Exploitation-Exploration Tensions and Organizational Ambidexterity: Managing Paradoxes of Innovation

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Achieving exploitation *and* exploration enables success, even survival, but raises challenging tensions. Ambidextrous organizations excel at exploiting existing products to enable incremental innovation and at exploring new opportunities to foster more radical innovation, yet related research is limited. Largely conceptual, anecdotal, or single case studies offer architectural or contextual approaches. Architectural ambidexterity proposes dual structures and strategies to differentiate efforts, focusing actors on one or the other form of innovation. In contrast, contextual approaches use behavioral and social means to integrate exploitation and exploration. To develop a more comprehensive model, we sought to learn from five, ambidextrous firms that lead the product design industry. Results offer an alternative framework for examining exploitation-exploration tensions and their management. More specifically, we present nested paradoxes of innovation: strategic intent (profit-breakthroughs), customer orientation (tight-loose coupling), and personal drivers (discipline-passion). Building from innovation and paradox literature, we theorize how integration and differentiation tactics help manage these interwoven paradoxes and fuel virtuous cycles of ambidexterity. Further, managing paradoxes becomes a shared responsibility, not only of top management, but across organizational levels.

Key words: innovation; organizational ambidexterity; paradox; tensions
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1. Introduction

Innovation marks a vital but challenging managerial responsibility. Innovation denotes intricate knowledge management processes of identifying and utilizing ideas, tools, and opportunities to create new or enhanced products or services (Subramaniam and Youndt 2005). To prosper, or even survive, firms must excel at both exploitative and exploratory innovation (Tushman and O'Reilly 1996), yet tensions emanate from their different knowledge management processes (March 1991). As Atuahene-Gima (2005) explain, exploitation hones and extends current knowledge, seeking greater efficiency and improvements to enable incremental innovation. Exploration, on the other hand, entails the development of new knowledge, experimenting to foster the variation and novelty needed for more radical innovation.

Organizational ambidexterity signifies a firm's ability to manage these tensions (Duncan 1976). Ambidextrous firms are capable of simultaneous, yet contradictory, knowledge management processes, exploiting current competencies and exploring new domains with equal dexterity (Lubatkin et al. 2006). Related research suggests multiple paths to ambidexterity. Theories of

architectural ambidexterity propose dual structures and strategies, differentiating efforts to focus on either exploitative or exploratory innovation (Gupta et al. 2006). Contextual ambidexterity, in contrast, emphasizes behavioral and social means of integrating exploitation and exploration (Birkinshaw and Gibson 2004). Socialization, human resource, and team-building practices, for instance, foster shared values and aid coordination, helping actors think and act ambidextrously on a daily basis (Ghoshal and Bartlett 1997).

Whereas literature is replete with warnings about the difficulties of managing exploitation-exploration tensions, related studies inhibit comprehensive understandings, presenting either architectural or contextual approaches and employing conceptual, anecdotal, or single-case studies (Atuahene-Gima 2005, Birkinshaw and Gibson 2004, Jansen et al. 2006). In response, we sought to enable more holistic, empirical research. To investigate exploitation-exploration tensions and their management in practice, we conducted a comparative case study of five ambidextrous firms that lead the product design industry. We chose the firms based on proxies

of ambidexterity, because each had demonstrated consistent profitability and repeat clients (indicators of successful exploitative innovation) while being ranked in *Business Week*'s top 10 for cutting-edge design and receiving prominent design awards (signs of successful exploratory innovation).

Our results offer an alternative framework for examining how ambidextrous organizations manage exploitation-exploration tensions. More specifically, three tensions appeared highly robust, posed as paradoxes because informants described their opposing poles as complementary. These nested paradoxes swirl around strategic intent (profit-breakthroughs), customer orientation (tight-loose coupling), and personal drivers (discipline-passion). Informants lauded integration and differentiation tactics as vital to their management. Integration positions tensions as interwoven and synergistic, whereas differentiation focuses actions on each pole separately. Building from innovation and paradox studies, we theorize how interplay among the paradoxes and their management fuels virtuous cycles of ambidexterity.

