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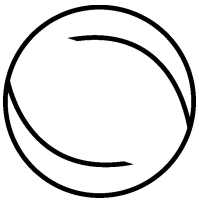

Bridging Social Constraint and Social Action to Design Organizations for Innovation

Deborah Dougherty

Abstract

Organization studies offers conflicting design ideas to organize large firms in mature industries for sustained product innovation. These conflicts arise in part from the bifurcation in theory between social constraint and social action, even though structuration views emphasize that neither exists without the other. Designs based on social constraint emphasize boundaries, authority, and reward mechanisms, while designs based on social action emphasize emergence, knowledgeable action, and self-fulfillment. This analysis applies a design science framework to reveal the incommensurate construction principles in the bifurcated designs. Construction principles are imperative statements for action that bridge organization theory and organization design, and highlight deeper meanings behind design guidelines. The construction principles for innovation evoke different patterns of managerial work, emphasizing either direct managerial agency while constraining employees or indirect shaping and enabling. I develop three alternate construction principles based on the mutual constitution of constraint and action. These principles capture some of the insights of the two separated sets of principles, but also reflect a coherent understanding of social order in organizations and organizing.

Keywords: design science, innovation, structuration, organizing

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Designing large organizations to generate streams of new products or services has been a central issue at least since Schumpeter (1942), who argued that large firms have the technological capabilities and infrastructure needed to innovate continuously. In support of Schumpeter's theory, studies show that large firms accumulate technology competences over long periods (Cantwell 1989) and that organizational size and innovation are positively correlated (Damanpour 1991; Camison-Zornoza et al., 2004). But many large organizations do not innovate effectively, in part because managers do not design them for innovation (Leonard 1998). Organization science is also partly to blame because it offers managers incommensurate advice for designing organizations for innovation. Some argue that 'big is bad': mature organizations focus on legitimacy and on replicating structures and routines, not on innovation (Hannan and Freeman 1984). Managers are told to innovate in renegade skunkworks, and to support 'heavyweight' project managers who force innovation through the rigid organization. Others argue that innovation is natural and will emerge normally if only managers let a thousand flowers bloom (Kanter 1988). Some argue that innovation requires creative freedom (Amabile and Conti 1999) while others argue that clear structures and procedures are essential (Adler 2006). Some say

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that innovation must be separated from routine work (Tushman and O'Reilly 1997) while others say that innovation must be integrated with other activities so that the organization can learn (Dougherty 2006).

The purpose of this paper is to explore these persistent conflicts in designing for innovation and suggest a way to resolve them. The conflicts arise in part from a bifurcation in organization theory between social constraint and social action. While social constraint and social action are two sides of the same coin of social order, a tendency to separate them has always troubled social science (Giddens 1982), and especially troubles organization theory (Schön 1983; Weick 2004). A design science perspective helps to explore these conflicts by focusing on the work and workers, and by zeroing in on design specifications that enable this work (Buchanan 2004). Design science also emphasizes the flow from theory to construction principles to designs and back (Romme and Endenburg 2006). Construction principles are imperative statements for action that emphasize a certain type of solution in view of certain goals, and highlight deeper meanings and intentions behind detailed design guidelines. They bridge organization theory and design, enabling theorists to reach forward from their theories to see the consequences of them, and enabling managers to reach back from their design choices to the theories that drive the behavior. Tracing out the flow of theory to practice reveals that constraint-based and action-based approaches assume very different construction principles for achieving desired organizational properties. I derive three alternate construction principles that bridge social constraint and social action, just as they bridge theory and design. The alternate principles embody both the duality of social order (Giddens 1982), and a human-centered view of organizing from design science (Boland and Collopy 2004).

Social constraint and social action are different properties of social order that have been noted at least since Dilthey and Weber, who distinguished *erklaren* (the causal explanation of natural phenomena) from *verstehen* (the understanding of human meaning) (Giddens 1982: 6). Similar distinctions include determination versus volunteerism (Collins 1981) and structure versus agency (DiTomaso 1982). Organization theorists use similar distinctions. For example, Feldman and Pentland (2003) differentiate ostensive from performative routines: the former are generalized understandings for carrying out a complex activity, while the latter are specific performances of a routine. Both are necessary since the ostensive routine provides a model for participants to carry out an activity, while the performative routine reflects the particulars of a given situation. Weick (1993) differentiates structural frameworks of constraint from shared provinces of meaning, and explains how both are necessary if people are to create and preserve meaningful behavior. Jelinek and Schoonhoven (1990) combine old and new to emphasize that organizations need both meticulous manufacturing mastery and continuous innovation.

