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Organizational Capacities for Sustained Product Innovation

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In today's business world, companies face an unprecedented challenge: the rapid-fire barrage of changes in markets, technologies, and competition. Companies with the opportunity to meet this new order of business are those able to sustain product innovation. Not only must companies generate a new stream of products over time, they must also continue to manage existing, or mature, businesses effectively. In this paper, author Deborah Dougherty presents exploratory research on how to structure an organization for sustained product innovation, so that the firm as a whole can be innovative and efficient simultaneously.

Breakthrough Thinking

Professor Dougherty develops new constructs defining the work of innovation within an organization, and discusses how the process itself must permeate the entire architecture of a company. Where current theory asserts that control and order must be sacrificed to achieve innovation, the author assumes that people can create a different system of organizing in which order and innovation can coexist. Why? Simply put, innovation is a value-creating process. As such, it is really no different than the rest of the work an organization does. Unfortunately, the present body of research emphasizes *what* organizations need to do far more often than *how* to do it, and assumes that implementing the necessary prescriptions, or best practices, is a trivial matter. It is not. Rebuilding an organization for sustained product innovation requires a substantial shift in functioning, new ways of learning, processing, and relating; in effect, building a viable alternate social system within the organization that both defines the work of the company and fulfills it.

How to Organize for Innovation

What should businesses do to become innovative? To answer that question, the author compares the organizational capacities of a variety of companies that range in their innovative abilities. By exploring these different approaches she articulates *how to organize* the work of sustained product innovation. These practices are both interactive and integrated across company lines: thus, market knowledge and technology knowledge are linked together to create successful products and businesses; various tasks are linked to coordinate workloads within a framework of creative problem solving; and employees are linked to the organization through rich personal work relationships and differentiated realms of responsibilities.

These linking activities are further embedded into specific, hands-on situations. Work is organized and carried out within four domains—product, knowledge,

business, and corporate—defined by the author as “locales of practice.” These locales are actually networks of collaborative communities, and anchor the new organizational capacity of the business.

Innovative organizations are not less structured, less controlled, or more chaotic than noninnovative ones; indeed, the reverse may be true. They do, however, operate in a qualitatively different way. The findings of this study indicate that the more innovative organizations possess fundamentally different cultural capacities, or shared understandings and skills, that people can utilize to frame their work and take appropriate actions. Developing these capacities will change the performance of a company, providing the synergy and coherence crucial to sustained product innovation, and, ultimately, contributing to the long term development and stability of business.

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Introduction

“Sustained product innovation” involves the simultaneous development of multiple product innovations and the efficient management of mature businesses. Single innovation projects have been researched extensively, and how to manage single projects effectively is well understood (Rothwell 1977; Cooper 1983; Kanter 1988; Souder 1987; Johne and Snelson 1988). Most organizations can produce a successful new product or service occasionally, but as firms must adapt on a more continuous basis to changes in markets, technologies, and competition, occasional new products may not be enough to remain viable. Indeed, firms in high technology industries are not the only ones to benefit from sustained product innovation. Organizations in mature industries, and non-high-tech small and medium-sized enterprises, that are capable of sustained innovation generate more growth, more profits, more jobs, and more employee productivity than their less innovative competitors (Capon, Farley, Lehmann, and Hulbert 1992; Baldwin and Da Pont 1993; Lund and Gjerding 1996).

Developing the ability for sustained product innovation is, therefore, important for a variety of organizations, in a variety of industries. Unfortunately, many organizations have serious difficulties with sustained innovation (Mahajan and Wind 1992; Tushman and O’Reilly 1996; Dougherty and Hardy 1996), despite the vast literature that describes the “best practices,” tools, and techniques used by innovative organizations (Wheelwright and Clark 1992; Griffin and Hauser 1993). The purpose of this paper is to build grounded theory on the organizational capacities that support sustained product innovation. The existing literature on managing product innovation is insightful, but it does not describe the underlying capacities that enable people in organizations to collectively carry out all the best practices and processes of sustained product innovation. To build new theory, I explore how and why organizations vary in their approaches to organizing the activities of innovation.

Contrasting how the activities of sustained product innovation are organized in a noninnovative versus an innovative organization provides preliminary insights into why organizations do not carry out all the widely disseminated best practices. The first quote comes from an assistant plant manager at Machco, a 120-year-old equipment manufacturer. Several years before, people in Machco’s production machinery unit had successfully redesigned a product, moving to first place in the market by following best practices for innovation project management. Tom Peters did a TV show on the case, and the *New York Times* wrote it up. Managers of the business unit concluded that, indeed, they had become innovative and started four new products the next year—all to be launched within a year. Three years later, all these products were still in development and way over budget. The assistant plant manager’s view:

I don’t see a universal strategy for new products. Everything is on a micro basis. Is anyone managing the new products overall as a sucker of resources from the plant and the division? No. They micro-manage each project with no foresight on what it will do to the oth-

ers. Plus we are implementing an MRPII program, becoming ISO-9000 certified, and we've got 400,000 square feet of shop floor in the back here producing mature products, and that doesn't happen by itself. . . . There is a need to stand back and look at what we have on our plate and determine what we really want to get done, . . . rather than try to do a hundred things on an inferior level. Things get too segmented on a day to day basis. You have too many hats to wear. Every five minutes you put a new hat on and take the old one off. The only time we can work on something for more than five minutes is when management is coming to town to look at our costs, and we need to come up with another program to reduce people.

He literally cannot see *how to organize* for innovation and routine together and cannot imagine how to reconfigure the resources to support both. He gets no direction from senior managers, so the tensions between innovation and routine run rampant. The only way he and his coworkers can make sense of these tensions is to separate their work into smaller and smaller bits. His comments also suggest that there is a fundamental division between senior and operating level managers: incommensurate goals, alternate orientations, and limited trust. The two sides do not conflict; they do not connect at all.

Contrast these comments with those of a new venture manager at Texco, an innovative but equally mature organization in the textile industry. This manager has no trouble imagining how he might shift resources in and out of business opportunities:

This group handles all of the. . . fabric I showed you, but that industry is cutting back so we may shift them to other groups. . . . This business is one of our new innovations [selling a special kind of textile fastener to both industry and consumer products firms], and it could double in two years, so we ask how can we service it? (How do you know what new product to develop?) We are not automotive and not apparel, so we do whatever we want as long as we don't interfere with other businesses at Texco. . . . When the growth of a business gets too big, there is a magic dollar figure, so when the business unit gets too big they spin it off. The specialty wovens over there [pointing to another group on the floor] used to be part of us but they are separate now.

Rather than feeling confused and overwhelmed, he understands the relationships among different activities and how these relate to the larger organization, and sees no inherent conflict between innovation and routine. He also feels able to "do whatever we want," but has organizational processes to help him. Unlike Machco, Texco does not impose meaningless abstractions (e.g., "reduce costs") but it is hardly *ad hoc* or disorganized.

