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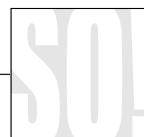Additional services and information for *Strategic Organization* can be found at:

Organizing practices in services: capturing practice-based knowledge for innovation

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Abstract

Service innovation depends on ambiguous designing and using knowledge. But this knowledge is embedded in ongoing practice, so capturing it requires the practices themselves to be organized somehow. I integrate literatures on work as practice with strategic innovation management to develop empirically grounded theory for this problem. The analysis identifies three work activities through which knowledge for innovation is generated, shows how they constitute a common ground for knowledge creation and redefines practice as a coherent frame for these activities. The analysis explains how conventional organizing destroys this knowledge, and develops organizing principles for the continued generation, capture and use of practice-based knowledge for innovation. The principles are strategically articulating the firm's practices as actual problems of value creation; embedding the three activities into everyone's jobs; and transforming R&D into a formal process for reflecting on practice.

Key words • innovation • knowledge • practice • services

This study examines how work in service organizations can be organized to capture and exploit the knowledge that is necessary to create new services. In the face of increasing competition and shifting technologies, service organizations must innovate to remain viable, just like manufacturing organizations. And as is the case in manufacturing, effective service innovation requires the integration of the firm's capabilities with customers' needs, which involves understanding how the complex social processes of designing services interacts with the complex social processes of using services (Dougherty, 1992; Leonard-Barton, 1995). Knowledge of designing and using is ambiguous, however, since technologists often cannot say how different designs might work without trying them out, while customers often cannot say what they need without trying the product either. To help surface this ambiguous knowledge, researchers have developed techniques for products that rely on hands-on interaction between innovators and potential customers, such as early release of new software so users can discover limits (Ianseti, 1998), 'empathetic design' (Leonard-Barton, 1995), team

visits with customers (Dougherty, 1990), and 'probing and learning' (Lynn et al., 1996).

Knowledge-intensive service organizations face two special challenges when it comes to surfacing the ambiguous knowledge of designing and using for innovation. Both arise from the intangible, relational and continuous nature of these services (Greenwood et al., 1990; Morris and Empson, 1998; Yakura, 2001). The first is determining what should be organized in the first place to generate the knowledge. Designing new services is deeply and continuously intermeshed with using them, so one cannot simply organize separate venture teams, and one cannot put aside the intermeshing once the product is manufactured to 'spec'. Knowledge for new services literally exists in 'daily operations' (Itami, 1987), or in the practice, which implies that services must organize everything to capture necessary knowledge. To overcome this challenge, it is necessary to identify the kinds of activities that are most crucial to the production and capture of designing and using knowledge.

The second special challenge for service innovation is strategic. While all innovations should be framed strategically, innovation in services is more deeply intermeshed with strategy. Competitive and market pressures are forcing many service firms to provide a 'complete solution' or a more complex, end-to-end package of activities (Brock et al., 1999; Meyer and DeTore, 2001). For example, municipalities expect civil engineering firms to not just design a sewage treatment plant but also to build, finance, and operate the plant, and insurance and banking customers expect services once delivered separately to now be bundled in special ways without raising prices and with clear indicators of quality (Lowendahl and Revang, 2001). According to Dankbaar (2003), service innovation concerns introducing order from a strategic perspective, since allowing every client encounter to be unique produces only variation, not innovation. Services must be deployed systematically across clients to assure quality, keep costs down and absorb new knowledge from particular applications so that offerings can be continuously enhanced in the face of strong competition (Lowendahl, 2000).

To generate and exploit knowledge for innovation, service firms must organize their work to capture the horizontal flow of designing and using, as well as the vertical flow of strategic focus and unique deployment. This study develops empirically grounded theory for how service work can be so organized. I build on the large literature on work as practice because a significant amount of knowledge for service innovation is embedded in the actual practice of innovation. The practice perspective provides a view of work that fits services, but differs significantly from more established views. Conventional views, however implicitly, conceptualize work as a static slice of specialized labor, and jobs as pre-defined activities to be executed without ambiguity (Schon, 1983; Brown and Duguid, 1991; Barley, 1996). These views overlook the continuous flows of activities that comprise work by focusing on outcomes rather than on the activities through which people produce those outcomes. The emphasis on achieving

pre-specified outcomes can hinder the exercise of clinical judgement that practitioners such as nurses, teachers, architects and management consultants ideally rely on to do their work (Benner, 2003). Conventional views of work also emphasize knowledge that exists in routines or expertise, and do not address the kind of knowledge that is continuously generated in practice.

The practice literature is incomplete as well, which is why more theory building is necessary: it is based on a limited view of practice, does not connect practice to managerial issues of innovation and competitive advantage, and does not address how to organize practice for strategic ends. In the next section, I outline three insights that inform organizing practice in services to capture knowledge for innovation, and point out issues that require further development. These issues become research questions that guide this analysis.

Conceptual background: applying work as practice to innovation in service firms

Focusing on the actual activities of work

One important contribution to knowledge management from the practice perspective is the identification of a kind of knowledge that is embedded in situated activity. Practice refers to how people actually get work done (Brown and Duguid, 2001). Practice includes the means and the ends of work, the practical wisdom people rely on, and the 'rich, socially embedded clinical know-how that encompasses perceptual skills, transitional understandings across time, and understanding of the particular in relation to the general' (Benner, 2003: 5; see also Schon, 1983; Dougherty, 1992; Brown and Duguid, 1991, 2001). Practice-based knowledge is produced continuously in situated action, as people draw on their physical presence in a social setting, on their cultural background and experience, and on sentient and sensory information (Blackler, 1995; Tyre and von Hippel, 1997; Orlikowski, 2002). Practice-based knowledge does not exist independently of social action, and its content does not necessarily mean the same thing to all involved.

To manage practice-based knowledge, therefore, it is necessary to focus on the actual activities of work, to enable the situated activities through which people accomplish tasks, to foster skills of knowing and to legitimate engaged participation in the practice (Lave and Wenger, 1991; Barley, 1996). Situated activities would include forming relationships with clients to elicit insights that might not otherwise be revealed, interacting with colleagues over the situation, considering subtle differences in the appearance of material (e.g. cancerous cells: Barley, 1996) or in equipment displays (e.g. readings in an intensive care unit: Benner, 2003), and improvising to surface problems (Schon, 1983). The skills for knowing comprise the 'artful competence' (Schon, 1983) of applying principles of the profession to unique situations, and making do with resources

available (Lave and Wenger, 1991; Orlikowski, 2002; Whittington, 2003). According to Brown and Duguid (2001), practice highlights know-how defined as the ability to put know-what into practice. These skills include tapping into knowledge held by a community. Practice-based knowledge is collective, since no person can know all the heuristics or principles involved, or possess all necessary experience (Cook and Brown, 1999). Competent practitioners need to know how to interact, negotiate access and participate in the community (Wenger, 1998).

Thanks to practice scholars, it is recognized that knowledge is situated in collective action. But these scholars focus on practice as an alternate view of knowledge work, and do not explain which activities should be organized in which way to produce practice-based knowledge embedded in them. These scholars also focus on clearly bounded occupations, crafts or disciplines which presuppose established activities. Professional services are not clearly bounded or defined (Yakura, 2001). New theory is needed to identify activities that should be organized and to define practice in a way that does not assume relevant actions are predefined.