According to Giddens (1982), structure is both the medium and the outcome of human action. Social structures or constraints do not exist on their own and have no reality except as they are enacted in practice, yet people cannot act together without some common structures such as rules or shared frameworks. Social constraints and social actions have a fundamentally recursive nature:

social action produces and reproduces constraints, while constraints enable action, so the two are mutually constitutive. Thus, a theory that emphasizes social constraint or social action alone may be partial, if not flawed.

Unfortunately, organization theories tend to emphasize one or the other, with negative results (Barley 1986; Orlikowski 1992). Suggesting that organization theory is dominated by social constraint, March (1979) advocates the 'technology of foolishness' to allow for emergent action, and Weick (1977) advocates the management of anarchy to enable self-designing. Other scholars discuss 'paradox,' or contradictory yet interrelated elements that should be combined to capture the true complexities of organizational life, but often are separated instead (Quinn and Cameron 1988). In analyzing the control versus collaboration paradox in governance, for example, Sundaramurthy and Lewis (2003) explain how each side can lead to low performance when taken alone. Excessive use of rational controls may signal distrust, motivating people to reduce efforts, leading to myopic behaviors, leading back to more controls. But focusing on cooperative decision making may reinforce groupthink, leading to the suppression of tensions and overconfidence, leading to strategic persistence.

I use structuration (Giddens 1982) as a meta-theory for integrating social constraint and social action, because while it applies to more general levels of society it is familiar in organization studies. Structuration has been used to illuminate links between technology and social action (Barley 1986) and technology designing and using over time (Orlikowski 1992). Structuration theory is also criticized for downplaying the material aspects of structures (Archer 1995), so this exercise in design science opens the door to experimentation with alternate perspectives. The first section below summarizes a 'design science' framework for organizing large firms for sustained product innovation, by defining the work of innovation and articulating three properties of an innovative organization: fluidity, integrity, and energy. The second section contrasts social constraint versus social action approaches to organizing for innovation regarding how they address each of these properties, highlighting the different construction principles that each side draws on. The third section builds on both structuration and design science to develop three new construction principles that bridge social constraint and social action.

A Design Science Framework for Designing Large Organizations for Innovation

The Work of Innovation

Design science is a pragmatic effort to construct a social system that functions as desired in actual practice (Romme 2003). A design science perspective focuses on the tasks or the work that the workers seek to carry out, in order to facilitate human beings in the accomplishment of their work (Buchanan 2004). A large body of research describes the work of sustained product innovation in detail (Storey 2004), and includes many 'how-to' guidebooks that lay out tools, techniques, and procedures for carrying out this work (Bobrow

1997; Cooper 1998; Belliveau et al. 2002). 'Product innovation' concerns bringing new products and services into customers' use, and encompasses the whole process of conceptualizing, developing, designing, manufacturing, marketing, and distributing new products. Successful new products are developed by multifunctional teams that delve into user needs and link them with technological and other organizational knowledge to design, build, manufacture, and distribute a product (Souder 1987; Bacon et al. 1994). However, a large firm will have scores of new products at one time, so sustained innovation comprises a complex system of deep marketing, technological, and manufacturing capabilities supporting a diversity of products and businesses (Day 1990). In addition to new product teams, business teams bundle firm resources into profitable product lines and new market trends; corporate managers recombine capabilities to link with emerging opportunities; and functional experts develop new technologies and link them with emerging businesses (Helfat and Eisenhardt 2004).

Properties of the Large Innovative Organization

Research suggests that the properties of fluidity, integrity, and energy enable the work of a large organization to be organized so that the thousands of employees can actually do all this market–technology linking in all these teams using the most appropriate techniques. These three properties are the design specifications needed to achieve an innovative organization. Other properties also may exist, but I focus on these three because large organizations tend to manifest the opposite properties of rigidity, 'segmentalism,' and power imbalances that discourage rather than energize workers (Kanter 1983). Thus, how to achieve these three design 'specs' is a central challenge in organization design.

Fluidity

Each new product comprises the creation, combination, and recombination of market and technology knowledge so each is at least somewhat unique (Leonard 1998). Moreover, teams inevitably encounter unanticipated glitches and must make changes 'on line'. I use the term 'fluidity' to capture all these ongoing, dynamic adaptations in product teams, among businesses, and within and across technologies and other capabilities. 'Fluidity' suggests loose coupling but also directed flows of activities. Danneels (2002) shows that product innovations both draw on and develop the organization's competences. Clark (1985) explains how technologies can 'ripple up' the design hierarchy, because people rethink prior choices if new technologies now make previously rejected options feasible, or changes in customer needs now highlight different kinds of performance. Leonard (1998) shows that large cycle changes involve a simultaneous adaptation of the organization design as prior decision points are revisited, resolved issues are reopened, and routines are unfrozen. Continual strategic transformation needs to occur as well, as managers move charters among business units to take advantage of free resources and other businesses' ebb and flow (Helfat and Eisenhardt 2004).