What accounts for these differences? Both organizations use best practices, albeit Machco does not use all of them or correctly. Both organizations employ committed, experienced, intelligent people, although Machco people do not think they have the freedom to change. The examples suggest a more straightforward explanation: In the first organization, the work of innovation is not organized, it is not

incorporated into the ongoing flow of activities that are defined and measured; in the second organization it is. My purpose is to explore these different approaches to organizing, and to articulate *how to organize* the work of sustained product innovation, so that noninnovative organizations like Machco understand the ways in which they need to change.

The existing literature on managing innovation has established three important insights that focus this study. First, research suggests that simplistic, abstract conceptions of organizational structure—such as formal versus informal, centralized versus decentralized, or specialized versus unspecialized—have weak or no associations, or unexpected associations, with sustained product innovation (Downs and Mohr 1976; Nord and Tucker 1987). This is not to say that “structure” does not matter, but rather that we must conceptualize “organization” and “structure” differently. Second, innovation research has identified *what* people in organizations need to do to innovate successfully (Wheelwright and Clark 1992; Cooper 1994; Griffin and Hauser 1993). By drawing on the actual work of new product development, best practices overcome what Barley (1996) argues is a major weakness of organization theory: the lack of attention to work itself, to what people actually do. However, the best practices do not explain *how* organizations, as social systems, can facilitate all this work of innovation.

Third, research suggests that the innovative organization has a fundamentally different approach to organizing (Jelinek and Schoonhoven 1990; Leonard-Barton 1995; Dougherty and Corse 1996). Becoming capable of sustained product innovation requires that people rethink what it means to “be organized.” Ideas about flexible organizing, learning, network structures, competencies, and dynamic capabilities suggest alternate conceptualizations of organization (Weick 1977; Hedberg 1981; Galbraith 1995; Powell 1990; Teece, Pisano, and Shuen 1997). While these ideas vary, they all emphasize underlying premises and shared schemas about work and managing (Bartunek 1984; Schein 1990). The question here is: What are the underlying premises or “deep structures” of meaning that seem to enable people at Texco to collectively carry out best practices for innovation?

To identify these underlying premises, I focus on “organizational capacities” (Dougherty and Corse 1995; Dougherty 1996). Organizational capacities are “cultivated capacities” (Swidler 1986) and comprise a “tool kit” of cultural material, such as symbols, stories, habits, categories, informal know-how, and skills, that people draw on to develop a line of conduct in a certain realm of action. Such capacities provide people with a way to represent their world and construct appropriate actions within it. Capacities constitute the underlying structures of meaning or shared cognitive maps that guide people’s “sensemaking,” orient their attention, and determine the kinds of issues that are dealt with. They are sets of “preexisting institutional arrangements, cognitive frames, and imageries that actors bring and routinely enact in a situation of action” (Whitaker 1996, p. 400).

According to Swidler:

One can hardly pursue success in a world where the accepted skills, style, and informal know-how are unfamiliar. . . . To adopt a line of

conduct, one needs an image of the kind of world in which one is trying to act, a sense that one can read reasonably accurately (through one's feelings and through the responses of others) how one is doing, and a capacity to choose among alternative lines of action. (1986, p. 275)

Swidler was describing the difficulties that people who live in inner-city ghettos have in adopting a middle class lifestyle, but the same idea applies, I think, to people in noninnovative organizations, like the person from Machco quoted above. The research challenge is to identify the organizational capacities that either enable or thwart sustained product innovation, and to suggest how the noninnovative capacities might be renegotiated into innovative ones.

The results suggest that more innovative organizations operate with fundamentally different capacities for knowing and learning, organizing work, and linking people. Key differences concern how these issues are differentiated and integrated. Innovative organizations differentiate market, technology, and operations knowledge to focus each domain on developing its unique, and substantive, contribution to value for customers, and integrate them using common referents for action anchored in customer value. They emphasize the integrity of the process of innovation by defining work in terms of the whole process of value creation. Work is differentiated into complementary sets of problems within the whole process and integrated by loose networks of communities of practice. Innovative organizations also differentiate responsibility into distinct but complementary realms of responsibility, and each community of practice takes charge of a certain realm of work. People are integrated with each other and the organization using rich personal relationships. In contrast, the noninnovative organization does not differentiate knowledge; instead, it subsumes all domains under ongoing operations and connects them by standards of practice that are abstracted away from customers. Work is differentiated into separate steps, both laterally and hierarchically, which disrupts the integrity of the value creation process. People share hierarchically declining amounts of generic responsibility for operations, and so relate with each other based on formal, impersonal rules.

To appreciate these different structures of meaning, it is necessary to first create a template of what organizations *ought* to do to be innovative. The best practices literature identifies the sets of activities that need to be carried out for effective sustained product innovation. By examining the organizational capacities that underlie these activities, we can begin to answer the questions, What enables organizations to be innovative? What prevents innovation?

A Template of Best Practices for Organizing for Innovation

Table 1 summarizes the best practices for innovation, and the areas in which these practices occur. It highlights three different sets of activities, each defined in terms of linking: linking market-technology knowledge to conceptualize and create products, businesses, and competencies; linking tasks to tasks to implement the ideas; and linking people with the organization to maintain the ongoing work relations. These three sets of activities are integrated groupings of activities, not lists of discrete actions that might be considered out of context. One cannot simply add teams, particular reward systems, networking structures, training, or participatory managerial styles to an organization and expect its members to be innovative, since whole sets of activities need to be ordered. While finer distinctions are possible, these three sets capture many of the issues in “knowledge creating,” collaborating, and processing, and human resource/capital managing discussed by others (Van de Ven 1986; Kanter 1988; Brown and Eisenhardt 1995; Leonard-Barton 1995; Dougherty 1996).

Table 1. A Template of Best Practices: *What Needs to Be Organized for Sustained Product Innovation*

	Market-Technology Linking: creating products, businesses, competencies	Task-to-Task Linking: coordinating the work of innovation	People-to-Organization Linking: managing work relations for innovation
Locales of Innovation Practice	Creating, applying market, technology, and core operating knowledge	Defining, coordinating and controlling tasks for creative problem solving	Clarifying expectations, responsibilities
Product Locale	<ul style="list-style-type: none"> ➤ Define product concept ➤ Customer needs in priority ➤ Solve tech problems ➤ Know use context 	<ul style="list-style-type: none"> ➤ Form multifunctional teams ➤ Work in parallel ➤ Jointly solve shared problems ➤ Appreciate others' constraints 	<ul style="list-style-type: none"> ➤ Develop mutually adaptive relations ➤ Collective accountability for work
Domain Locale	<ul style="list-style-type: none"> ➤ Connect products to knowledge systems ➤ Develop deep domain expertise ➤ Integrate domains 	<ul style="list-style-type: none"> ➤ Network domain expertise across products, businesses ➤ Implement processes to support connections, resources shifts 	<ul style="list-style-type: none"> ➤ Encourage creativity, maintain diversity of skills ➤ Assure fair, constructive work climate ➤ Provide challenge plus control
Business Locale	<ul style="list-style-type: none"> ➤ Keep business in sync with market, technology trends ➤ Identify and disseminate key dimensions of value to customers ➤ Maintain deep understanding of core operations 	<ul style="list-style-type: none"> ➤ Link products into families ➤ Link shifting teams of practitioners to business ➤ Network across knowledge domains 	<ul style="list-style-type: none"> ➤ Manage work to eliminate extreme time pressures, nasty politics, risk avoidance ➤ Include practitioners in strategic conversations
Corporate Locale	<ul style="list-style-type: none"> ➤ Link organization to external world to form, affirm identity ➤ Convert identity into indicators of competencies ➤ Continually disseminate, rethink 	<ul style="list-style-type: none"> ➤ Develop, deploy long term investments in competencies ➤ Create decision-making systems that move resources and maintain connections among businesses, domains 	<ul style="list-style-type: none"> ➤ Enable people to take control of own work and take responsibility for whole value creation process ➤ Enable situated judgment via training, development