2. Innovation, Knowledge Management, and Organizational Ambidexterity

In his foundational work, March (1991) links innovation and knowledge management to explicate tensions surrounding exploitation and exploration. Both forms of innovation entail combining knowledge—one employing existing knowledge in well-understood ways, the other leveraging varied and dispersed knowledge in new ways (Taylor and Greve 2006). As Wadhaw and Kotha (2006) explain, exploitation demands efficiency and convergent thinking to harness current capabilities and continuously improve product offerings. Exploration, in contrast, entails search, variation, and experimentation efforts to generate novel recombinations of knowledge. Studies find that excelling at both exploitation and exploration is vital to successful product development (e.g., Sheremata 2000) and long-term performance (e.g., Tushman and O'Reilly 1996). Fundamentally, however, these knowledge processes conflict (Lubatkin et al. 2006).

The complexity of the tensions intensifies management challenges. Smith and Tushman (2005) posit that exploitation and exploration represent overarching demands, spurring nested tensions throughout the firm. Indeed, Dougherty (1996) depicts firms as grappling with multiple innovation tensions, such as conflicts between outside-inside, new-old, determined-emergent, and freedom-responsibility. Sheremata (2000) similarly describes innovation as a tug-of-war between centripetal and centrifugal forces that fuel discovery and synthesis, respectively, whereas Taylor and Greve (2006) stress that knowledge breadth *and* depth enable product development.

Innovation tensions also may trigger traps, vicious cycles that stem from increasingly one-sided focus on either exploitation or exploration. Firms tend toward homogeneity, finding comfort as they develop mindsets and routines supporting one form of innovation, escalating their efforts in their preferred mode to the neglect of the other (Smith and Tushman 2005). The results are counterproductive and eventually destructive. Exploitation drives out exploration or vice versa (March 1991, Tushman and O'Reilly 1996). An exploitation bent may engender "competency traps" (Gupta et al. 2006). Leveraging current capabilities may enable immediate profits, but foster eventual stagnation, leaving firms vulnerable to market and technological changes (Atuahene-Gima 2005). Likewise, Gupta et al. (2006) describe "failure traps" triggered by gravitating toward exploration. Firms narrowly seeking exploration take escalating risks, attempting to negate past innovation failures while ignoring core competencies. Future opportunities are sought at the expense of today's operations (Birkinshaw and Gibson 2004).

Organizational ambidexterity is prized as a means of managing such innovation tensions. As Beckman (2006) reviews, studies encourage top management to create supportive structures, strategies, and contexts (e.g., Gibson and Birkinshaw 2004, Smith and Tushman 2005, Tushman and O'Reilly 1996). The ideal outcome has been described as balance. Such balance does not denote a mediocre split or bland compromise, but truly excelling at both exploitation *and* exploration (Atuahene-Gima 2005). Prescribed approaches to ambidexterity, however, differ in their emphases, typically advocating either differentiation or integration tactics.

Proponents of architectural ambidexterity, for instance, stress using structure and strategy to enable differentiation. Segregated efforts target either exploitation or exploration. Related tactics rely on spatial and/or temporal separation (Puranam et al. 2006). Spatial separation parses work into distinct units, whereas temporal separation utilizes the same unit but at different times for either exploitation or exploration. For instance, parallel structures may partition the firm (McDonough and Leifer 1983), whereas dual strategies aim the different units at opposing goals (Tushman and O'Reilly 1996). Such differentiation tactics help manage bounded rationality by ensuring focus, but may engender isolation, engrain a preferred innovation mode, and impede coordination between varied efforts (Gibson and Birkinshaw 2004).

Contextual ambidexterity utilizes more behavioral and social means to integrate exploitation and exploration. This approach has been prescribed at the executive level and as a more pervasive approach. Hambrick (1994) describes behavioral integration as a unity of effort through which the top management team synchronizes

their social and task processes. Lubatkin et al. (2006) theorize that greater behavioral integration helps executives cope with the contradictory knowledge processes of exploitation and exploration and enable their joint pursuit. Birkinshaw and Gibson (2004) present contextual ambidexterity as a higher-order approach. Supportive social processes (e.g., socialization and recognition practices), culture, and interpersonal relations help actors throughout the firm think and act ambidextrously. Ghoshal and Bartlett (1997) depict context as the largely invisible set of stimuli and pressures that can shape individual and collective behaviors toward ambidexterity. However, proponents also warn that such integrative efforts may strain actors, given the complexity and potential confusion posed by the contradictory forms of innovation (e.g., Gibson and Birkinshaw 2004).