Integrity

Innovation scholars have also always emphasized a need for integration in organizing for innovation. I use the term 'integrity' to capture the sense of pulling things together within and across levels of innovative work, because it reflects the idea of integration as a mindset and as an outcome. Developing new products integrates functions because all functions have unique insights for a given product design (Dougherty 1992). Each product must also mesh with the organization's capabilities in technology, manufacturing, marketing, sales, IT (and so on), as these develop over time, since multiple products share common resources (Jelinek and Schoonhoven 1990). Kanter (1983) finds that innovation is based on an integrative mindset through which people see problems as wholes related to larger wholes. The integrative mindset includes an ability to consider wider implications of actions, and mechanisms for information exchange, finding a common ground, and taking multiple perspectives into account. She contrasted the integrative mindset with a 'segmentalist' mindset through which workers compartmentalize actions, events, and problems, and see problems as narrowly as possible, independently of their contexts. Clark and Fujimoto (1991) argue that firms compete on 'product integrity,' or the consistency between the structure and function of the product (i.e. parts fit well, components work well together), and how well a product's function, structure, and semantics fit the customer's objectives, values, production system, and use pattern. Iansiti (1998) develops a similar idea of 'technology integration' to explain how firms merge knowledge domains with details of production systems and user environments, since these application contexts enable innovators to view innovation in a holistic fashion and look for broad, lateral solutions.

Energy

Research also indicates that the innovative organization needs to continually enable and motivate people to do this complex work (Amabile and Conti 1999). I use the term 'energy' to emphasize the idea that innovation workers need the emotional and physical wherewithal to do the work of innovation. Scholars argue that innovators need access to power resources such as information, credibility, and alliances (Kanter 1988), and to the power of processes and meaning making (Dougherty and Hardy 1996). Innovating workers also need control over their work and decisions (Damanpour 1991), and the opportunity to participate in strategic conversations regarding the organization's future (Westley 1990) which energizes middle managers. Moreover, the work of innovation requires *very* sophisticated skills which also take energy. According to Clark and Fujimoto (1991), innovation workers need to anticipate problems in other functions and appreciate others' constraints. Iansiti (1993) suggests that they need 'T'-shaped skills, or both a deep understanding of a specialty and an intimate understanding of the potential systemic impacts of their specialty. Leonard (1998) adds that innovation workers need to be able to shape their specialized knowledge to fit the problem at hand rather than insist that the problem appear in a certain way.

Contrasting Social Constraint and Social Action

I highlight and even exaggerate differences between social constraint and social action for achieving the desired properties of fluidity, integrity, and energy, to bring the split between the two out of the background. I do not suggest that all theories that draw on each perspective have all construction principles, nor do I suggest that all authors cited strictly reflect one or the other. Table 1 outlines the very different construction principles that theories from each perspective presume. Below each construction principle I list explanatory theories that the authors draw on to contrast causal explanations for why and how people behave in organizations. The conflicts between these causal explanations are also deliberately sharpened to point out that these organization theories focus on very different aspects of collective behavior, perhaps without really thinking about the links between theory and design. A few design options are listed at the bottom of each cell to illustrate how the theories flow through the construction principles to design. Each cycle from theory to construction principles to designs seem sensible because they are internally consistent. Yet they also build on only one aspect of the duality of social order, so each one is incomplete, and perhaps incorrect.

Contrasting Approaches to Fluidity

Social Constraint and Fluidity

Social constraint approaches theorize that people have limited cognitive abilities via bounded rationality (March and Simon 1958) and that institutional forces further constrain possible actions (Leonard 1998). The construction principle for fluidity is that managers should directly force change. Baum and Amburgey (2002) summarize this approach well:

> '…under conditions of uncertainty and ambiguity, however, there are severe constraints on the ability of boundedly rational individuals to consistently conceive and implement changes that improve organizational success and survival chances in the face of competition.' (2002: 305)

Bounded rationality means that people are unable to explore more than a few decision alternatives, rely on simple rules of thumb, and 'satisfice,' or settle for good enough, not optimal, decisions. To put it simply, people do not know much. These limits to rationality are institutionalized in the organizational structure as capabilities become rigidities over time (Leonard 1998), so the structure limits attention, interpretation, and decision making (Morgan 2006). People also search locally among familiar practices for solutions to problems, since applying 'tried and true' approaches seem more expedient (March 1991). External pressures reinforce these limits by pushing organizations to stick to familiar markets, technologies, and processes as they seek to maintain legitimacy. Change is rare and occurs mostly at the population level (Hannan and Freeman 1984).