Next, as shown in the rows of Table 1, each set of linking activities occurs in different “locales” of organizing. The term “locale” refers to particular situations in which hands-on, face-to-face activities take place, and in which negotiated orders must be created by the participants. There are four locales in Table 1: creating specific products, developing competencies and expertise (labeled “domains” of knowledge), managing businesses to compete in specific markets, and developing corporate strategic action. Rather than imagine the organization as a complex machine with lines of communication, boxes of tasks, authority, information flow, reporting, control, task coordination, and so on, let us think instead of these as

comprehensible locales of organizing. The locales of practice highlight the importance of the actual contexts of innovation work. All locales are embedded in external and internal relationships, so customers, competitors, alliance partners, and marketplaces are, ideally, part of the flow of events and knowledge. The work of innovation is situated in these various contexts, and the contexts help to “set” the problems that people work on by cuing relevant knowledge and resources, defining issues, and pointing to solution paths (Schon 1983; Tyre and von Hippel 1997). I summarize each set of best practices across all four locales of practice below.

Market-Technology Linking: Creating Products, Businesses, and Competencies

New products are the physical manifestation of knowledge, so one essential set of activities concerns “market-technology linking” to create and apply all the necessary knowledge. The knowledge embodies various dimensions (e.g., tacit versus articulated, complex versus simple, independent versus systemic; Nonaka and Takeuchi 1995; Garud and Nayyar 1994; Winter 1987), and comprises various contents (e.g., customer needs, technology trends, engineering capabilities).

At the *product locale of practice*, market-technology linking involves creating knowledge about (1) the user needs and values in priority order for particular product designs, even though the market may be evolving and customers cannot articulate what they want, (2) the scientific and engineering know-how necessary to achieve particular design attributes, and (3) the fit between various operating subsystems to produce the requisite levels of product volume and quality (Moorman 1995; Rosenberg 1982; Bacon et al. 1994).

At the *knowledge domain locale of practice*, market-technology linking involves linking all new and old products with the market, technology, and operations domains. No organization can operate manufacturing, selling, distribution, logistics, or R&D separately for each product, so each must fit at least a bit with existing domain knowledge. At the same time, each domain must adapt to accommodate new kinds of products by developing more specialized knowledge, so each domain needs to link with the relevant knowledge outside the organization, in universities, professional associations, and industry groups (Tushman and Anderson 1986; Leonard-Barton 1995).

At the *business locale of practice*, market-technology linking involves keeping the business in sync with both its market and its technologies, as both evolve over time. Business practitioners must track market trends, usually by participating actively in those markets and accumulating the intelligence gained from ongoing experimentation (Sanderson and Uzumeri 1996), and convert this knowledge into product families and key dimensions of value to customers. They must also disseminate this knowledge to the domains and maintain detailed knowledge of the core operations of the organization, so they can choose among opportunities and respond quickly.

At the *corporate locale of practice*, market-technology linking involves connecting the organization with its external milieu to form or reaffirm its “identity,” people’s per-

ceptions of the features of their organization that are central, enduring, and distinctive (Albert and Whetten 1985; Fiol 1991). According to Ring and Van de Ven (1994), identity allows organization members to project themselves onto the environment and gain a self-referential appreciation of themselves, which permits them to act in relationship to the environment. Heller (1998) found that new products in two firms cued questions of “who we are” and “what we do” (i.e., identity). Once managers could understand what a product entailed, they considered whether that use of technology in that kind of market was really “right” for the organization.

Task-to-Task Linking: Coordinating the Work of Innovation

All the knowledge of innovation serves no purpose if it is not converted into goods and services. Product innovation involves several identifiable tasks that also must be linked, such as opportunity identification, concept development and verification, product design, manufacturing, marketing, distribution, and ongoing management. These tasks have two central properties: (1) They are all processes that usually cannot be separated; they often proceed in parallel, so that carrying out one task must take into account carrying out another (Souder 1987; Cooper 1994); and (2) they concern creative problem “setting” and problem solving, at all locales of organizing (Tyre and von Hippel 1997).

At the *product locale of practice*, task-to-task linking relies on multifunctional collaboration, but this takes more than simply appointing a team. Clark and Fujimoto (1991) show how Japanese auto producers worked the product and manufacturing design in parallel, which only happens if the two groups work very closely, with in-depth appreciation for one another’s problems and constraints, and extensive communication. People need to recognize and solve complex problems quickly and push issues along within their own areas by using extensive expertise. They must also jointly focus on problems that affect more than one unit and solve those problems by taking each other’s constraints into account. Yang and Dougherty (1993) call this approach to work “iterative organizing.”

At the *knowledge domain locale*, task-to-task linking involves networking all the domains of knowledge across the organization to support a variety of new product teams and businesses, and to keep the domains abreast of market and business needs. This networking requires extensive communication and a variety of special roles to gather, broker, and/or process expertise (Allen 1977; Ancona and Caldwell 1990).

At the *business locale of practice*, business units link tasks by linking products in families, and linking shifting teams of people with specific markets. These teams tap into the domain knowledge as appropriate, incorporate the new products into the business, and change the business to fit with new needs. Business practitioners also maintain a close connection with customers and the key values being delivered to customers (Jelinek and Schoonhoven 1990).

At the *corporate locale*, practitioners must develop and deploy decision systems that facilitate task-to-task linking, channel resources quickly to innovation, make long term investments in competencies, and assure that the organization can leverage investments in technologies that are too large for any one product or business.

People-to-Organization Linking: Managing the Work Relations

The final set of best practices concerns linking individuals and the work organization. This linking involves an explicit or implicit “contract” between workers and owners (now usually “management”) regarding the kind and amount of work to be done in return for pay and other benefits associated with a livelihood. This relationship is very complex: Even for the simplest of jobs, no one can specify in advance, exactly, the workload, the role of the person, and the rights and responsibilities of the employee and the employer. These can be worked out only in the continuing day-to-day relations. The work of innovation exacerbates these challenges, because it is that much more indeterminate. Burns and Stalker (1994/1961) found that innovative work was “experienced by the individual manager as an uneasy, embarrassed, or chronically anxious quest for knowledge about what he should be doing, or what is expected of him, and similar apprehensiveness about what others are doing” (1994 ed., p. 122). Without an organizational capacity to make sense of the work relationship, so that both sides are comfortable, people will fixate on specifying their rights and responsibilities.