Although researchers call for more comprehensive models of managing exploitation-exploration tensions, such studies are rare, and methodologically limited. Proponents of both approaches note the equifinality of ambidexterity, stressing multiple, and possibly mutually supportive pathways. Birkinshaw and Gibson (2004), for example, propose that contextual ambidexterity may complement dual structures and strategies by enabling shared values that aid coordination. Likewise, Smith and Tushman (2005) call for top management teams to think ambidextrously, serving as the integrative lynchpin between differentiated units. Yet most research examines specific tactics within one or the other approach. Furthermore, existing works offer conceptual, anecdotal, or single case studies as evidence, inhibiting more holistic, empirical insights (Atuahene-Gima 2005, Birkinshaw and Gibson 2004, Jansen et al. 2006).

Our research responds by providing a comparative case study of five ambidextrous firms, examining their exploitation-exploration tensions and corresponding management approaches (differentiation and/or integration). The research design follows the recommendations of Denison et al. (1995) as we sought to identify specific tensions and their management in practice. It also extends the model provided by O'Reilly and Tushman (2004), which demonstrated the value of learning from ambidextrous leaders. However, whereas their work offered anecdotal evidence from two such firms, we applied a more systematic, empirical approach to study patterns across five exemplars of ambidexterity. We now detail our methods.

3. Methods
Our research entailed a comparative case study. This inductive design applies replication logic. The cases are treated as multiple experiments, each case helping to confirm or disconfirm the findings drawn from the others (Yin 1994). Results are more focused than overarching theories and more valid and generalizable than those of single-case studies, because findings are deeply grounded in varied, empirical evidence (Eisenhardt and Graebner 2007, Yin 1994). Applying prescribed methods of comparative case study (e.g., Eisenhardt 1989, Yin 1994), we selected theoretically relevant cases, collected case data, and conducted iterative, inductive analyses. This method fostered a vital mix of depth and breadth, allowing immersion within multiple, ambidextrous organizations.

3.1. Research Context
We carried out this research in leading new product design (NPD) consultancies for several reasons. First, the NPD context has proven well suited to studying innovation challenges and their management (e.g., Alvesson 1995, Robertson and Swan 2003, Sutton and Hargadon 1996). NPD consultancies are innovation-intensive settings, demanding that firms excel at both exploitation and exploration (Hargadon and Bechky 2006, Hargadon and Fanelli 2002). Product development projects, driven by clients or the consultancies themselves, range from incremental improvements to radical inventions. Further, within such widely differing projects, the firms must identify opportunities to both leverage their existing competencies as well as build new capabilities. Similarities between NPD and other industries may also enable generalizability to a wider population (see Hargadon and Sutton 1997, 2000). This industry resembles others that rely on knowledge workers, such as cultural (e.g., art, movies), high-technology (e.g., research, biotech), and professional (e.g., medicine, law) industries.

Second, we theoretically sampled firms to fit our research focus (Eisenhardt 1989). The five case firms are models of ambidexterity, renowned for their excellence in exploitative and exploratory innovation within the intensely competitive NPD industry. As Sheremata (2000) notes, ambidexterity is essential to successful and ongoing product development. Likewise, according to Tushman and O'Reilly (1996), ambidexterity enables both profitability and innovation over the long term. Indeed, each case firm has remained highly and consistently profitable, while receiving numerous awards and top rankings for cutting-edge innovation.

Lastly, within this setting, we sought firms with similarities that would aid comparisons and replication, yet with sufficient heterogeneity to help assess potential generalizability. Selecting firms that offer common services, including product design, engineering, and branding, helped control for certain contextual factors. In addition, all firms are headquartered in the United States. To provide variety, however, we chose firms with different industry specializations, thereby offering eclectic settings for exploitative and exploratory innovation, and with clients ranging from entrepreneurial firms to Fortune 500 companies. We also selected firms of differing

Table 1   Overview of Case Firms

Firms[a]	Services[b]	Specialization[c]	Year founded	Number of employees	Annual revenues (millions)[d]	Number of offices[e]	Number of awards[f]	Number of projects	Number of patents
Firm A	B., Eng., Gr.D., I.D.	Computer hardware (e.g. desktops, monitors, printers, memory cards)	1984	45	$6.0	2	200 26	3,500	93
Firm B	B., Eng., E.D., Gr.D., I.D., In.D., P.D., P., R.	Consumer and health products (e.g. padlocks, digital thermometers)	1983	125	$19.6	3 2	140 29 1	2,700	280+
Firm C	B., Eng., Gr.D., I.D., In.D., P.D.	Consumer electronics and services (e.g. mobile phones, retail environments)	1969	250	$37.5	8 2	500 41	10,000	200+
Firm D	B., Gr.D., P.D.	Computer hardware and sports equipment (e.g. video game consoles, golf)	1994	16	$1.5	1	15 6 1	250	20
Firm E	Eng., Gr.D., I.D., In.D., P.D., P., R.	Consumer products (e.g. kitchen tools)	1985	65	$8.5	2	125 24	800	100+

[a]Pseudonyms are used to protect anonymity of case firms and their members.