The social dynamics of knowledge creation

While the strategic organizing of practice remains underdeveloped, the social dynamics through which people create and share knowledge have been developed in detail via ethnographies (Lave and Wenger, 1991; Barley, 1996; Carlile, 2002; Orlikowski, 2002; Bechky, 2003; Obsfeld, 2003). These ethnographies emphasize surfacing and articulating tacit or privately held ideas *in practice,* creating common ground to create knowledge across work boundaries, and replicating activities that produce practice-based knowledge organization-wide.

First, people need to collectively make sense of new ideas or insights (Nonaka and Takeuchi, 1995; Weick, 1995), and ongoing articulation is central to this collective sensemaking. According to Obsfeld (2003), Polyani (1958) devotes considerable attention to articulation, or the process by which knowledge evolves from the inarticulate to the articulate. Obsfeld's ethnography of automobile innovation suggests that knowledge articulation, defined as the lifting of knowledge out of the tacit, private, complex and random to make it explicit, public, simpler, ordered and relevant to the situation, is the engine of knowledge creation in innovation. Some researchers focus on the tacit nature of practice-based knowledge, but articulation involves the continued juxtaposition of tacit with articulate knowledge (Spender, 1996; Tsoukas and Vladimirou, 2001). According to Schon (1983), when knowledge in practice remains tacit, work often becomes routine because activities are carried out by rote, without reflection.

Second, important knowledge creation for innovation occurs at work boundaries, so new insights must be articulated across these boundaries. Separate groups tend to de-contextualize knowledge of a whole service or prod-

uct, so, to work together on innovations, people need to re-contextualize knowledge relevant to innovation in a way that makes sense to different groups. Bechky (2003) explores the processes of creating a common ground to transform separate understandings into coherent views of products or processes. Carlile (2002) finds three different boundary objects for sharing knowledge, depending on the novelty of the knowledge. Information transfer works when people agree upon differences and dependencies. When groups interpret novel issues differently, translation of the differences is necessary, via integrating devices such as standardized forms and methods. And when knowledge is embedded in separate practices, transformation is necessary to change the old knowledge so that new knowledge can be integrated (using devices such as objects, maps, models).

Third, knowledge embedded in practice does not transfer like a physical object that is packed up and moved. Orlikowski's (2002) field study of global product teams suggests that since practice-based knowledge is embedded in work activities, the activities themselves must be replicated across the organization to recreate the knowledge. Practice-based knowledge is an ongoing social accomplishment, emphasizing again that it does not exist independently of social action. Orlikowski develops theory about organizational capabilities, such as sharing identity, aligning effort and enabling participation that sustains a collective competence for doing similar work in similar ways, so that knowledge is continually reconstituted.

These studies suggest that the organization of practice should incorporate these critical dynamics of knowledge creation and sharing. However, because of their detailed analysis of particular work settings, ethnographies rarely look across work sites to discover more general structures of organizing that enable these dynamics. Grounded theory building based on a variety of work settings is needed to identify organizing principles that can support these dynamics.

The challenges of organizing work as practice

While the organizing principles that capture practice-based knowledge have not been identified, those that disrupt this knowledge have been. Bureaucracies are based on vertical divisions of labor that chop up the horizontal flow of practice (Barley, 1996), and on premises of rationality that separate means from ends (Benner, 2003; Covaleski et al., 1998). Professional services organized around local autonomy and individual accountability also disrupt the activities of practice. Local autonomy privileges individuals and inhibits the absorption of new ideas (Hinings et al., 1991). Lowendahl (2000) finds that professional service firms based on autonomous practitioners lack the norms and the skills for managing complex project teams needed for many new services. The emphasis on billing hours in many professional service firms inhibits the social dynamics that generate practice-based knowledge and even the willingness to share knowledge in the first place (Orlikowski, 2000; Yakura, 2001).

I extend the practice literature to the strategic problem of innovation in services by addressing the three questions posed earlier. First, I identify specific work activities that are crucial to the generation of practice-based knowledge for innovation, and explain how and why they comprise the common ground of practice that allows people to articulate, transform and replicate this knowledge. I also re-define practice as a frame that meaningfully bounds these activities, so people can continually enact the practice and make sense of the knowledge. Second, I explain why conventional organizing operates as an anti-practice strategy that eliminates the common ground and de-legitimates the continued articulation of practice. Third, I identify pro-practice organizing principles that enables the systematic generation of practice-based knowledge for innovation. The result is a theory that can be tested, elaborated and corrected in subsequent research, providing a pathway for advancing the theory of knowledge management.

Methods

Grounded theory building creates rather than verifies a theory, and conceptualizes rather than generalizes (Strauss, 1987; Dougherty, 2002). Since ethnographies will not produce the data needed to address my research questions, I carried out ethnographic interviews (Fielding and Fielding, 1986; Fontana and Frey, 1998) with 59 people in nine service firms about how they develop new services. Ethnographic interviews do not assume that pre-formulated questions are to be answered in a depersonalized question-and-answer session. Rather, questions are considered, rephrased and analyzed with interviewees so that they can discuss how they experience their work world, and what kinds of things are meaningful to them. A manager in each firm directed me to people who were involved in new service development. The people had diverse functional expertise and worked from middle to senior levels of management. The interviews lasted from between one and one and one-half hours, and were done at the interviewee's work site. People were asked to describe what they knew about usage and design as they innovated, how they developed new services with specific examples and how they incorporated knowledge into their work. Managers were asked how they supported innovation, allocated resources and developed strategies. Interviewees were kept grounded by asking for details (names, numbers, dates).

These interview data do not reveal details of interactions, but they do reveal the kinds of interactions people were engaged in, the nature of their participation in work situations and activities, what they knew about designing and using new services, how they worked across boundaries to create and share knowledge, and how their organization of work affected their ability to generate and use practice-based knowledge. These data allow me to add to the many ethnographies some new insights regarding general patterns of organizing that shape everyday interactions.

Sampling

The purpose of sampling in grounded theory building is to find varying instances of the phenomenon being studied, so that the underlying patterns can be articulated by taking various contingencies into account. The domain of services is large, so I deliberately limited sampling to knowledge-intensive services with three attributes in common: established for 20 or more years, experiencing market and technological transformations and trying to innovate. Longer establishment meant that the organizations were likely to have shared practices, while being in the middle of industry transformation meant that people were more likely to be reflecting on changes. Studies show that practice can become unreflective in stable times, so struggling to change makes it more likely that people can articulate their old and new practices. I focused on firms that were trying to innovate because this is a study of innovation, and is not intended to fit knowledge capture in services that do not innovate. I added a case study of an IT consulting firm that had changed extensively for insights into more complete change than was in my data.

Within these boundaries, I sampled two types of knowledge-intensive services: professional services (civil engineering, IT consulting, training) and utility-like services (transportation, telephones, testing). Although these two types have different backgrounds, the firms in each type were grappling with similar competitive and marketplace transformations, and trying to change their services to embody the knowledge of designing and using more fully. All were building more ongoing relationships with customers and more flexible internal capabilities. This sample highlights and perhaps exaggerates the phenomenon of interest, which allows me to delve deeply into dynamics, but also limits the resulting theory to only these types of services.