Because of limited fluidity, social constraint designs rely on a 'heavy hand' from strategic managers who use their agency to constrain others.

Table 1. Contrasting Social Constraint and Social Action for Designing Innovative Organizations

	Social Constraint Construction Principles, supporting theory, and illustrative design options	Social Action Construction Principles, supporting theory, and illustrative design options
Fluidity	**Directly force change** Because (theory): • Bounded rationality inhibits information retention, awareness • Change is rare, occurs mostly at population level • Institutionalization drives behavior Design options: add on venture units, skunkworks; bring in fresh blood, restructure by breaking up or eliminating units, formally train	**Let a thousand flowers bloom** Because (theory): • Practical consciousness gives people much social competence • Change is constant, occurs in everyday actions • Improvisation drives behavior, enabling emergence Design options: build repertoire of routines, skills for action in org. memory; enable maverick communities of practice; facilitate learning in situation via iterative problem surfacing in actual settings
Integrity	**Separate innovation from other work, rely on strategy to integrate** Because (theory): • Coordination is difficult, costly • Different work requires separate architectures for congruence • Individual businesses become stuck in existing markets Design options: separate businesses into congruent units; senior managers create new units to experiment with opportunities; use strategic objectives	**Group work around emergent flows of innovative action, use minimal structuring** Because (theory): • Coordination is natural and not costly • Different work flows together readily with guiding visions • Projects drive daily business, so units evolve readily Design options: integrate entire organization to assure flows of learning; use a few 'semi-structures' only; shift from formal, quasi-formal, informal structures to make changes
Energy	**Energize workers with a strong vision, culture** Because (theory): • Energy comes from what people believe • Managers are central • People are opportunistic, lazy, must be 'incented' Design options: develop culture to promote creativity, implementation; careful rewards for innovation; rigorous selection and socialization	**Energize workers by strategic participation, play** Because (theory): • Energy comes from what people do • Employees are central • People seek achievement, actualization Design options: engage people in strategic conversations, give them access to rules of interaction, content; enable play in various ways

Social constraint views tend to concentrate on the lines or boundaries drawn around work and workers, and view everyday social action within these bounds as largely inert. Therefore, fluidity arises mostly by shifting the boundaries: managers directly force change by creating new units and roles, and by breaking up old ones. Managers create fluidity by downsizing, eliminating the dead wood, and other radical restructuring that breaks open the rigid system (see Cascio 1993 for summaries). Less extreme design options to achieve fluidity are based on 'add-ons' such as venture units, skunkworks, task forces, and acquisitions, and by bringing in new people with 'fresh blood', diverse views, and better skills. Formal training to inculcate new skills is also useful.

Social Action and Fluidity

In contrast, as shown in Table 1, social action approaches theorize that people have enormous social competence (Goffman 1961; Giddens 1982) and that improvisation (Moorman and Miner 1998) rather than institutionalization drives behavior. The social action construction principle for fluidity is that managers should let a thousand flowers bloom (Kanter 1988). Fluidity occurs naturally, and change is constant in organizations (Weick and Quinn 1999; Tsoukas and Chia 2002). Rather than the limits of bounded rationality, social action perspectives assume that people possess extensive knowledge about social life that they apply skillfully as they enact complex collective behaviors without being told explicitly and repeatedly what to do (Giddens 1979). Rather than institutionalization, improvisation drives collective behavior, since even in stable situations people enact roles and routines anew each time, so roles evolve with different meanings (Miner 1987). People improvise from existing roles to new ones in response to new technology (Barley 1986). Mintzberg and McHugh (1985) trace more than 50 years of adaptive change at the Canadian film board, showing how people draw on routines and on an umbrella strategy to frame the development of new routines. Hutchins (1991) describes the improvisation of a new navigation system in a disabled ship, even though no individual fully grasped the whole system or why it was working.

Because fluidity is natural and potentially unlimited, social action designs rely on a light, indirect hand from managers. Weick (1977) suggests that bounded rationality comes from poor management systems, not from individual cognitive limits. To support improvisation, Moorman and Miner (1998) recommend that managers enhance the procedural and declarative aspects of organizational memory, to give people access to a rich repertoire of skills and routines, and a deep mastery of facts and ideas to help them make sense of new knowledge. Dougherty (1995) finds that core rigidities arise from the abstracted nature of people's tasks, not from institutional forces. People always need to make sense, but if the only source of sense is abstracted structures and roles, the sense people make will be stilted and limited. Instead, she argues that work should be kept realistic by keeping everyone actively involved with customers. Brown and Duguid (1991) propose that managers allow maverick communities of practice to emerge on their own. Maverick communities drive fluidity by allowing parts of the organization to step outside the 'limiting worldview' and try something new. Learning is enabled via participation in the situated work (Lave and Wenger 1991), not by formal training.