At the *product locale of practice*, people are linked together in complex but temporary working relationships based on mutual adjustment, and on taking the responsibility for making the innovation happen, whatever their particular role. Dougherty and Corse (1996) argue that successful new product teams create the requisite commitment by locating accountability collectively, in the team; collective accountability makes people more comfortable taking on broader responsibilities because they feel they can share it with others. They also found that successful project teams created a sense of inclusion among its members (cf. Van Maanen and Schein 1979), because many had extensive experience with the company and were real insiders.

At the *knowledge domain locale of practice*, people cannot constantly develop underlying capacities unless the context of work encourages creativity “through the fair, constructive judgment of ideas, reward and recognition for creative work, mechanisms for developing new ideas . . .” (Amabile et al. 1996). Creativity requires that supervisors set goals appropriately and support the group, that the work group has diverse skills and access to appropriate resources, and that people have challenging work and a sense of control over it (see also Bailyn 1985).

At the *business and corporate locales*, practitioners must facilitate people-to-organization linking by (1) eliminating impediments to innovative work, such as internal “politics” unrelated to working out problems, destructive internal competition, risk avoidance, an emphasis on routine business, and extreme time pressure (Amabile et al. 1996), and (2) including others in “strategic conversations” (Westley 1990), so that people across the organization are involved in articulating directions and framing rules of action. Such inclusion both energizes and informs people. The authority system must encourage people to use situated judgment (Dougherty 1996). “Situated” refers to being engaged in the intricate details of an activity to appreciate the complex, tacit issues involved; “judgment” refers to the ability to size up unstructured situations and make decisions based on less than perfect data (Vickers 1965).

So, how can organizations develop and organize all this knowledge? How can they define all these tasks, assign them across the organization, and coordinate and control them? How can they assure that the people-to-organization relationships support broader jobs, greater commitment, and more responsibility without making people “chronically anxious”? I do not emphasize the challenges of managing routine plus innovation together, because I do not think they are inherently distinct. The practices described above emphasize the processes of value creation, and both new product development and routine business management are processes of value creation. Some might argue that product innovation introduces special complications, but in a era of emerging resources, competencies, and dynamic capabilities, product innovation may well be the basic and most general kind of value creation.

Methods

To address these questions, I interviewed 123 people who were working on new products, managing the functional and business units, or managing at the corporation locale, in 12 organizations. The organizations are relatively long-established firms in North America with mostly mature technologies, but include service and manufacturing. This is a theoretical sample: Organizations were included if they (1) were more mature, (2) added variation on ability for sustained product innovation, (3) were trying to improve product innovation abilities (to leave out organizations content not to innovate), and (4) were profitable (to leave out those under stress).

A common interview protocol was used in all organizations, with different questions for people working in different locales of practice. People working on innovation projects were asked to describe whether and how they incorporate customer needs and uses with technology in their effort, and what systems or processes help or hinder them. Knowledge domain or business managers were asked to describe how they make choices, allocate resources, evaluate projects, and assist project managers, as well as any changes made to promote innovation. Senior managers were asked to describe the strategies for innovation, how they develop resources and abilities, and programs to improve innovation. People come from all functions and specialties.

These data are limited in three ways. First, the organizations are in relatively more stable (historically) but noncommodity industries, where discontinuities have been less abrupt, changes less rapid, and markets less determined by global supply and demand than in other areas. Second, the data are cross-sectional, with no direct evidence of change. I use indirect data to infer some dynamics of change, but these inferences are extremely tenuous. Third, I try to hold the material characteristics of the firm's technology or industry "roughly constant" to focus on the organizing within the organizations, but these may indeed vary, thus affecting the findings. The more innovative organizations all have industrial markets, where customers are other organizations, usually a rather small group. All consumer products firms in the sample are less innovative, so perhaps the complexity of the marketplace affects the findings.

The innovativeness of the organizations was established independently, based on managers' assessments of their own organizations. Ideally, I would use an objectively measured industry comparison of new product success rates or proportion of revenues generated from new products, but such a measure was not available. I relied instead on managers' opinions, with some judgments on my part. For example, in several firms, senior managers characterized their organizations as innovative, but also noted that most of their new products were either exact copies of competitive innovations, or were "derivative" (simple changes in appearance, e.g., packaging). Everyone else said that the firm did not create new products readily and detailed the many problems they had moving new products through the system, so I categorized these as noninnovative. Several firms were quite skilled in incremental innovations (more than simple cosmetic changes), but only within the

particular product category, and several others seemed able to generate new products both in established and new markets and product categories. This apparent continuum was divided into three categories of ability for sustained product innovation: noninnovative, incrementally innovative, and comprehensively innovative. This categorization is to facilitate exposition only, since distinct phases of innovative ability cannot be inferred from these limited data. Table 2 summarizes the organizations and the number of people interviewed.

Table 2. Organizations, Number of People Interviewed, Innovation Category

Organizations	Number of People Interviewed	Category of Innovation Ability
Humresco (professional services in human resources, 55 years old)	21	noninnovative
Machco (industrial machinery, 120 years old)	30	noninnovative
Transco (transportation, shipping, 100 years old)	9	noninnovative
Shoeco (producer of shoes, 30 years old)	9	non- to moderately innovative
Prodco (consumer durables, 130 years old)	6	non- to moderately innovative
Phoneco (operating communications co in U.S., approx. 90 years old)	8	incrementally innovative
Engrco (engineering services, 50 years old)	5	incrementally innovative
Infoco (systems services, 20 years old)	7	incrementally to comprehensively innovative
Mealco (processed foods, 30 years old)	11	incrementally innovative
Commco (office and electronic equipment, 50 years old)	3	incrementally innovative
Chemco (specialty chemicals, 100 years old)	4	comprehensively innovative
Texco (textiles, 130 years old)	6	comprehensively innovative

To identify the different sets of organizational capacities across the three types of organization, I worked with several teams of research assistants, using methods described by Bailyn (1977) and Strauss (1987). We contrasted people's descriptions of how they went about the three sets of activities (described in the preceding section) across the organizational types. We first analyzed descriptions in a noninnovative organization, and then compared the findings to descriptions of equivalent activities in more innovative ones. This open coding was continued over 15 two-to three-hour sessions with two different groups of assistants. Preliminary themes that characterized the organizational capacities for market-technology linking, task-to-task linking, and people-to-organization linking in the noninnovative, incrementally innovative, and comprehensively innovative organizations were articulated, and then sharpened by comparing the data again.

The interviews were also content-analyzed separately, and coded to enumerate certain activities that reflected more or less of all three sets of best practices. As would be expected, these counts indicate that people in the more innovative organizations had more knowledge, linked more tasks, and placed less emphasis on linear, sequential work. Table 3 summarizes the preliminary codes for a subset of the

organizations in the data set (coding not yet finished). People in comprehensively innovative organizations had more extensive rich data of customer needs and possible technological solutions, on the average, than others, discussed far fewer barriers to integration across units, and were far less likely to rely on linear procedures than people in less innovative organizations [figures are percent of interviews devoted to topic, averaged by company].