An example of theoretical sampling illustrates that grounded theory is based on continual surfacing of hypotheses that are then explored with more data. I began with Humresco (all organizations are disguised), a professional services firm that tests and licenses professionals. People at Humresco described a very bureaucratic structure that severely inhibited innovation. I then gained access to two utility-like firms (telephones and transportation), that were much bigger than Humresco, but equally bureaucratic and with similar problems with innovation (based on initial analysis). I added professional services similar in size to Humresco, for contrast; Humresco is a professional service firm even though it is managed as a utility. The contrast revealed different organizing of designing and using, and particular constraints, which pushed the theory building further. For example, the utility-like organizations had changed less. One possible explanation is the capital-intensive operations at their core might require so much routine and specialty knowledge that practice-based knowledge is overshadowed. Or perhaps these firms had simply reified their operations. Ideally I would sample very innovative utilities to delve into these possibilities, but instead I articulated the theory that I could see in these data. The relative

Table 1   Organizations in data set

Organizations	Number of people interviewed
Professional service providers	
*Infocol: IT infrastructure, 20 years old	1 plus case analysis and documents
Infoco2: IT systems services, 20 years old	7
Civco1: engineering services, 50 years old	5
Civco2: engineering services, 30 years old	3
Trainco: training skilled workers, 10 years old	2
Investco: purchases, manages small firms for investment, 30 years old	3
Mass-production service providers	
Humresco: testing services for human resources to gov'ts, 55 years old	21
Phoeco: operating communications co in US, 90 years old	8
Transco: transportation, shipping, 100 years old	9

Note
• Some details used in the analysis come from a case study by Dankbaar (2003), plus interview by author with senior manager and a presentation by that manager regarding changes they had made to enhance innovation.

lack of transformation in the utilities remains unexplained. Instead, I sampled three more professional services in a limited way (just a few interviews each) to see if the theory being developed fitted those firms as well. The nine firms in the analysis are summarized in Table 1.

Data analysis leading to the grounded theory

Grounded theory building is inherently subjective since the researchers are interpreting people's experiences. Analytical techniques therefore involve the constant questioning of ideas across researchers and events in the data over time and between the empirical and theoretical planes (Bailyn, 1977), to continually check possibilities. I followed specific analytical steps described by Strauss (1987), as elaborated by Dougherty (2002): 'open coding' (to surface many possible categories), 'axial coding' (to hone categories and articulate properties) and 'selective coding' (to articulate a core category that integrates others into a theory).

To begin with open coding, I met with doctoral students for between two and three hours at a time, in two or more sessions a week over the course of a summer, to discuss particular passages in interviews. The goal was to surface as many ideas as we could about how practices are organized to generate knowledge for innovation, to keep the analysis from fixating on particular ideas too early and to closely analyze what was going on in the data. We worked through an entire interview in this manner (which took multiple sessions), then through additional interviews from that firm, and then through interviews from other firms. In addition, we began to contrast insights across interviews and firms. I

recorded what was said during each session, and wrote up notes afterwards about ideas and relationships (referred to as memos by Strauss, 1987). Preliminary categories included knowledge about customers (depth, kind, problems with), kinds of relationships with customers (e.g. remote compared with direct and hands-on, holistic compared with piecemeal), kinds of work boundaries and how they were crossed or not, and connections between designing and using. Many people said that innovation required different mindsets, and a more holistic view of the minutiae of everyday work. We noted curious depictions of R&D in professional services, and embodying this knowledge in artifacts.

Axial coding involved exploring categories across service types and examples of successful compared with problematic innovations. In professional services designers worked closely with users, but almost entirely in a particular customer site, and senior managers were worried by 'parochial' work and their inability to replicate new services. In utilities, few designers interacted with users, since customers were owned by one function, and designing work was separated into functions. In both service types, however, the core pattern was that designing and using were chopped up and localized, and the chopping up was associated with limited knowledge for innovation. In successful innovations, we found efforts to step back in professional services to look at the whole activity, with restatements of strategy, formal groups doing new services, formal development of R&D activities and the construction of prototypes. We found similar efforts to rethink the strategy in utilities, integrating across separate functions (as opposed to separate local offices) and breaking down huge operations (as opposed to building up coherent prototypes).

Our final insight was to identify three specific activities that were crucial to the ongoing generation of practice-based designing and using knowledge. Once we understood these activities and coded selectively for them, we saw that the problematic organizing eliminated them and the alternative approaches enabled them. From here, I developed a theory that explains how to organize practices to capture practice-based knowledge for innovation.

Findings

The analysis produced three major insights that together formed the empirically grounded theory. The first to be presented was the last to be discovered: what constitutes practice in service organizations in the first place, or what is to be organized. The theory is that people generate practice-based knowledge for innovation if they collectively enact three kinds of activities in their everyday work: interweaving designing and using (or, routinely doing their particular designing activity in terms of its impact on using, not apart from it), participating in the whole flow of designing and using (or, routinely doing their part in terms of its relationship to the whole, not apart from the whole) and reflecting in action (or routinely iterating from emergent knowing to articulating that

knowledge). These activities constitute a common ground of social action, so people can engage in situated learning and make sense of what they learn in similar ways across the organization. As well, a shared understanding of what the practice is in the first place is needed to keep these activities doable and meaningful. Part of the first insight is that practice in services is defined as a coherent flow of problem setting and problem solving. This definition provides a vivid, sensible framework that keeps the activities salient and doable.

The second insight is that conventional approaches to organizing are 'anti-practice' in two ways. First, they push the activities into the background, which eliminates the common ground for knowledge creating, sharing and replicating that the three activities provide. Second, conventional organizing de-legitimates practice by focusing attention on generic outcomes that do not frame everyday activities coherently and sensibly. People cannot articulate new ideas and combine them with old ones, so the organization cannot learn.

The third insight is that reorganizing requires new organizing principles to continually strategically articulate the problem that the practice addresses as it evolves over time, to embed the three activities of practice into everyone's work, and to transform R&D into a formal process for creating and reflecting on practice-based knowledge. In the following sections, I develop and illustrate each insight.

Practice-based knowledge via three activities, framed as problem setting and solving

Two examples illustrate practice in these services, and show that a good deal of designing and using knowledge for new services resides in practice. They also illustrate that people generate this knowledge by interweaving designing and using activities; engaging fully and actively in the complete flow of activities that constitute the practice; and juxtaposing articulated and unarticulated dimensions of practice, what Schon (1983) calls 'reflection-in-action'.

A successful innovation at Civco1, a civil engineering firm, illustrates these three relationships. Civco1 provides engineering services including waste treatment. One innovation was a floating membrane system (based on anaerobic microbes) that reduces waste and captures the bio-gas that is given off in that process (to reduce pollution and provide fuel for other tasks). An engineer described how the knowledge necessary for installing and innovating this system was embedded in the practice of installing it across multiple sites:

> The whole idea of the product is based on floating membrane systems. We put in a liner (in a large pit that may cover several acres) and build a floating cover . . . Once that is built you pump water in the tank and the cover floats. The purpose is to recover bio-gas . . . The system is an evolution. Every one of the jobs has been an improvement over the last . . . and we are always learning something from one to the next . . . Each installation has new people and new tools, and we have learned

that there is more than one way to skin a cat. There are numerous ways for doing the same thing, and we learn from all around the world. For example, in Australia they look at drawings and interpret them differently, or the expertise of local labor will vary. In Colombia for example there are no cranes and everything is done by hand. Once the covers are in service, innovations are borne out of necessity. Some systems can build up a fat or scum layer . . . The cover is insulated to keep the heat in, and when scum builds up it moves the insulation around. We learned to put in an intermediary layer of membrane to stop the movement.

