork, architects talked about the sensitive qualities of drawing done with pencils, in terms of line thickness and expressivity, as well as their attachment to the use of pencils, which they feel characterizes their profession. Our case illustrates a change of material conditions under which architectural drawings are produced as well as the symbolic and affective dimensions that this change reveals. The increasing reliance on computer tools to produce visuals creates a rupture with the professional practice resting on the use of paper and pencils established centuries ago that has come to symbolize the architectural profession. It is the investigation of these ruptures between tools, coming from different sociohistorical contexts, that enriches our way of thinking about change within a practice-based tradition.

To summarize, by focusing on challenge persistence/resolution, the embodiment of contradiction, and the view of technology as a sociohistorical material construct, we offer a view of organizational members as competent and reflexive actors shaping their own work practices. Whereas structuration theory suggests that organizational members act reflexively when they are confronted with a newly emerging practice that they can choose to reproduce or not, analytically, this dimension of structuration remains underdeveloped. Beyond this instance in which social actors are confronted with the reproduction of structural properties in context, we observed manifestations of reflexivity in our case study in other circumstances. More generally, reflexivity is a driving force manifesting itself during the whole change episode, as organizational members, individually and collectively, experience challenges and act upon them. Consequently, we provide a view of change where institutionalized practices do not determine situated practices; rather, they are part of the equation organizational members are faced with in the way they deal with the conduct of their everyday activities, on their own as well as in a collective. And it is, in part, the experience of the tensions among various institutionalized practices that enable these organizational members to transform their work practices.

Conclusion
In this study, drawing on and extending activity theory’s concept of contradiction, we investigated how different sociohistorically institutionalized practices interact and come into conflict with situated practices during an episode of change. Our study makes three main contributions to the literature on situated change: by conceptualizing the conflict between situated and institutionalized practices, by capturing social dynamics through the embodiment of poles of contradiction, and by analyzing technology as a material sociohistorical construct.

First, our study revealed three different patterns of interaction between situated and institutionalized practices, which we labeled enactments, reenactments, and challenges. In particular, we developed the concept of challenge to analyze more precisely the tensions between situated and extended practices that are central to the transformation of work practices. We view change as a pattern of challenge resolution and persistence, as well as enactments and reenactments, giving rise to a particular mix of reproduction and transformation informed by tensions. Our framework thus presents situated change not only as a continuous, incremental, and cumulative process but one that is also experienced as discontinuous by organizational members who see emerging local practices confronting long-standing traditions.

Second, we developed a way of thinking about contradictions by identifying patterns through which poles of contradictions are embodied. We further suggested that particular sociohistorical traditions, such as the ones typical of professional partnerships or bureaucracies, could be associated with various statuses and roles through which contradictions are experienced, identified, and dealt with, giving rise to different social dynamics.

Finally, our reading of technology combines its social and material dimensions in a unique way. We argued that technology not only enables and constrains human practices as it is used by organizational member in context; it also carries with it a sociohistorical tradition that adds a new perspective to the multiple interests and voices already existing in an activity system.

This study suggests numerous avenues of research to further validate and articulate this view of change. First, future research could investigate different patterns of challenge emergence, resolution, and persistence to better understand change driven by contradiction. For example, what type of patterns occur in circumstances where efforts to resolve tensions aggravate the situation? Second, it would be interesting to study the embodiment of the poles of the primary contradiction in different settings. For instance, in cases where different groups embody different poles of contradiction, what social dynamics lead to challenge resolution? What happens when one pole of the contradiction dominates the other? Finally, the investigation of episodes of change leading to the coexistence of tools from different sociohistorical traditions would be interesting. How is conflict among different tools, as well as between various tools and social arrangements, resolved?
This leads us to our final conclusion. We feel that this view of change, apart from its conceptual contribution, can provide practitioners with an analytical frame that will allow them to make better sense of the multiple tensions inherent in episodes of change.

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Endnotes
1 Recently, some authors have proposed other explanations for the source of the primary contradiction. For example, Miettinen (2009) feels the opposition between use value and exchange value is being challenged in certain types of organizations, such as those using open-source media, where he sees new forms of knowledge sharing and social interactions that move away from the traditional commercial logic. In the same vein, Blackler (1993), although recognizing that some of the tensions within activity systems may reflect the opposition between use value and exchange value, suggests that the tensions within human activity are complex and rooted in various historical traditions extending beyond the one identified by Engeström (1987) as the primary contradiction. Although we agree with Blackler’s proposition, our case study, based on a small profit-seeking organization, illustrates the economically based tension proposed by Engeström.

2 To newly integrated organizational members, as we observed with the intern, both sides of the contradiction might not be fully integrated because their training emphasizes the professional pole as the main pillar of their identity and downplays the commercial side of their practice, as suggested by Cuff (1991).

References


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