Table 3. Measures of Best Practices Across Subset of Data

	Noninnovative			Incrementally Innovative		Comp. Innovative	
	Transco	Prodco	Shoeco	Mealco	Commco	Texco	Chemco
Knowledge Differentiation							
Market Knowledge							
Rich Customer Data	0.0	1.0	1.1	2.4	2.5	3.8	5.1
Abstract Market Knowledge	3.6	4.6	6.7	3.3	2.3	3.7	6.0
Technical Knowledge							
Rich Customer Data	0.0	2.1	5.1	2.0	2.5	3.5	5.8
Abstract Technical Data	6.2	3.9	5.1	4.3	7.1	1.7	7.4
Integration							
Barriers to Interaction	19.4	21.3	18.6	12.9	11.5	7.0	2.3
Emphasis on Linear; Seq. Work	5.0	6.5	6.3	2.9	1.4	3.2	1.0

Figures = % of interviews devoted to topic

The Organizational Capacities for Sustained Product Innovation in Mature Organizations

The findings suggest that very different meaning structures for the three sets of activities account for these expected differences in observable practice. People in innovative organizations ordered the activities of innovation with fundamentally different organizational capacities than those found in noninnovative organizations. One key insight is that these capacities do not involve greater or lesser degrees of certain organizational attributes (e.g., more flexibility, fewer levels); rather, they represent qualitatively different approaches to organizing. A second key insight is that the innovative organizations are indeed highly ordered; they are not loose, chaotic, or out of control, but they are, again, organized differently. Table 4 summarizes the organizational capacities for each set of best practices in the comprehensively innovative organization. The first row in the table highlights the overall frameworks for ordering each type of linking, while the next four rows outline how these frameworks operate at each of the four locales of organizing. Table 5 compares the approaches to the three sets of best practice in all types of organizations.

Table 4. Organizational Capacities in Comprehensively Innovative Organizations

	Market-Technology Linking:	Task-to-Task Linking:	People-to-Organization Linking:
	<ul style="list-style-type: none"> ➤ Extensive differentiation of knowledge domains ➤ Linking via common referents for action that reflect value to customers ➤ Importance of knowledge well developed 	<ul style="list-style-type: none"> ➤ Preserves integrity of value creation process in all work ➤ Focus on process, not steps; connections well mapped out ➤ Differentiation of work into problem sets, work defined as communities of practice 	<ul style="list-style-type: none"> ➤ Personal work relationships ➤ Norm of reciprocity is to make work interesting to others; impetus for action is law of the situation: all enable easy, quick negotiation of comfortable work relationships
Product Locale	<ul style="list-style-type: none"> ➤ Products framed as temporary relationships with customers ➤ Practitioners link organizational skills with customer situation to solve particular problems 	<ul style="list-style-type: none"> ➤ Practitioners organize activities of creating specific products, pulling together resources, determining design 	<ul style="list-style-type: none"> ➤ Practitioners feel collectively accountable for project ➤ Have freedom to define it within constraints of value
Domain Locale	<ul style="list-style-type: none"> ➤ Each domain separated, distinct ➤ Practitioners link substantive knowledge with customer value 	<ul style="list-style-type: none"> ➤ Practitioners organize around problems of creating, developing, deploying competencies to provide customer value 	<ul style="list-style-type: none"> ➤ Practitioners take charge of core competency development, by networking activity into businesses, products
Business Locale	<ul style="list-style-type: none"> ➤ Deep knowledge of market, practitioners link market with firm's core operating abilities 	<ul style="list-style-type: none"> ➤ Organize the problem of generating profits, by bundling domain expertise, product possibilities 	<ul style="list-style-type: none"> ➤ Take charge of effective use of resources and capabilities in organization to meet user needs
Corporate Locale	<ul style="list-style-type: none"> ➤ Identity based on solving customer problems ➤ Practitioners link organizational competencies with emerging needs 	<ul style="list-style-type: none"> ➤ Organize the problems of focusing work and long term investments ➤ Maintaining organizing capacity to support all connections 	<ul style="list-style-type: none"> ➤ Take charge of delineating processes, altering standards to fit changing needs, assuring that customer value is articulated

Table 5. Comparing the Capacities for Organizing Across the Noninnovative, Incrementally Innovative, and Comprehensively Innovative Organizations

	Market-Technology Linking	Task-to-Task Linking	People-to-Organization Linking
	<ul style="list-style-type: none"> a. degree of differentiation b. common referents for action c. identity 	<ul style="list-style-type: none"> a. what is delineated b. definition of work c. central focus 	<ul style="list-style-type: none"> a. nature of work relations b. norm of reciprocity c. impetus for action
Noninnovative Organizations	<ul style="list-style-type: none"> a. none: all knowledge part of operations b. abstracted, internal standards of operations c. ongoing functioning, what we are 	<ul style="list-style-type: none"> a. tasks, which are separated vertically and horizontally b. work is an office, function c. applying pre-established solutions 	<ul style="list-style-type: none"> a. impersonal, b. staying out of one another's turf c. constraint—do not make mistakes
Incrementally Innovative Organizations	<ul style="list-style-type: none"> a. partial, one domain differentiated from operations b. external, concrete product attributes c. maintain product category, what we do 	<ul style="list-style-type: none"> a. processes at product locale, tasks above b. work is both an office and a community c. solving problems within product category 	<ul style="list-style-type: none"> a. personal at product locale, impersonal elsewhere b. help others, provided own constraints met c. maintain current product portfolio
Comprehensively Innovative Organizations	<ul style="list-style-type: none"> a. extensive, importance of each domain recognized b. customer value, business opportunity c. help customers solve problems; what we can do 	<ul style="list-style-type: none"> a. processes of value creation, differentiated by problem set b. work is a community of practice c. identifying and solving new problems 	<ul style="list-style-type: none"> a. personal, multidimensional b. make work interesting for others c. respond to the situation

First, innovative organizations have a capacity for organizing knowledge that allows them to both understand more about each domain of knowledge and to integrate that knowledge more readily in the management of all activities, including product innovation. This extensive differentiation and integration of knowledge is possible because the linking is based on common referents for action that embody actual practice rather than abstracted (and thus rather meaningless) standards of operation. Second, innovative organizations have the capacity to focus on the processes of innovation, not the separate steps. These processes are extensively delineated so people have rich cognitive maps of connections. The work is broken out into different sets of problems that are handled by practitioners in the different locales of practice. Each locale operates as a community of practice, where people take responsibility for a certain realm of organizing and work within the evolving constraints set by the other communities. Each locale is a network of people who carry out real work in context, focusing on the development and application of situated knowledge, relying on collaborative problem solving and “sensemaking,” and depending on a common experience for integration (Brown and Duguid 1991). Third, innovative organizations have the capacity to link people to the organization with personal relationships based on situated needs of practice, because the overall authority for action is collective rather than individual.

In the following sections, I describe the organizational capacities for each set of best practices in the noninnovative, incrementally innovative, and comprehensively innovative organizations (see Table 2 above). The contrasts flesh out the different capacities and suggest how certain activities can be renegotiated, so that more innovative capacities can be developed.