[b]B. (Branding), Eng. (Engineering), E.D. (Environmental Design), Gr.D. (Graphic Design), I.D. (Industrial Design), In.D. (Interaction Design), P (Packaging), P.D. (Product Design), R (Research).

[c]Most of the firm's revenue is derived from consulting in these markets.

[d]Information supplied by principals of each case during fieldwork.

[e]First number is total offices; second is the number of offices outside the United States.

[f]First number is total awards won; second is number of Design *Business Week* Awards; third is Catalyst Award (prize for products that have excelled in the marketplace).

sizes and ages. Table 1 provides an overview of the case firms.

3.2.   Data Collection

Our data collection was intensive, extending over more than four years. We used several data sources: (1) semistructured interviews, (2) archival data, and (3) observation (Table 2 summarizes the data sources per case). Informant interviews were our primary source of inductive data, although archival materials and observations expanded our understandings of each case context (e.g., strategic, operational, and cultural features), offering insights that might refute or reinforce our interview findings (Forster 1994).

3.2.1.   Interviews. We conducted a total of 86 semistructured interviews with individuals (68 men and 18 women) directly involved in the innovation process (e.g., senior executives, directors, designers, engineers). We asked firm founder(s)/CEOs to nominate participating employees across levels, disciplines, and tenure to enable representative sampling. To further ensure that our sample included the most knowledgeable informants, we used a "snowballing technique." We asked

initial informants to recommend others within their firm who could offer further insight. All interviews (lasting 70 minutes on average) involved two researchers and were tape-recorded and transcribed verbatim to ensure reliability (Eisenhardt and Bourgeois 1988).

An interview protocol was designed with exploitation-exploration tensions in mind, but did not include terms like "tension," "contradiction," or "dilemma." Rather, following Spradley (1979), interviews began with questions covering general topics: company history and structure, current projects, relationships with team members and clients, competitors, and a typical workday. Given our inductive aims, we encouraged informants to wander freely in their answers and probed whenever possible. Our interview protocol evolved systematically. As Glaser and Strauss (1967) recommend, the study began with general research aims. Then, as data collection and analysis unfolded, our interviews became increasingly focused. Within each firm, we continued recruiting informants until additional interviews failed to dispute existing, or reveal new, categories or relationships—that is, until we achieved theoretical saturation (Strauss and Corbin 1990).

Table 2   Data Sources

Firm	Interviews[a]	Archival material[b]	Observation
Firm A (at two locations)	CEO (1) Senior managers/directors (10) Product designer (1) Senior industrial designer (2) Industrial designers (7) Graphic designer (1) Senior engineers (2) Engineers (3) CAD and animation (3) Total: 30	Company handbook Appraisal forms Values surveys Marketing material Articles	Office observation (2 weeks)
Firm B	CEO (1) Senior managers/directors (5) Senior Industrial designer (1) Industrial designers (2) Graphic designer (1) Total: 10	Company handbook Marketing material Articles	Office observation (1 week)
Firm C (at two locations)	CEO (1) Senior managers/directors (7) Senior industrial designer (1) Industrial designers (4) Digital designer (1) CAD and animation (1) Total: 15	Company handbook Appraisal forms Marketing material Articles	Office observation (2 weeks)
Firm D	CEO (1) Directors (2) Industrial designers (3) Total: 6	Company handbook Marketing material Articles	Office observation (1 week)
Firm E (at two locations)	CEO (1) Senior managers/directors (13) Senior industrial designers (3) Industrial designers (3) Senior graphic designer (1) Senior engineer (1) Senior design researchers (1) Design researcher (1) Senior model maker (1) Total: 25	Company handbook Marketing material Articles	Office observation (2 weeks)

[a]This column summarizes the number of informants interviewed and roles within their firm.
[b]This column summarizes the forms of archival or secondary material collected for each firm.