Contrasting Approaches to Integrity

Social Constraint and Integrity

As Table 1 outlines, social constraint approaches theorize that coordination is difficult and thus costly (Thompson 1967), and that the organization's social system must be internally congruent (Nadler and Tushman 1996). The resulting construction principle says that managers should separate innovation from

regular work. Integrity resides in the organizational architecture, where the culture, strategy, structure, and human resource management processes are designed to be congruent with each other. To have its own integrity, innovation must be separated from routine work of efficiency. Early theorists said innovation work should be separated by stage because early stages required creativity while later ones required mechanistic thinking (Zaltman et al. 1973). Other notions of separation include the dual core that separates technical from administrative work (Daft 1978), and parallel structures (Kanter 1983) that separate innovation from routine. Tushman and O'Reilly (1997) argue that whole businesses should be separated into ambidextrous organizing, because each will have a distinct, internally congruent organizational architecture. Christensen (1997) says that business units get stuck on current customers because people build up familiarity with them, so managers again must create new business units to enable innovation.

Because innovation and regular work cannot fit together, constraint designs for integrity focus on separating business units and on creating new businesses over time, and on integrity by strategy. Strategic managers must actively design for innovation by creating new business units to experiment with emerging markets and opportunities, since the businesses cannot and will not on their own. Strategy is a design tool for integrity since the right strategy, vision, and objectives provide a common orientation to opportunities (Day 1990).

Social Action and Integrity

In contrast, as shown in Table 1, social action approaches theorize that coordination is a natural and need not be costly, and that social organizations can be emergent, local, and temporary — they need not be congruent (Lave and Wenger 1991; Brown and Eisenhardt 1997). The social action construction principle for integrity is that managers should group work around emergent flows of action and otherwise use minimal structuring. Integrity resides in the everyday practices of work. Even if people are spread around the world they can coordinate, provided they have a repertoire of practices through which they can continually enact their innovation work (Orlikowski 2002). People work naturally in communities of practice if they have 'seeding structures' such as rules, symbols, and perspectives that act as focal points around which they can identify and interact (Jarzabkowski 2003). Different work can flow together readily around emerging technologies or product family sequencing (Helfat and Eisenhardt 2004). Leonard (1998) argues that projects drive daily business as teams dissolve and regroup according to the dictates of the business needs.

Because innovation and regular work readily fit together, social action designs for integrity are based on emerging work flows with minimal structuring. Social action theorists focus on technology development and on projects and product families, not on businesses or the entire corporation as do constraint theorists. Managers can concentrate on the activities that create their technical and market knowledge, making small checks on position, direction, and proximity to competitors, according to Leonard (1998). To keep the flows of work integral, people need only a few 'semi-structures' such as managing

transitions from team to team, clear priorities, and clear reporting relationships. With this minimal structuring, people can carry out specific innovations and integrate their work over time across projects (Brown and Eisenhardt 1997). Jelinek and Schoonhoven (1990) suggest innovators use formal, quasi-formal, or informal structures to organize work, and rely on one facet while others are shifting. For example, new product teams work based on informal relations while formal structures are transformed to accommodate new kinds of connections.

Contrasting Approaches to Energizing Innovation

Social Constraint and Energy

Social constraint approaches theorize that energy comes from what people believe. The construction principle for energizing workers is that managers should promote a strong vision and culture. Strategic managers articulate a strategy, vision, and purpose that enable employees to believe 'that their efforts are contributing to something worthwhile' (Tushman and O'Reilly 1997: 100). Managers also must promote a culture that helps people achieve the organization's goals. According to Tushman and O'Reilly (1997: 102) 'culture is a system of shared values and norms that *define* appropriate attitudes and behaviors for its members' (emphasis added, to highlight the social constraint view). To energize innovation, the culture should promote creativity and implementation. Creativity can be enhanced by norms that support risk taking and tolerance of mistakes, while implementation can be enabled with norms that promote effective teamwork and emphasize speed and urgency. Extreme constraint ideas have a 'theory X' view of employees. Employees are lazy and opportunistic and will satisfy their own needs at the expense of the organization's needs, so managers must control these workers by monitoring their actions directly, and by applying clear, extrinsic (monetary) rewards that invoke required behavior (Ghoshal and Moran 1996).

Because people's beliefs and values drive their behavior, social constraint designs for energizing workers emphasize culture building. Managers should actively promote a culture by shaping norms and value to support creativity and implementation. Managers can do so by modeling, making good actions visible, and celebrating effort even if the project fails. Managers can also make sure the system of rewards is comprehensive and adequately rewards innovation, and have a rigorous selection and socialization process so that the right people are brought in and then carefully socialized into the innovative culture.