Noninnovative Versus Innovative Capacities for Market-Technology Linking

The central differences in the capacities for market-technology linking concern the nature of the linking that is enabled, the common referents for action that are used, and the ways the relevant knowledge in the locales of practice are defined. The central dynamic in evolving market-technology linking capacity toward greater innovativeness is the extent to which the organization differentiates each of the domains of knowledge from each other. Differentiation highlights each one and enables people to elaborate the knowledge within each domain by locale. The differentiation and elaboration allow the organization as a social system to recognize the separate importance of each domain to the common activity of value creation, and also to actively develop each as a competence, apart from specific businesses or product lines.

In the noninnovative organization, market-technology linking is dominated by operating knowledge in the abstract. Differentiation and elaboration of the market, technology, and operating knowledge are severely inhibited, because the domains of knowledge are seen as subordinate to operations. The domains each link with operations in a very tight but singular fashion and only to solve problems of ongoing functioning. Domain knowledge is broken down further in a way that makes sense only within the domain, so parts of knowledge can only be put back together by experts in that domain.

The common referents for action are the internal problems of ongoing functioning that are abstracted from the actual contexts of practice. These abstracted common referents for action obstruct “sensemaking” in all locales of practice and constrict the linking necessary to process new or tacit knowledge. The lack of differentiation means that each domain has no real importance in its own right: Market knowledge is nothing more than marketing knowledge, or techniques to launch and sell regular output; technology knowledge is just a way to design a product or improve cost ratios. New markets or technologies do not make sense either (collectively), unless they relate to the usual products. Only senior managers can “see” the whole, because knowledge integrates only at the top; they tend to dictate product categories, while others execute their specialized knowledge.

How the relevant knowledge for the locales of practice is framed maintains the undifferentiated dominance of operations in the abstract. New products are framed as vague outputs of internal operations, so relevant knowledge includes only abstracted, internally defined standards regarding what the product should do. The knowledge domains contribute only specialized knowledge for maintaining or optimizing abstract standards of ongoing operations. The organization’s identity concerns only what it *is*, not what it can *do*.

Only a few organizations in this study had such a severely nondifferentiating capacity for market-technology linking, because it makes new product development very difficult. Most organizations have recognized the importance of market knowledge and are trying to differentiate it from a subordinate role in ongoing functioning. Three big service companies have broadened their customer service units to embody market knowledge, and two are learning to use rigorous market research. However, knowledge development still concerns the ongoing functioning of the system; keeping the plants, the network, or the logistics running at optimum remains the primary focus.

Two actions seem necessary for a real break with the noninnovative knowledge architecture: (1) differentiating another domain of knowledge, so that it is understood to be the equal of operating knowledge and not just a part of it, and (2) developing the collective ability to anchor some market-technology linking activities in the actual contexts of practice—which always involve other units and external players like customers. In fact, these two actions operate together: Once knowledge domains are differentiated, the linking between market and technology activities requires common referents for action that are not a part of one or the other, but sensible to both.

Empirically, the best example of change occurred in a consumer products company that “suddenly” lost market share, when new competitors offered products that better met the changing market needs. All the frames for the locales of practice shifted a bit to incorporate the contexts. First, the unit shifted its identity from an internally defined one (our food is best, because it has high quality as we define it) to an externally defined one (we make the best food in this segment, for these people). The frame for the product development locale changed from how the product should be used (it is the best food, so of course everyone will love it) to how it actually is used (this is the best food for this use). The unit differentiated the market domain from operations by emphasizing the importance of market analysis to the work of everyone. However, manufacturing still concentrated on noncontextual, self-referential goals (e.g., line speeds, similar packaging), partly because the technology was not differentiated as a substantive domain of knowledge in its own right. New investments remained tied to specific business plans and were not made unless the proper payback from the business could be demonstrated, which they often could not be, since specific product ideas are too small to finance major technology changes. At present, only incremental improvements are made in technology, so only incremental product adjustments are made.

The incrementally innovative organization’s capacity for market-technology linking has shifted from the internal focus of the noninnovative capacity, and emphasizes a concrete external focus. All the frameworks for the locales of practice center on product attributes that reflect market needs, and these concrete product attributes are the common referents for action. Since more linking occurs, more knowledge is created and used. The product attributes are standards that are not easily changed, however, so they limit the kinds of knowledge that are created. New products are framed as specific bundles of product attributes; knowledge domains are partially differentiated, but core operations knowledge is maintained as an abstraction; and

the organization identity concerns the product category. The result is that people know a great deal about their particular product category, but knowledge of other opportunities is as mysterious to them as knowledge of customers is to people in the noninnovative organization.

A transition to the comprehensively innovative capacity for market-technology linking requires the full differentiation of market, technology, and core operations knowledge domains, and their redefinition as competencies that can be drawn on for continual innovation. The comprehensively innovative capacity bridges external with internal issues by centering on indicators of business opportunity or customer value. These indicators of value are the common referents for action. Since the common referents directly represent the contexts of practice, the domains of knowledge, and the products at once, issues do not have to be translated first into mediating constructs, so they flow together easily. New products are framed as relationships with customers that bundle organizational skills temporarily; all three knowledge domains are differentiated from each other, and each is understood in terms of its contribution to the customer value; the organization's identity concerns being a provider of certain skills to solve customer problems.

Everybody does not know everything, but most people have some experience in common. Individuals have a background of experience in a domain of knowledge and in a customer or market context, so they all have some substantive knowledge of how the products are made and some applied knowledge of how products are used. When they work together on an innovation project or organization-wide task force, they can readily negotiate a shared frame of reference for the kind of knowledge that is needed, and a common language for the task. Then each person applies his or her own expertise to the commonly appreciated task. People from different disciplines understand the expectations put on the product and how their own expertise can contribute to those expectations. They do not have to understand each other's knowledge. Since people do not have to spend time translating expectations into marching orders for each department, and then retranslating output into common abstractions so senior managers can appreciate the implications, they are able to create many more products and see how these products fit together in a business.

The innovative and noninnovative capacities for organizing knowledge do not, however, stand alone. They require another set of profoundly different capacities for organizing the various tasks of innovation, and for defining the relationships between the individual and the organization, which I call task-to-task linking. What capacity enables companies to organize for the practice of task-to-task linking? I would argue that it requires a fundamental change in work relationships: the capacity for people-to-organization linking.

Noninnovative Versus Innovative Capacities for Task-to-Task Linking

Comprehensively innovative organizations have collective capacities for task-to-task linking which are fundamentally different than the capacities of noninnovative organizations. The central differences concern how work is separated and coordinated. The comprehensively innovative task-to-task linking preserves the integrity of the whole value creation process and delineates processes rather than steps. The complex

whole of work is broken down into processes, rather than into separate tasks; the reverse is true for noninnovative organizations. The central dynamic in evolving toward an increasingly innovative capacity for task-to-task linking is the increasing *differentiation of problems* in the value-creating process into the distinct locales of practice. The problems all reflect the whole process, but focus on different aspects of that whole. Differentiation of problems both draws attention to them and makes dealing with all of them comprehensible. This differentiation also emphasizes the situated, context-bound nature of the work. Differentiation into distinct sets of problems occurs as the locales of practice become understood as the primary “unit” of work, and communities of practice are formed around them to carry out the particular end involved (developing products, creating competencies, managing businesses).