He emphasized that the situated, hands-on learning allowed them to develop, deploy and continuously innovate the service. Digging a big hole and lining it with a membrane may seem mundane, but the process is very complicated. Many installations are in remote sites in undeveloped countries, so the membrane is shipped in pieces (no cranes to lift them out of containers) and stitched together on site. The pits may be dug with a labor pool of 'women with baskets on their heads', in the words of another Civco1 manager. Like the often cited practice of copy-machine repair (Brown and Duguid, 1991), floating membranes are complex systems of many interacting parts that work in a situated manner, depending on usage patterns, available tools or labor expertise, the environment of the setting and how people interpret drawings.

He emphasizes the interwoven nature of designing and using: design depends on how principles of sewage treatment are interwoven with the setting of a particular installation and its ongoing operation. Second, he suggests an active, engaged participation in the whole: floating membrane teams acquire the knowledge for designing and installing the system by actively participating in the whole practice. To learn in practice requires full engagement in the physical and social contexts of the entire flow of practice, as explained by Lave and Wenger (1991). People cannot know much about floating membrane systems simply by examining engineering principles, blueprints or routines. Third, he suggests ongoing juxtaposition of articulated and unarticulated knowledge (Obsfeld, 2003). As we have seen, Schon (1983) calls this relationship 'reflection-in-action', or having a conversation with the situation: surfacing premises and intuitive understandings, doing frame experiments by stepping into the problem and imposing a frame on the situation, and reflecting on the surprising consequences of efforts to shape the situation. Civco1 practitioners continually surfaced tacit knowledge and combined it with new and old insights as they learned about new issues that might be relevant to other sites by clarifying problems (e.g. how to work without cranes or figuring out why the insulation is displaced), experimenting with solutions (working with local experts or trying additional layers) and incorporating new elements in the complex set of interactions (e.g. new tools, new expertise).

An example from Transco, a shipping company, also illustrates the activities of practice through which people generate knowledge for innovation. When

asked how they designed a successful new service, the manager explains that they looked at improvisations that operations people had already tried:

> Physically it was very easy. We were already doing [the service] on a random basis because some customers wanted this kind of service, so we were doing it for free. We were already shipping xx thousand pieces [in this mode]. Coming from operations most of my career, I find it is not hard to envision what to do and where to go . . .

He used their everyday practice of shipping to learn about new service. The practice-based knowledge he drew on integrated customer issues with operations issues. As well, he did not set and solve the problem abstractly, based on algorithms of industrial engineering or financial modeling (although these aspects of technique did play some part). Instead, he was deeply engaged in Transco's actual practices by working with operations managers and drawing on his own experience in operations. They traced out the ad hoc improvisations that were made for particular customers and even experimented by color coding certain shipments and observing their movement through Transco's system. They reached deeply into the realities of their operating system to see the interconnections among activities, and to reflect in action on how new interactions could mesh with the system.

Both innovations are generic solutions that are adapted to particular problems. Researchers emphasize that knowledge services are about solving client problems (Maister, 1993; Morris and Empson, 1998). I suggest that services are more than solutions, and that practice in services can be defined as ongoing interactions of problem setting and problem solving, with the proviso of centering on problems that the clients actually face (and not internal problems of operational efficiency or building a client base). Conceptualizing practice in service innovations as an active, situated and coherent flow of problem setting and problem solving activities is a simple framework for the three activities, bounding them sensibly and providing people with an image of what needs to be done.

Problem solving refers to the application of technical and scientific knowledge. Schon (1983) argues that professional practice concerns not just problem solving, but problem setting, which involves figuring out the relevant 'things' of the situation, and defining 'the decisions to be made, the ends to be achieved, and the means which may be chosen' (Schon, 1983: 40). Benner (2003: 6) says that focusing on pre-specified outcomes in nursing is flawed because it is 'based on the premise that only technique is involved in health care, that one knows the outcomes to expect, and that all things can be "fixed"'. The innovation management literature emphasizes problem setting and solving as well. Allen (1977) suggests that new technologies are created as people iterate among defining the problem, establishing criteria to evaluate possible solutions and exploring possibilities. Clark and Fujimoto (1991) describe techniques in automobile innovation that are designed to reveal problems in design and manufacturing.

Appendix A contains examples of practice-based knowledge for innovation being embedded in and produced by the three activities of practice (interweaving designing and using, engaged participation in the whole and reflection-in-action on the practice) from all firms, and of how these activities are framed by definitions of the practice based on problem setting and solving for customers. As indicated in Appendix A, not all firms systematically fostered the three activities, and their enactment was often local and temporary. How, exactly, these activities can be enacted sensibly across the organization remains to be developed. A necessary first step is to understand the difficulties people had with organizing their practices, because all three activities, while hardly new or surprising on their own, seemed to be illegitimate in some firms.

Anti-practice organizing that inhibits practice-based knowledge for innovation

The second major insight emerged when we delved into the problems people had capturing practice-based knowledge for innovation. Organizing in some of the firms centered on the achievement of pre-specified outcomes rather than on the activities through which people actually accomplished tasks. This organizing dissipated practice-based knowledge, because it did not support or incorporate the three activities necessary to create this knowledge. The activities were separated into discrete units (either functions or local offices), so people enacted their own work without regard for how these connected with others' activities. The firm's strategic management was also part of the anti-practice organizing, because neither the strategy nor the senior managers provided meaning for what the firms actually did for whom and why. The outcome was that the practice itself, as defined above as a coherent flow of problem setting and problem solving, had no collective meaning.

Two examples illustrate this anti-practice form of strategic organizing. Humresco creates and administers tests to certify employees and license professionals. Customers were demanding new services and competitors were taking away business, so Humresco was trying to innovate. Their reorganizing was initiated by what they thought was a tactical shift in IT, from pencil and paper to computer-based testing, in order to better meet some customers' demands. 'When we moved to the computer we did not understand that the change was significant enough to change the program as a whole. We said this is just an enabling technology . . . and we underestimated the impact on [end consumers].'

However, computer-based testing also broke open established rules and routines, and 'opened up the question of who we are', according to one manager. The director of R&D said: 'When you change the technology, all the things that had been closed for years now become open.' The new technology no longer tied them to particular ways of measuring, which enabled Humresco to test many additional things. For example, instead of simply selecting people, they could profile employees' capabilities in order to facilitate company training. The new technology therefore forced them to rethink their discrete specialties and

connections among them. They were also forced to rethink whom their tests were for and what value they created in the first place: in other words to reflect on the problem their practice addressed and how to set that problem.

But people had no sense of how to enact the activities in which their practice-based knowledge resided, as this manager explained:

> This new program sat for 18 months, and nothing happened because it did not fit into traditional Humresco boxes . . . Each function has its own director . . . Early on I sat in a meeting and said we need to set up an oversight unit of all the heads. We had large discussions but no work got done . . . One issue that was highly controversial was [a specific issue in testing]. Test development has a long involved process to assure that [this problem does not occur] . . . but psychometrics thought that the process was absurd. This held us up for months. We had long heated arguments, and there was lots of pressure on me to make an arbitrary decision. I dug in and said I will not make the decision, I will wait . . .