Social Action and Energy

Social action approaches theorize that energy comes from what people do, not what they believe. The social action construction principle for energizing workers is that managers should emphasize strategic participation and play (Westley 1990; Schrage 2000). Employees are self-motivated and capable of optimizing the collective good, not just the individual good, even when the

structure of work relations actually gets in their way (Barley 1996). Culture plays an indirect role because it concerns sharing meaning rather than defining attitudes and behaviors. According to Swidler (1986), culture influences action not by providing ultimate values toward which action is oriented, but by shaping a repertoire or 'tool kit' of habits, skills, and styles from which people construct strategies of action. Schein (1990) argues that an organization's culture is unique, reflecting its history and founders, and is not easily diagnosed let alone changed. He provides case studies of two companies with very different cultures, but both are innovative nonetheless. Fiol (1991) also argues that culture emerges from action. Managers cannot directly change values, but they can change the behavior which may shift cultural meanings as they are reenacted over time.

Because people's situated actions drive their behavior, social action designs for energy emphasize employee participation in developing the firm's strategy by engaging in strategic conversations (Westley 1990). If the everyday micro-social work rules allow people to reframe strategic drivers in conversations with superiors, they are energized by inclusion and power. Play is also an active way to generate energized, positive affect which leads to enhanced creativity, intrinsic motivation, and the potentiation of an adaptive response (Sutton-Smith 1997). Play can be introduced by keeping play materials such as game tables, blocks, drawing materials readily available for work groups and meetings (Schrage 2000; Roos and Victor 1999), and leaving time for play.

This brief contrast of social constraint versus social action approaches to designing organizations for innovation deliberately highlights the major differences between the two sides. The theories within each cell are familiar in organization studies, but in conflict across the cells. The construction principles that link theory to practice evoke very different patterns of managerial work that lead to different design practices. One emphasizes managerial agency but otherwise is constraining and bounding, while the other emphasizes indirect shaping and enabling. The two sides seem to be about very different social realities, look at similar issues from very different perspectives, and focus on different levels of action. Yet both sides make some sense, suggesting that the insights of each need to be combined.

Bridging Social Constraint and Social Action for Innovation

Table 2 summarizes structuration-based construction principles that embrace the duality of social constraint and social action, the theories that underlie them, and the design options that flow from them. These alternate construction principles bridge social constraint and social action just as they bridge theory and design. They also build on design science that focuses on work and workers by emphasizing that managers do not constrain workers directly. Rather, managers constrain the organizing to keep work based on the practice of innovation.

Table 2. Structuration Construction Principles for Innovative Organizations

Construction principles, supporting theory, and illustrative design options	
Fluidity	**Define and enact work as professional practice of innovation** Because (theory): • Situated, hands-on practice keeps people knowledgeable • Change can emerge readily as stable competences evolve • Practice drives behavior Design options: formal institution of professional practice, all accountable for contributions to innovation, build reflection-in-action skills, use best practices to map and guide actions
Integrity	**Organize work into horizontal flows of innovation problem setting and solving** Because (theory) • Ease of coordination comes from a common ground of coherent work • Different activities flow together with guiding strategies • Larger loosely connected structures can possess stability, resilience Design options: formally recognize domains of innovation practice that flow apart from each other, provided each is guided by similar strategy (projects, businesses, capabilities, strategic management)
Energy	**Energize work by directly resourcing work of innovation** Because (theory) • Energy comes from social resources • Workers are central • People seek wherewithal to accomplish work effectively Design options: direct access to others' time and attention; control over application of one's own expertise; access to multiple options for problems, choices

Structuration and Fluidity

The mutual constitution of social constraint and social action theorizes that situated, hands-on practice keeps people knowledgeable, and that practice can lead to change in competences over time. The structuration construction principle is that managers should define the work of all the organization's workers as the professional practice of innovation. Structuration emphasizes the everyday constitution and reconstitution of social life as regularized practices (Giddens 1982). Organization scholars have extended the idea of practice to collective work in professions (Schön 1983) and to communities of practitioners engaged in the work of innovation (Brown and Duguid 1991; Orlikowski 2002). Work as professional practice emphasizes that people *can* acquire considerable knowledge by drawing skillfully on the situation (Lave and Wenger 1991). When work is defined as professional practice, jobs embody the means and the ends of work, the practical wisdom people rely on (Schön 1983), 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). Practitioners learn to 'reflect in action,' defined by Schön (1983) as 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 surprising consequences. Change occurs as 'the practice' accumulates knowledge

and capabilities, and as skills build up in a community. People take responsibility for the practice, for doing it right, and for contributing their own expertise effectively to it (Brown and Duguid 1991; Barley 1996).