In the noninnovative organization, “work” is collectively understood to be the efficient and effective execution of a task, which is carried out by a clearly delineated and bounded “office” or “function.” To make this work sensible and controllable, the different tasks of product development are separated, both hierarchically and laterally. The task of opportunity identification is done by senior managers, who determine the situation for the organization as a whole, and convert that determination into standards. These standards become output objectives or marching orders for each of the offices and functions, and are used by them to frame their task or piece of a task. Thinking is separated from execution, and each task is separated from the other, so that it can be developed, examined, and adjusted to be as efficient as possible without having to worry about ramifications on other parts. The tasks are coordinated by standardization: Each is performed to standard, so they automatically connect. This capacity for linking tasks to tasks minimizes concern with the connections between them, makes each unit a repository of solutions, and reinforces people’s skills in applying established solutions to new problems. The hierarchy of control is based on declining degrees of responsibility for the same task.

Only a few organizations in the study have the noninnovative capacity for task-to-task linking in its complete form, since this capacity cannot handle activities that are inherently coordinating, process-based, and lateral, like product innovation. Nearly all organizations have differentiated the product development locale of practice, since products cannot be created without a multifunctional team. Each team is only a temporary community of practice, however, so these new work relations are rather *ad hoc*. Several firms have also instituted a business structure, but the “business unit” is usually only the marketing function (carrying out separate marketing tasks), rather than a truly differentiated business locale of practice that allows a community of practice to develop. The whole process of value creation is not managed deliberately. Business managers must negotiate access to technology, production, or other tasks on an almost *ad hoc* basis, because the functions are managed separately to be “optimal” (usually defined as limited cost or less cost than last year).

In one firm, for example, the sales function called for a moratorium on new products, because the salespeople had to be “pulled off the streets” for several days for each introduction, and they were losing too many selling days a year. In the innovative organization, the whole selling process is geared to regular introduction of new products, the salespeople are familiar with the changing customer context, and

the new products are designed with the selling needs in mind in the first place, so this problem is addressed continually.

The key for transition to the incrementally innovative organization is to differentiate some locales of practice around the whole value-creating process into distinct communities. Several firms in this study differentiated the business locales of practice by creating separate business units that embodied all the relevant tasks and functions. These units produced a comprehensible whole of the separate tasks that enabled people to “see” the value creation from end to end and work laterally in a process mode. The business unit was also organized into product lines, not functions, which created product communities of practice. Shifting to a product line organization allowed managers to collapse separate functions into one another, thus reducing the number of barriers. However, several organizations in this study retained a separate definition of tasks above the product line level, which encouraged managers to focus on optimizing their “offices.” As well, the corporate managers were not operating as a community of practice that focused on managing the organization; they still focused on abstract tactical standards, like returns on invested capital (defined in a particular way), volume, scrap rates, and other throughput productivity measures. This bifurcated capacity for task-to-task linking fixated attention on the specific product category around which the businesses were organized.

The strict business unit structure also seems to be a temporary one in these data, because it cannot support the long term development of market, technology, and core operations competencies. However, it also seemed that firms in this study did not really “see” the problems of long term competency development until they formed separate business units. Once the business units began to operate as communities of practice working in their markets, they began to need resources they could not afford alone, and so formed corporate-wide task forces to develop them.

The transition to the more comprehensively innovative capacity for task-to-task linking begins when senior managers form themselves into a community of practice and start to actively confront the problems of long term competency development. First, the comprehensively innovative task-to-task linking capacity delineates processes rather than steps. The complex whole of work is broken down into processes rather than into separate tasks. The corporate, business, domain, and product locales develop into communities of practice that are each responsible for the entire process of value creation, from opportunity identification to sales, which preserves the integrity of the process. At each locale, people can go back and forth from opportunity identification to technology development, for example, and adjust either or both as appropriate. The elaborate delineation of the processes of product development and value creation allows people to concentrate on the flow of work and on the interconnections and iterations among steps, functions, and procedures, and helps them renegotiate specific steps as adjustments in the whole are developed. This attention to the process is reinforced by a wide variety of procedures for decisionmaking, operations review, process evaluations, assessments of customer satisfaction, product development processes, planning, and so on.

Second, the process of value creation is differentiated into distinct problem sets, so each locale of practice forms a community around a different set of problems in the

overall process of delivering value to customers. For senior managers, problems concern maintaining and developing the organization's competencies: They make corporate-wide resource investment decisions for R&D, manufacturing technology, and selling and distribution systems that are shared by the businesses; they evaluate strategic opportunities and manage the organizational processes and procedures to assure that connections are working, and that the standards fit the work. Senior managers develop, implement, and replace standards for work to keep the processes flowing. Business locale practitioners work on the problems related to keeping the business unit in sync with its market so that it can generate profits. Their job is to know the business well enough to forecast their needs in production capacity; to sell well enough so their colleagues in the domains can allocate resources; and to make longer term predictions of where the business is going, so that senior managers can invest in the competencies. They also must reconfigure the business unit to accommodate new products, and organize and manage systems that integrate the various tasks in product development. Domain practitioners concentrate on developing the competencies to produce the customer values now and in the future. Product locale practitioners work on creating new products and managing products.

The innovative organization is highly ordered and controlled. All the processes developed at each locale articulate aspects of the overall process of value creation, and each locale works in the context of the others. This approach to linking tasks focuses on solving problems, but the solutions are not preordained so the problem solving is very creative. Product innovation is part of the normal work of the organization, no different than other work, and in fact helps the organization uncover glitches. However, neither the capacity for market-technology linking nor task-to-task linking can evolve in this way without a fundamental change in work relationships: the capacity for people-to-organization linking.

Noninnovative Versus Innovative Capacities for People-to-Organization Linking

The innovative organizations in my research had a very different capacity for linking people to the organization, one that supported and enhanced innovative work rather than inhibited it. The central differences in this capacity across organizations concern whether work relations are impersonal or personal, whether norms of reciprocity create or delimit relationships, and what is the primary impetus for action. The central dynamic for evolving toward more innovative people-to-organization linking capacities is the differentiation of realms of responsibility.

The capacity for linking people with the organization in the noninnovative organization is based on impersonal work relationships. These are based, in turn, on formal job descriptions and the informal expectations that build up around an occupation or function. Each individual is expected to carry out her or his own job properly, in accordance with the standards set by the managers, and is held personally accountable for doing so. Norms of reciprocity concern staying out of one another's turf. People develop skills for doing what they are told, or if in a professional or managerial position, for doing what is expected of them. As people go higher in the hierarchy, they have more and more autonomy to execute their office as they personally see fit, and everyone understands this as the boss's prerogative.

The central impetus for action is to meet standards and to avoid mistakes that may bring the whole system down. Both the individual and any action he or she might take are controlled and constrained.

The noninnovative capacity for linking people to the organization fits well with the related knowledge and task linking capacities. One can see how people with such an understanding of work relations would find the work of innovation very anxiety provoking. Most organizations in my study have developed more innovative capacities for linking people to the organization at the locale of product development, because effective innovative team work requires more personal and mutually reciprocal relationships. However, these relationships are not reinforced by the organization and so are tenuous.