People could not see how to set and solve the new problem of testing introduced by the new technology, and nothing helped them to create a common ground so that they could translate or transform separate knowledge. Rather than be engaged in the whole practice, each specialty focused inward on its own issues, and people demanded that the hierarchy impose meaning for their joint task, since they could not enact new meanings for themselves. This group finally resolved their difficulties with an innovative team structure, which provided a template for the three activities of practice. But teams are single events, so innovations were local interruptions in Humresco's anti-practice social fabric.

The three relationships of practice were not all that was missing at Humresco, however. As the comment quoted in Appendix A suggests, a manager said that Humresco 'does priorities without meaning', so how people's work actually fits together or creates value makes no sense. I infer from this and other examples in Appendix A that strategic framing for the practice is a necessary organizing principle.

Traditional organizing in professional services also cut up the activities of practice that conveyed practice-based knowledge, and also lacked a strategic frame. Infoco2 was trying to meet client demands for end-to-end activities by finding local success stories and trying to repeat them across the firm, as a senior manager who was in charge of that effort explained:

> My job is to help the regional offices . . . move the local types of success stories to something that is repeatable. Doing this is a giant step, and we are just starting to learn how . . . We have local execution, with no global plan . . . We leave the decision of which case to take up to the local manager. It is a bottoms-up strategy, and my job is to catch up and see how we can repeat things. The challenge is not that we are not paying enough attention to the customer, because we are. The challenge is how do we react and know what will work and not.

His comment that they executed locally rather than globally suggests that they set and solved problems in a very situated manner. They focused on individual client problems, and created unique practice-based knowledge that was 'held' by the temporary team of consultants who worked in the client site. Since the teams were continually disbanded as projects were completed, the knowledge dissipated. Their bottoms-up strategy provided no strategic frame to reflect in action across sites.

Appendix A provides more examples of organizing and strategizing that disrupted practice and dissipated practice-based knowledge. These problems could not be resolved by shifting around the current structure, or by adding new links or parts, however. The more successful reorganizations were based on very different principles of organizing.

Pro-practice principles of organizing for capturing practice-based knowledge

The third insight is that three new principles of organizing are necessary to keep the practices and the activities that constitute them collectively meaningful and doable. The first is a strategy that articulates the real problems of value creation for customers that are set and solved in specific situations. Defining each practice as a kind of problem that employees set and solve articulates what people should do and how they should make sense of their actions. They can thus approach specific projects more systematically because they think about the overall process that produces the problem, not just the unique aspects of particular situations. The strategic articulation of practice standardizes people's understanding of what we do, how and why, providing common, sensible frames for the practice (Fiol, 1994). It enables people to enact particular problem setting and solving activities in a common framework of meaning, and serves the same legitimating role as established occupations, disciplines or crafts. However, the practice or practices (service firms may have several practices) must be continuously articulated to keep them meaningful as they evolve, because as the previous section suggests, it is easy for action to become overly localized and situated.

The second principle is to formally include the three activities of practice in everyone's job. This organizing keeps everyone in the know because they can enact similar knowledge in their everyday work, which provides a common ground for knowledge creation and sharing across boundaries. The third new principle is to formally organize corporate R&D around the practice, not on basic science or technologies. Together, these organizing principles articulate the practices themselves and the relationships among the activities in the practices (Obsfeld, 2003). I illustrate each new principle below.

Strategic articulation of practice as a problem of value creation
One example of the strategic articulation of the firm's practices as problems of value creation for customers to be set and solved comes from Infoco1, an IT infrastructure management consultancy. Over 20 years, Infoco1 had grown to

more than 2000 employees, and by the late 1990s had a portfolio of over 50 core competencies. Like many professional firms, they had formed competence groups to develop knowledge, but these groups had no specific tasks, met irregularly because people concentrated on billing hours and focused on topics of interest to the consultants, not on practice. In fact, the competence groups addressed expertise, not practice. And the core competencies were techniques or solutions detached from actual client problems.

Infoco1 managers became concerned that they did not approach innovation strategically, left much of their knowledge unused and were reinventing rather than leveraging project knowledge (Dankbaar, 2003). Infoco1 engaged in a lengthy process of redefining what it does, resulting in a synthesis of 50 competencies into four knowledge areas, what I call practices: business and IT alignment, human capital development, IT process and project management, and technical infrastructure management. These four practices reflect problems that customers have, not a menu of solutions that Infoco1 offered. The strategic articulation is a stepping back from the minutiae of daily activities themselves to emphasize a coherent flow among activities. Articulating their practices as four kinds of problems also meant that Infoco1 would not compete for any and every IT project any more, but rather focus their attention (and marketing) in these strategic domains (Lowendahl, 2000).

Transco, a mass production service provider, also was shifting away from specific projects to focus strategic attention on more coherent flows of problem setting and problem solving. This vice-president explained that they were looking into integrating their processes to fit more smoothly with customers' information needs:

> In the marketplace now, we have (he listed 6 different products). There are lots of products out there and we continue to enhance our offerings. But now we have to make it easy for customers to use the products, and to overlay the inventory information they can use to work with their customers . . . These are the next level products. A lot of the changes will be process and structural changes, not new products. Any way that a carrier can help manage inventory, cut costs, provide options . . .

What he defined as the next level is a more complete, integrated flow of practice, also a kind of stepping back from the minutiae of products. Transco's director of strategic planning also talked about Transco's shift in identity, from a shipper to a supply chain manager for customers.

The strategic articulation of the firm's practices as actual problems of value creation for customers makes it an essential element of organizing. The strategy provides a common image of the whole flow of problem setting and problem solving, and reflects the activities that convey practice-based knowledge.

Incorporating the three activities of practice into everyone's work
The practice also had to be embedded in everyday work by incorporating the activities of practice into people's jobs. This is how the organizations replicated

activities across the organization, so that people could create similar practice-based knowledge. Everyone does not carry out every relationship in the same way, but rather carries out their own activities with their contributions to the whole flow of practice in mind. These three activities comprise a common ground upon which people can more readily create, share and replicate knowledge.

Infoco1 is the most complete example of the formal reorganization of work. They developed two kinds of work units based on the four practices. Business units were dedicated either to a small group of large customers or to a location, reflecting the traditional structure of professional services around customers, which helped them manage customer relationships carefully. Individual consultants were members of a business unit when they worked on a project with those clients. Infoco1 also formed specialty groups that were like communities of practice around the four practices. Each consultant was also a member of a community of practice. These communities were responsible for delivering the particular practice in conjunction with the business units, and for developing competencies and product innovations, so they had formal responsibilities for managing reflection in action. The communities had budgets to pay consultants to work on competence development and innovations.

The consultants still worked on projects with local teams, and still applied their expertise to the projects. But they did so from within a framework of a clearly defined practice, and shared their experience with an organization-wide community of consultants who were also engaged in a similar kind of problem setting and solving. Strategic managers worked to keep these practices sensible and legitimate, so that everyone was expected to participate in the community.