Because work as practice is both an institution and an ongoing accomplishment (Barley and Kunda 2004), duality designs combine direct managerial action to enable change and indirect managerial action to let situated social action emerge. Managers can use 'best practices,' tools, and techniques for managing innovation as constraints that map out possible flows and pathways, not static boxes of activity. Ongoing operational reviews measure cycle times, yield rates, percent of experts that are oversubscribed, capacity utilization, product quality, customer satisfaction, delivery times, market share, or profit margins to help keep the projects and strategies in sync (Leonard 1998). These control processes include objectives to be achieved but emphasize how those objectives come to be, how they emerge continually over time, and how they are interpreted. These processes surface problems so they can be addressed, rather than seek to eliminate variance or punish miscreants (Jelinek and Schoonhoven 1990). These processes therefore keep practices out in the open, to be evaluated and reconceived as necessary.

Structuration and Integrity

The mutual constitution of social constraint and social action theorizes that coordination can emerge easily from a common ground of coherent, shared work and that loosely connected structures can be resilient. The structuration construction principle for integrity is that managers should separate the work of innovation into horizontal divisions of labor, around different sets of innovation problems. Barley (1996) argues that horizontal divisions of labor are the most effective kinds of work relations when knowledge and skills are too complex to be vested in a position or decomposed into separate subsets. Knowledge is preserved and transmitted through extended training along with practice within a community of practice, rather than through rules and procedures. The literature in the previous section indicates that constraint theorists emphasized the strategic and business management challenges of innovation, while the action theorists emphasized the technology development and project-based challenges. Clark and Fujimoto (1991) among others characterize innovation as problem solving. Schön (1983) adds 'problem setting,' which is the artful competence of defining the decisions to be made, the ends to be achieved, and the means that may be chosen. Adding this problem-setting and -solving focus to the four sets of innovation challenges suggests that the work of innovation can be organized into these four horizontal flows of problems: strategic, business, capabilities, and projects. Each innovation problem is a big block of activity that needs to be bounded off as constraint theories emphasize, but each is an ongoing flow of activity with its own inherent emergence, as social action theories emphasize.

As shown in Table 2, this construction principle is also based on a more situated, work-centered understanding of coordination. People working on any one of the problems would have a view of a whole, and could see how their work contributes to that larger work. These larger and loosely connected sets of work also have a certain stability over time, so people working within a given

horizontal flow have regular, sensible work that they would do every day. Integrity depends on how coherent the flows of action are (Weick and Roberts 1993). If people can develop some common ground for collectively enacting new behavior, then they can achieve 'unity of effort' (Lawrence and Lorsch 1967).

Because people can coordinate complex actions with the right kinds of framing, duality designs for integrity start with the formal recognition of these four sets of innovation problems to be continually set and solved: strategic, business, capabilities, and projects. The strategic problem is to set a common direction for all the businesses, functions, and projects, look for new business opportunities, and make the necessary investments in capabilities (Tushman and O'Reilly 1997). Senior managers move charters from business to business to keep resources employed and to seize new opportunities (Helfat and Eisenhardt 2004), oversee technology platforms shared by business units, and choose emerging technologies to invest in. The business problem is to generate profits over time. Business managers oversee product portfolios to maintain the right mix; track dimensions of value for the business such as ease of use, quality, or delivery time; and oversee ongoing assignments among personnel. The capabilities problem is managing R&D, manufacturing, and marketing to support businesses and projects. Technologies and other organizational capabilities provide functionalities for current opportunities, and enable new opportunities by creating new functionalities. The innovation project problem is to design and develop particular new products that meet customer needs and leverage organizational capabilities (Clark and Fujimoto 1991; Leonard 1998). Work within each horizontal flow would emerge fairly readily, provided the other sets of problem setting and solving are being enacted effectively (Dougherty 2006).

Structuration and Energy

Finally, the mutual constitution of social constraint and social action theorizes that workers are energized by social resources that provide the wherewithal to engage in the work of innovation. The structuration construction principle is that managers should energize work by directly resourcing the practice of innovation. Structuration emphasizes resources as an element of structure along with rules (Giddens 1982). Feldman (2004) develops the idea of resourcing, or the creation in practice of assets that enable people to work together. These assets include people, time, money, knowledge, skill, trust, and authority. People use the resources to enact schemas about what we do and how we do it. The theoretical factors underlying this construction principle, listed in Table 2, are based on a more situated, work-centered explanation. People will be energized to innovate if this complex work is enabled directly by the organization, but they will not be energized if they cannot access the needed social resources.