The real break from the noninnovative work relations begins with the formal institution of teams for managing new product development, which includes granting the teams authority over all the design choices and product strategy. Product development is differentiated as a realm of responsibility; the practitioners in the product community take charge of it, within general strategic parameters. However, if senior managers retain the authority to dictate specific product design, and if product approval continues to be a lengthy political process rather than a matter of strategy, then team members have no reason to invest themselves fully in the task. Indeed, their role is still one of execution, and that is more easily done when people maintain functional autonomy. However, the functional separation among tasks found in the incrementally innovative organizations at higher levels of management maintains a fixation on applying function-specific solutions, not on negotiating over defining collective problems. If one function dominates, their solutions will be imposed, which induces an opposing sense of separateness in the other functions. Continued reliance on abstractions of ongoing operations to integrate knowledge also reinforces noninnovative work relationships in these departments. In team meetings, people who represent the functions will focus on constraints or what they cannot do, which inhibits creativity.

The transition from the incrementally innovative to the comprehensively innovative capacities for linking people with the organization depends, of course, on developing the other two capacities as well. The key to this transition is the delineation of responsibilities for all the locales of practice, and the formation of communities of practice to take charge of these responsibilities (or problems to be worked on, as described in the previous section). Rather than controlling individuals and individual action, the organization controls the framing of the communities of practice and their realms of responsibility. Differentiating realms of responsibility helps to bound the expectations that are placed on any individual, and provides everyone with a sense that the relevant work will get done. In addition, the organization's many resources, systems, processes, and procedures are managed to support the product development process. The innovation teams do not have to redesign the computer system, reengineer the engineering change orders, or fix the whole evaluation procedure to enhance their own ability to work, since these systemic issues are being worked on by the other communities of practice who take charge of those issues.

With the differentiation of realms of responsibility, three particular characteristics of work relationships are developed. First, people relate to each other on work projects on a personal basis, so that the relationships are firsthand rather than distant, multi-dimensional rather than simple, and rich rather than abstracted. Personal relationships are capable of more mutual adaptation, in which the work emerges as the situation demands through the reciprocal adjustments of the people involved. Personal relationships are also more intense and require careful mutual attention to the feelings and integrity of each person. It is not that employees devote themselves heart and soul to the firm, becoming robotic “organization men.” The other two comprehensively innovative capacities allow people to handle these more intense work relationships because the issues that people must negotiate to carry out a joint task are reduced. For example, people do not have to negotiate specific roles, role expectations, task goals, and decision criteria among all the players every time collaboration is called for, or worry that some people may change their outcome objectives later on, as they usually must do in noninnovative organizations. The practiced skills people have in working with customers, invoking common frames of reference, and applying their expertise to solving problems keep people focused on common issues, make roles clear and simple to understand, and provide a clarity of purpose.

Second, the norm of reciprocity governing work relationships is that people must strive to make an activity interesting for others to encourage them to join in. This means the activity must meet some goals of the other person, and the initiator must take some responsibility in seeing that that happens. As well, one person cannot make work interesting for another unless he or she can really appreciate what the other wants or needs and is able to listen effectively. The individual is free to choose to participate or not in any given project (within the boundaries of the job, which says that everyone works on processes with others).

Finally, the central impetus for action is the “law of the situation.” A particular situation dictates what needs to be done for product and business development, and individuals are expected to respond to that situation to solve specific problems, take advantage of opportunities, make judgments, and balance the contradictions that may occur between new problems and established practices or standards. The law of the situation both recognizes people’s responsibility for making things happen within certain realms of action and certain business areas, and gives people the authority to control aspects of the work situation. The different communities of practice frame the kinds of opportunities that should be addressed and how, but individuals involved have the authority to work out specific action themselves.

Implications

This analysis has only begun to articulate the fundamentally different organizational capacities that enable people to generate a variety of new products over time, yet still manage routine and mature businesses effectively. I have emphasized the capacities as shared frameworks for thinking and acting in regard to knowledge and learning, tasks and processes, and collective work relationships. These capacities, I suggest, are missing from our theories and from our lists of best practices and our prescriptions of organizational forms. To be sure, specific tools, structures, and techniques are necessary to help implement these capacities; but the tools, structures, and techniques themselves do not constitute the approaches to organizing, the underlying collective logics, that actually facilitate the work of innovation. These capacities are what order the work of innovation and structure the meaning systems that people collectively draw on to generate products and services, as well as to develop the competencies and organizing systems that support that generation. I suggest that unless the capacities themselves are changed, any organizational changes to structures, or changes in how strategies are devised, will not work.

The inferences on change are the least well grounded empirically. With that caveat, these data suggest that reasonably small changes are all that is necessary to begin the transformation, although the changes must be made fully and across all three sets of practices. The key dynamics for change concern differentiation of knowledge, of work, and of realms of responsibility. The monolithic, generically functional organization of the noninnovators needs to be broken out into loose, weakly but extensively tied, networks of communities of practice. Doing so sorts out the myriad aspects of learning, processing, and relating that are involved in sustained product innovation into comprehensible, thus doable, sets of work.

For example, in one incrementally innovative firm, product teams have slowly taken on more responsibility, simply to get their work done properly. Now they are beginning to attack more fundamental infrastructure problems in manufacturing and how those resources can be made more flexible. They do this not because they have chosen to invade that turf, but because these problems must be solved in order to get their new products out the door on time. This change is further differentiating the product development community of practice and its associated realm of responsibility, and also prompting the firm to differentiate a business community of practice. It is also pushing senior managers to take up certain organizational problems—they are beginning to become a corporate community of practice.

At the same time, the corporation is beginning to integrate resources across the many business divisions, to develop corporation-wide capabilities and competencies: They are finally differentiating the technology knowledge domain from abstract operations and investing in long term technical capability in its own right. They are putting together worldwide task forces for bits of technology that many units can share (e.g., pasta making equipment). These resources should help managers develop unit technologies, and ultimately enhance the creation of technology

as a competence, corporation-wide, rather than just a part of operations. These separate initiatives, started one by one because they attack various problems in maintaining the corporation's competitiveness, can impel the organization toward developing the comprehensively innovative organizational capacities.

More work needs to be done on clarifying these capacities for innovation and on describing how they can be developed in organizations that now operate with different capacities. The dynamics of differentiation, and the pressures it creates for the more extensive linking, also must be explored. However, this emerging theory on capacities for innovation is useful for three reasons. First, consistent with change theory, it acknowledges that whole sets of thinking and acting need to be changed at once if the organization as a social system is to become more innovative, and indicates what those sets of thought and activity are. It is therefore realistic. Second, the theory connects these whole systems directly to innovative (and noninnovative) activities, explaining both why some organizations can innovate and why some cannot. Third, the theory points to manageable dynamics for change. The comprehensively innovative organizations in this study are ordered, controlled, sensible; they are not chaotic, complex, or incomprehensible. Building knowledge of the organizational capacities that underlie innovative organizing should lead to a more complete, yet more elegant, understanding of how organizations can become, and be, truly innovative.

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