Humresco shows the more modest reorganizing typical of the mass production services. Task forces were formed to develop common bundles of activities for test creation that most programs could draw upon. Senior managers were pushing to do things better, but they had not yet articulated the practice strategically. However, people in the middle of the organization articulated activities and the connections among them in a way that was meaningful and sensible to people across units. One member of the test creation task force described their work:

> Now we have a test creation task force. This [test creation] is the heart of the business that makes Humresco separate from 100 others in testing, it includes all the special things that we do . . . Phase I was a few months of creating a highly developed vision . . . We had the benefit of resources and no limits. In Phase I we were told do what you have to do . . . The goal is 60% reduction in cost, plus the capability of creating a new test in as little as 6 months. If the new test does take time, it will be based on what the client wants, for example 3000 interviews to design a job analysis. We want the capability to do things in a period that is dramatically less.

This task force pulled the practice of test creation out of separate boxes in which it had been hidden, highlighting its integral nature. People could now see the coherent flow of designing and using, and could participate in the whole

practice, as the person described: 'I get lots of notes from people who say: "I heard your presentation [about the test creation process], and thought it was great", and then they say, "Hey, did you think of this or that?" There is a tremendous people resource here . . . Now that we understand the problem, we are setting a target that is uncomfortable. People are excited, they have the opportunity to think big . . .'

A community of practice did not have to be imposed, since one formed naturally around the practice once some common meaning for the practice was articulated. People could now share practice-based knowledge because their similar engagement in similar activities gave them a common experience of work. And, rather than resist change, people were excited because they could now 'think big' or see their contributions to work of real value.

Formal organization of R&D to focus on practice and to represent practice concretely
The third new principle of organizing was to formalize R&D as the study of practice. R&D was new to the professional services in this study, since most developed new knowledge on an ad hoc basis within certain projects (billed to clients or to governments). But four of the six professional services had set up and financed an R&D unit to develop knowledge about new practices. For example, Infoco1 already had an R&D unit, but changed its mandate to strategic trend watching and to assuring knowledge distribution among knowledge areas. The R&D unit worked with the business units and the communities of practice to develop competencies, to accumulate and diffuse ideas for innovation with existing practices, and to lay the groundwork for new practices. Infoco2 also invested in a new R&D department focused on the practice rather than on expertise, and were in the process of figuring out how to interweave R&D into the still autonomous regional offices.

An equally interesting finding was that, as part of their formal R&D, nearly all of the professional services were investing significant time and money in a concrete representation of the entire flow of their practice: prototypes, simulations or intermediate technologies. Appendix B describes these prototypes as well: a miniature sewage treatment plant at Civco1, a prototype co-generation electrical plant (costing '$6 million') at Civco2, and elaborate simulations or models of the whole flow of problem setting and solving at Infoco1, Infoco2, Trainco and Investco. The literature emphasizes that tools and artifacts act as repositories of knowledge (see Argote and Ophir, 2002 for a summary). However, the theory of organizing practices developed here suggests that these concrete representations also facilitate the social dynamics of knowledge creation and sharing. Building prototypes and simulations allowed people to literally reflect in action on the new practice and to create practice-based knowledge that they could not acquire any other way. They could also interact with customers in practice around their particular problems, because the prototypes and simulations enabled customers to experience the innovative practice and get a real sense for what the service will do for them.

Appendix B provides examples for all three organizing principles from all firms in the study. As it suggests, all were trying to implement all three principles, albeit to varying degrees. The examples also indicate that the firms were trying a variety of mechanisms. Further research is necessary to identify specific structural mechanisms (e.g. types of departmentalization, and techniques for coordination and control) that may facilitate the implementation of the principles in various strategic situations. This analysis focuses on elucidating the organizing principles themselves. However, the appendix also reveals that the utility-like services had transformed to a much lesser extent, which raises important questions about the limits of this theory. I consider the implications and limits of the theory in the final section.

Discussion

This study has examined a significant but overlooked type of organizational knowledge, that which resides in the ongoing actions and interactions of practice, illustrated its strategic role in service innovation, and had developed new theory for how this knowledge can be managed more systematically. The theory addresses only innovation in knowledge-intensive services, so any application beyond this domain requires further study. The theory also focuses only on practice-based knowledge, even though the illustrations show that practice-based knowledge interacts with other kinds. My intent is to suggest that practice-based knowledge is a vital aspect of organizational knowledge: it does not reside in routines, expertise or skill, and it cannot be conceptualized as tacit knowledge alone. Rather, practice-based knowledge must be managed on its own terms of situated action (ogilvie and Fabian, 2003). However, the organizing principles for so doing that have been proposed here must be examined empirically, and their limits must be defined.

The theory is that three organizing principles together provide a relational infrastructure through which people generate practice-based knowledge organization-wide, capturing both the horizontal flow of designing and using and the vertical flow of strategic focus and situated application. First, strategic articulation of the firm's practices as actual problems of value creation for customers, to be set and solved in specific situations, provides a vivid, understandable and shareable frame for the practices of the firm, the frame that is missing when legitimate occupational frames do not operate. Second, redesigning work to include the three activities of practice (interweaving problem setting and problem solving, participating fully in that process and reflecting in action on the practice) keeps everyone in the know because they enact similar knowledge as they go about their work. New insights from any situation can make sense to others. Third, organizing corporate R&D to focus on the practice, not only on basic science or technologies, enables people to reflect in action on practices. These principles keep the ongoing integration of problem setting and problem

solving grounded in actual value creation, coherent through linking the various activities of practice, open to engaged participation and reflective. The activities of practice are collectively salient, legitimate and sensible, so the practice-based knowledge generated by them has the same attributes.

This study suggests that practice-based knowledge has strategic value for service organizations, because it captures the designing and using knowledge necessary for innovation. However, the anti-practice approaches to organizing were deeply institutionalized, and many managers in this study apparently did not recognize knowledge in practice, and created strategies and organizations that routinely destroyed this resource. The reader may recall that the Transco new services manager quoted in the first section began his explanation of how they designed the new service by saying: 'physically it was very easy'. Much of the rest of his story recounted their social nightmare of trying to convince senior managers that the new design was workable. The practice-based knowledge that informed the design apparently had no legitimacy for Transco senior management. With some exceptions (Pfeffer and Sutton, 2000; Orlikowski, 2002), practice-based knowledge has limited legitimacy in strategic organization theory too, at least based on the dearth of research.

Research that explores the implications of this theory can also flesh out the pro-practice strategic organization. First, the importance of practice-based knowledge per se to innovation and its differentiation from routines, experience or expertise, needs to be empirically confirmed. Practice-based knowledge may be overlooked in part because practice itself has not been defined in a way that fits managerial work. I have proposed that service practice be understood as a problem of value creation for customers, to be set and solved in specific situations. This definition is more specific than occupation, craft or discipline, and it emphasizes the content of knowledge embedded in practice, namely the synthesis of designing and using. This more instrumental definition may not fit cultural organizations (e.g. museums, theatres), clearly established professions (nursing, physicians) or governmental agencies (police, intelligence gathering). Research should explore the conditions under which practice defined as problem setting and solving usefully frames innovation in other service domains.

Second, practice may not fit services whose operations are technologically complex, like telephone companies or transportation systems. The practice view of work is almost the inverse of the presumably efficient bureaucratic view, that focuses on achievement of pre-specified outcomes, emphasizes people's limited rationality rather than their skills with navigating complex social situations and highlights individual accountability over collective action. Perhaps the inherently dynamic and indeterminate understanding of work that practice emphasizes provides limited strategic value when expertise and routine dominate. And perhaps it does fit. This question needs to be empirically examined.