For innovation, people need the resources that enable them to work as professional practitioners in horizontal flows around continued problem setting and solving. Three specific resources can energize these activities: access to others' time and attention; control over how one's own capabilities are applied; and access to a variety of options and alternatives that can be chosen for given problems (Dougherty et al. 2005). Direct access to others' time and attention enables

teamwork, collaboration, and iterative development of problems and solutions. Control over how one's expertise is applied to the project motivates people by giving them a sense of work significance, feedback regarding how one's contributions matter (Hackman and Oldman 1980), and heedfulness (Weick and Roberts 1993). Each person can contribute his or her part effectively, based on an understanding of the whole project and its role in the business strategy. Access to options developed by others that are available to be tried on a given project help people learn more rapidly as they investigate several design options in parallel (Iansiti 1993).

Because social resources enable concerted behavior, duality designs combine careful control over the amount of work and the number of projects being pursued with active promotion of skill building and experience. Wheelright and Clark (1992) tell the story about a company that had no strategic constraints on innovation yet actively pushed innovation. The result was that many people had many pet projects, but none got enough social resources for innovation. Managers had to develop a clear strategy that defined priorities among product lines and allocated time and attention to breakthrough, platform, and derivative projects. Managers can keep the three social resources for innovation available if they strategize to keep time and attention available, and actively promote skill building and experience that help people contribute to the various innovation teams. They can also foster the development of alternatives, and make them available by encouraging networking, task forces to develop ideas, and assigning experts with the responsibility to disseminate new ideas (Cusumano and Nobeoka 1998).

Discussion

The bifurcation between social constraint and social action leads to conflicting designs for organizing for innovation, to conflicting principles of managerial work, and to conflicting explanations for human behavior. This analysis suggests that theories and designs for innovative organizing that are based on only one side of the constraint/action duality of social order are not only incomplete, but also incorrect. However, the limits of these theories are not apparent unless the two sides are compared across the entire design science cycle of theory, principle, and practice. Each side does make sense on its own, because each side captures one essential aspect of social order. Within it own cycle, each side may be self-reinforcing.

Combining design science with a structuration perspective focuses attention on the work and the workers as these are situated in everyday practice. For example, people are boundedly rational, but exactly how such a tendency will play out depends on the situation of work. People are also enormously socially competent, but how they would enact this competence also depends on the situation of work. Coordination can be costly but is not automatically so. This focus suggests three alternate construction principles that embody both constraint and action and reflect more situated and realistic explanations of human behavior. Social constraints are necessary because

the work must be orchestrated, shaped, defined, and guided so that people can come together readily even if they do not know each other, can share key assets with others effectively, and can deal with the inevitable institutional pressures from regulators, competitors, and other social forces. Social actions are also necessary because innovation problems are unpredictable: people must improvise together in the situation since they cannot be told what to do ahead of time. Managers cannot force action and they cannot avoid constraint, so they need to constrain the organization to enable action. If everyday work is focused on tasks that have been abstracted from the whole and thus have little intrinsic meaning and is motivated by coercive authority, then segmentation, rigidity, and de-energized workers arise straightforwardly. But if managerial constraints frame core processes of innovation work so that professional practice is fostered, holistic problems of innovation management are continually addressed, and the necessary resources for everyday work are continually generated, then integrated, fluid, and energized social action arises straightforwardly.

This analysis has emphasized the construction principles themselves because they provide a more general approach to organizing that allows for a variety of situated realities. Managers could implement the principle of work as professional practice in different ways, so some industries may need very deep expertise that requires more complex coordinating, while others can have professional work with less depth or breadth. Managers need to articulate the particular nature of 'the practice' of innovation that fits their sector. To foster integrity, managers bound the practices into separate problems to be set and solved, but which problems are necessary and whether or not one dominates may depend on the nature of the industry. Finally, how to go about resourcing everyday work by enabling access to others' time and attention, control over one's own contributions, and keeping a variety of options available would also vary based on the technology and on the underlying market–technology linking involved.

In conclusion, a design science perspective helps to clarify the conflicts in some existing approaches to organizing for innovation by revealing a split between social constraint and social action. Design science combined with structuration suggests three new construction principles that invite managers and workers to ask what kinds of everyday actions are needed by the organization to generate sustained innovation, and what kinds of constraints would help enable these actions. The construction principles, theoretical explanations, and design options from all three perspectives outlined in Tables 1 and 2 can be tested against each other by science and tried out by practitioners, to really push this kind of design science. Theorists can explore whether and when more constraining or more action-based views of social structure work better than structuration-based ideas. Managers can develop particular approaches for fostering a professional understanding of work roles, keeping the core problems of innovation in the foreground, and for directly resourcing everyday innovation work.

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