A third area of research is to flesh out the three organizing principles. Strategy and organization are interdependent in this theory, since the ongoing enactment of practice produces the strategy content (e.g. identifying new oppor-

tunities, exploring options), and the strategy is a central element of organizing. This theory suggests that strategic managers must continuously articulate, frame and support the ongoing creation of practice-based knowledge for innovation, which provides a specific description of the practice of strategic work (Whittington, 2003). As well, transforming R&D to focus on practice rather than only on discrete areas of knowledge is certainly new and may be a radical idea. I presume that some services (like the telephone company) require both types of R&D, so how these two types might fit together needs to be explored.

Finally, practice is not simply about tacit knowledge, expertise or experience, but rather it is about the artful, skilled combination of these along with knowledge in routines, procedures and equipment in the situation. Research on interactions among knowledge types is necessary. For example, experience affects people's ability to comprehend insights generated in practice. Nursing scholars suggest that different stages of clinical experience give nurses the ability to know more, to explore more deeply and reflect in action on a broader scope of activities (Benner, 2003). It would be useful to explore the kinds of experience that may enable or disable practice-based knowledge in the business world of services. Routines are used in practice to create and share knowledge in various ways (Carlile, 2002; Bechky, 2003). This study suggests that if routines help people to enact the three activities of practice, they can support the effective use of practice-based knowledge. Routines that emphasize outcomes or that fit single disciplines suppress practice-based knowledge. Exploring such ideas about interactions among facets of organizational knowledge would add important content to the field of knowledge management.

In conclusion, this study integrates work as practice with knowledge for innovation and strategic services management. Unfortunately, there are no simple fixes. The organizing that helps to capture knowledge for innovation in services is ongoing, because so is the creation, application and recreation of the knowledge embedded in practice. However, knowledge-intensive services facing demands for integrated services may have no choice but to bring their practices out of the background, articulate them strategically and make significant investments in their continuing enhancement. The theoretical framework developed here suggests how managers and researchers can explore these important questions in strategic management.

Acknowledgements

Appendix A Practice-based knowledge for innovation and defining practice compared wth anti-practice organizing that disrupts practice

Company	Knowledge generated via three activities framed by problem setting and solving **Activities** Integrates designing–using, part–whole, tacit–articulated **Practice** Frames activities as problem of value creation	Anti-practice organizing inhibiting practice-based knowledge creation, capture Ignores necessary activities De-legitimates practice
Infoco1	**Activities** emphasizes 'intimate connections with customers reinforces active engagement by coaching employees to assemble competences in unique combinations facilitates reflection-in-action by formally assigning people to oversee some innovations from internal process developments (e.g. change management, employee development) **Practice** 'specialty groups' focus on solving customer problems in IT infrastructure mgt	**Activities** work cut up into markets not competencies which separate designing from using and parts from whole focus on techniques or solutions detached from problem setting and solving new services based on adding more competencies, up to 50 **Practice** defined in outcome terms as 'market segments' such as finance, education no sense of flows of activities
Infoco2	**Activities** history of close working relationships with customers: one innovation *'started with a good relationship with a client, and the client was willing to work on it with us. We were partners.'* full engagement with client rather than practice, except in int'l division that is oriented to process improvements reflection in action apparent in int'l division based on continuous improvement with clients over time **Practice** int'l division mgr said they focus on 'business solutions' for customers, not applying expertise, which he said is focus in main business	**Activities** local office control of all services, so knowledge localized, partial and unreflective, and did not replicate; senior manager on exemplar innovation: *'There was no clear plan. As the project unfolded, at each point we were faced with a new set of possibilities, and that opened up more possibilities.'* **Practice** Main business leaders did not want to specify practice for fear of losing 'broad appeal' in Canadian market no shared framework across local offices for practice, only for profits and values

Civco1	**Activities** building new services such as tools for sustainable development of watersheds with ongoing interactions with client groups full engagement in specific new services but not practice actively trying to articulate principles from situated actions **Practice** starting to develop more coherent definitions across offerings: *'It is a nice front-end service to what (civil engineers) have traditionally offered … We offer a comprehensive package and with this we follow through with the design and build'*	**Activities** organized in local offices, thus localizing knowledge for innovation Regarding environmental services: *'We recognized that we were not doing a good job … Everyone was doing it in their own way and there was no synergy. We lost the synergy of a bigger company. We would use just a parochial approach … due to our cost center approach …'* **Practice** beginning to legitimate collective: *'I did a lot of lecturing on what was important to Civcol business plan, and that a global approach is better than parochial ones …'*
Civco2	Innovation by evolving from one practice to another over time, following opportunities developed by government: *'We had to find a niche, and we found ours in the field of agriculture. There was a huge demand for drainage of the clay subsoil … Because of that success, Civco2 became larger and we looked for other niches … In 1980, (provincial utility) was thinking of rehabilitating most of its substations and power plants …'* **Activities** all three evident in each business **Practice** clear, focused frames for what they do	No organizing problems discussed by interviewees regarding generation and use of practice-based knowledge for innovation: interviews were done to check emerging ideas about practice and organizing
Trainco	**Activities** focus on customer needs emphasize end-to-end training create, develop, deploy new modules via hands-on interactions with offices around world **Practice** emphasizes whole flow of problem setting and solving around training for clients: *'For this process we bring development from a content approach to a competency approach.'*	**Activities** localized in unit: part of private community college, and have difficulties drawing on resources from other units, or dealing with administrators who want precise budgets. **Practice** interviews to check theory, and found coherent practice but only within unit, not for college as a whole

Appendix A Continued

Investco	**Activities**	No organizing problems discussed

Investco

Activities

holistic approach of designing and using, working actively with small firms company invests in to grow them, and team continuously re-visits plans.
President: '*We look mostly at the management … do they have good knowledge of their firm, how well do they know their market and customer needs, not dreams. We talk about real things … People we fail with … did not know their markets or customers.*'

Practice

clear focus on while problem of growing small companies '*We look at operations, everything from the receptionists to the shippers. A good operation is neat, intense, from the receptionist on you can feel it. They have a real sense for the business, for how to greet people …*'

No organizing problems discussed by interviewees regarding generation and use of practice-based knowledge for innovation. These interviews were done to check emerging ideas from other firms; successful organizing seems based on a clear frame for the value they create and how they do so.

Humresco

Activities

innovations based on hands-on, multi-functional problem setting and solving; failures designed in abstract, on what people thought was good for clients. Director, task force on internal changes: '*Our job was to figure out how to (implement new computer technology). Our method was to infiltrate the organization, not just single functions … We'd get people from different organizations together … and say here is a problem that runs across the programs and functions … You figure it out. That was very successful …*'

Practice

focused on whole but local problems

Activities

severely partitioned: (Dir. of Innov): '*This is a very traditional organization and each department has responsibility for certain areas. If you need them to do something you have to do the specs for them and hand the job over to them.*'

Practice

strategy focused on outcomes, does not make activities of practice meaningful, doable: '*For years we have been an organization with 28 corporate priorities per year. A few years ago I personally was working on 5 or 6 corporate priorities. There are no resources for all this work … The organization does priorities without meaning.*'

Phoneco

Activities

integrating designing and using at project level; beginning to reflect on how to innovate better: *'We have evolved as a company … Network people step up to work harder on the business. Everyone is highly sensitized to this, that revenues do not grow naturally, they grow because of what we do … If you took a picture of us five years ago and now, you would see a big improvement.'*

Practice

problem setting and solving at project level: *'We no longer have a build it and they will come attitude. We are more customer and business problem oriented.'*

Activities

units set and solve problems separately. VP of strategy: *'One area where we have significant frustration is with alignment of objectives. Lines of business are given revenue commitments so they focus on R … and are not incurring the costs of production or profitability … The network is a huge shared resource but they are measured on expense reduction and capital concentration … The organization structure gets in the way … The end result is that a project manager tells what they have done to be successful but it is not a repeatable thing …'*

Practice

overall, is to generate 'R' and reduce 'E': does not make activities of practice collectively meaningful or doable.

Transco

Activities

focus more on designing and using combinations, and measuring connections with customers. VP of mkting: *'Our history is operations and engineering. That is how we got to where we are now … We are changing, with more emphasis on quality and how we manage, and more elements of the performance evaluation are on the outside, not 99% internal.'*

Practice

business innovations include whole flow of problem setting and solving, but are set up as separate units, apart from main operations

Activities

functional organization, so CEO is involved in every new 'product decision'. Separate functions such as sales and IT work to their own objectives, which hinders innovation

Practice

focus still on internal operations strategy is to keep systems efficient, which does not make activities of practice meaningful or doable

Appendix B   Pro-practice principles of organizing for capturing practice-based knowledge

Company	Strategic articulation of practices as problems of value creation to be set and solved	Incorporating the three activities of practice into everyone's work	Formal organization of R&D to focus on practice and to represent practice concretely
Infoco1	Redefined work from 50 core competencies to four 'knowledge areas' that are practices of problem setting and solving for customers: business and IT alignment, human capital development, IT process and project management, and technical infrastructure management. Senior mgt articulates practices continuously	All consultants formally assigned to a community of practice that combines designing and using and fosters full engagement in practice. Reflection-in-action fostered by emphasis on continuous improvement and by new development funded by knowledge area	R&D department, separate from practices, supports development of standards, trend watching, and knowledge management; also maintains an elaborate IT-based knowledge infrastructure for posting sharing of ideas, matching employee preferences and customer demands; R&D oversees, updates standard templates of practice
Infoco2	Lack of articulation in main business, but clear in int'l unit. Managers say they need a better way to combine local responsiveness with full solutions to real client problems	Has variety of structures and processes to enable activities of practice across organizations, e.g.: central budget to move people across regional office bounds formal cross pollination groups formal quality mgt with techniques, templates teams that oversee projects have shifted focus from results only to process	Has new, separate R&D unit focusing on combining activities and looking into future: *'We learn about new technology combinations in [R&D]. In service consultation you are conservative and there is not much risk … But in software development you think about what is new in technology three years from now, and you have to make sure that your product will be up to date and still ahead …'* Has simulation of entire practice in scheduling.
Civco1	Rethinking practices strategically as complete problems: *'Two years ago we really began a more integrated team approach, focusing on whole client needs and recognizing what we need to respond to. Do we give them what they want or what our resources deliver? We are shifting to the former. Innovation is in part how we package the service. We move from a single discipline to a package … In a number of cases we will not sell.'*	Project management and matrix structures across disciplines and groups to combine functions with projects. *'The project manager is responsible for delivery to the client … and he selects the ultimate team. Five years ago there were problems all the way through this process, but we now do a good job of working it out.'* Uses ISO techniques with quality oversight Units do not have extensive sharing and overlap	Has invested in several corporate R&D projects that integrate various activities. Company is in a consortium to develop and integrate IT enhancements for environmental management and which simulates coastlines to explore placement of sewage plants. Has built a mini-sewage treatment plant used to experiment, with possible clients, on options for remediation of various kinds of sewage and contaminants in water

Civco2	Senior managers create new practices by following govt funding: from irrigation, municipal electrical work, to building co-generation plants. *'Our creativity comes from feeling the trend before they are trends – where are the governments going in the next 2, 3, 4 years in the development sense, not the political sense'.*	The new practices are formally organized to include all activities, built around a senior manager who develops clients. Individual consultants join the new unit (as older markets become saturated and/or new opportunities to develop interests arise)	Has invested in building a mini-co-generation plant in order to experience at first hand all the activities involved and learn about them in practice
Trainco	Training service involves whole flow of problem setting and solving. Director: *'It is my philosophy to be very close to customers in the services we offer. The first step is a needs analysts, not only to answer a request. We analyze how will the service be good for the client and where will it be located'.*	operate with a community of practice outside organization: human resource/training freelancers	Uses a simulation. Showed me a flow chart: *'We start with a needs assessment, a strategic analysis of the organization. We start with their (client's) strategy and see how this demand for training contributes to it. If it doesn't, we are not sure we can help. We improved on the original method (in the book). It is very mechanistic versus ours is empowering'.*
Investco	Has a single focus on investing in relatively low-technology manufacturing firms with about $10 million in revenue that can be grown to near $100 million, and then sold. Investors stick to but build on this model and learn	All investors actively involved with partner firms they invest in, combining designing and using; all act as board members, emphasizing full participation; they continually talk about what they are learning and what experience may be becoming too entrenched, emphasizing reflection in action	Does not have an R&D unit per se, but does use a clear conceptual model based on being a CEO of a small manufacturing company with solid record of efficiency. Handles competitive intelligence and market trends for the businesses they partner with
Humresco	COD did not articulate practices, but emphasized specific core competencies in test development and test creation. Strategic frames for innovation are still missing	Is adding multi-functional project work across the organization that combines activities, engages people in a realistic practice rather than in specialities and enables people to reflect in action	Computer-based testing became an intermediate model of testing process overall, replacing the monolithic IS. R&D department, which already exists, is exploring other new media for testing and training, but these are still one-off projects

Appendix B Continued

Company	Strategic articulation of practices as problems of value creation to be set and solved	Incorporating the three activities of practice into everyone's work	Formal organization of R&D to focus on practice and to represent practice concretely
Phoneco	Services still defined generically by customer size or type: small and large business, residential Innovation task force has proposed a process organization for major innovations that cuts across units; being resisted by senior managers	Middle mgrs are integrating units for innovation: '*In the past 12 months, Barbara has developed a window into the network organization [by pulling together the many network disciplines into a product support team].*' Building regional operations centers to bundle up disparate switching centres by geography	Developing integrated lab to test innovations: '*A key recommendation is to create an integrated lab invironment, so when you are doing the testing, you use a real live network environment . . . Without duplicating the real live stuff we can't really see if it works.*'
Transco	New articulation of problems company actually solves for customers, still early. Strategy mgr: '*The real value is that the information we give to customers allows them to model their supply chain and dig deeply to see their operations 5 to 7 steps out.*' Trying to rethink processes: '*We need to simplify the product line, to help sales guys see the value proposition and position it to customers. Customers can't see 16 different brochures . . . we are moving toward solution selling.*'	Like with other utility-like services, new service teams are integrated since innovation cannot occur otherwise; however, many functions focus on operations. VP talked about decentralization: '*We are looking at pushing some authority to the field to create more customer solutions . . . there is a team in each region, (with reps from all depts.). They go out and sit down with customers and develop opportunities . . . This is two years old.*'	VP of strategy outlined new kinds of practice-based knowledge they are developing, but they seemed to be structuring these as tech centers, or expertise groups, not practice-based knowing groups

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