3.2.2. Archival Data. Industry reports and internal documents were examined. Before each visit, we gathered articles and Web material related to that firm. During the visit, we also collected documents produced by the firm, such as employee handbooks, marketing material, and press releases.

3.2.3. Observation. Informal, nonparticipant observations were made during site visits. We were invited to examine and take notes of the work environment in all five firms. Within the firms, we shadowed members in their daily routines (e.g., designing on computers, sketching, handling client calls) and in social interactions (e.g., team meetings, impromptu discussions).

3.3.   Data Analysis
Through analysis we moved from raw data toward identification of specific tensions and their management. Our four-stage process followed Glaser and Strauss (1967) and Miles and Huberman (1994). Systematic, iterative comparisons of data, emerging categories, and existing literature aided development of cohesive constructs and an integrative, theoretical framework.

Stage 1. Identifying Initial, Broad Categories Within Each Case. From our interview data, we first compiled

separate case studies of each firm. Examining all interview transcripts, we identified patterns and variance in descriptions of innovation tensions using language indicators such as: tension, friction, yet, but, on one hand...on the other hand, juggle, balance, it can swing both ways, there is a fine line,...how can you...and still.... We also looked for contradictory statements within the same transcript. Across all cases, references to tensions were identified in 78 of the 86 interviews. To further categorize the raw data, we applied techniques advocated by Van Maanen (1979). Specifically, our conceptual coding entailed using in vivo codes (i.e., first-order concepts comprised of language used by informants) or a simple, descriptive phrase when an in vivo code was not available (Strauss and Corbin 1990). These first-order concepts offered general insights into innovation tensions and corresponding management efforts as described by informants.

To assess the reliability of the generated codes, we then involved a second coder with considerable qualitative research experience. Using standardized coding instructions, the second coder examined all interviews for comments indicating tensions and their categorizations. We compared codings, resulting in an intercoder agreement of $k = 0.82$ (Cohen 1960). Disagreements were resolved through discussion between the first author and second coder.

Stage 2. *Linking Related Concepts Within Each Case.* In stage two, we searched for links between and among the first-order concepts, which facilitated grouping them together into second-order themes. A core aspect of the inductive process was that we allowed concepts and relationships to emerge from the data, rather than being guided by a priori hypotheses (Strauss and Corbin 1990). Each completed case write-up was provided to that firm's founder/CEO. Executives shared their views of the categorizations in follow-up sessions.

Stage 3. *Conducting Cross-Case Comparisons.* Using standard cross-case analysis techniques (e.g., Eisenhardt 1989, Miles and Huberman 1994), we looked for similar concepts and relationships across cases, comparing the categories produced in stage two. Similar themes were gathered into aggregate dimensions that served as the basis of our emerging framework. We labeled these dimensions (e.g., strategic intent, integration) either by capturing the content at a higher level of abstraction or by referring to existing literature that described highly similar notions. This process entailed seeking evidence across all cases for tension descriptors, resulting in 341 instances (66 focused on strategic intent, 136 on customer orientation and 139 on personal drivers). We also identified 597 depictions of corresponding management approaches (177 addressed strategic intent, 187 customer orientation, and 233 personal drivers).

We assessed the reliability of each dimension in two ways. First, we involved the second coder, comparing

codings of the first author and second coder. Intercoder agreement was $k = 0.90$ (Cohen 1960). Disagreements were resolved through discussion between the coders. Next, the second author provided an outsider viewpoint. Through extensive discussions, the two authors debated interpretations of the data and probed how data fit within the proposed dimensions. All discrepancies were discussed to reach agreement.

Stage 4. *Building a Theoretical Framework.* In the final stage, we drew on existing studies of ambidexterity and paradox to refine our labels and understandings. To converge on a parsimonious set of constructs, we focused only on the most robust findings. Figures 1(a) and 1(b) depict data structures for identified paradoxes of innovation and their management, respectively.

4. Findings: Paradoxes of Innovation and Their Management

Investigating exploitation-exploration tensions across the case firms, we identified two overarching patterns. First, informants were acutely aware of tensions surrounding opposing forms of innovation, apparent in rich descriptions of three, highly robust tensions. Even more interesting, however, was that actors depicted the tensions as paradoxes—not as either/or dilemmas or trade-offs, but as synergistic and interwoven polarities. Second, integration *and* differentiation tactics were lauded as vital to

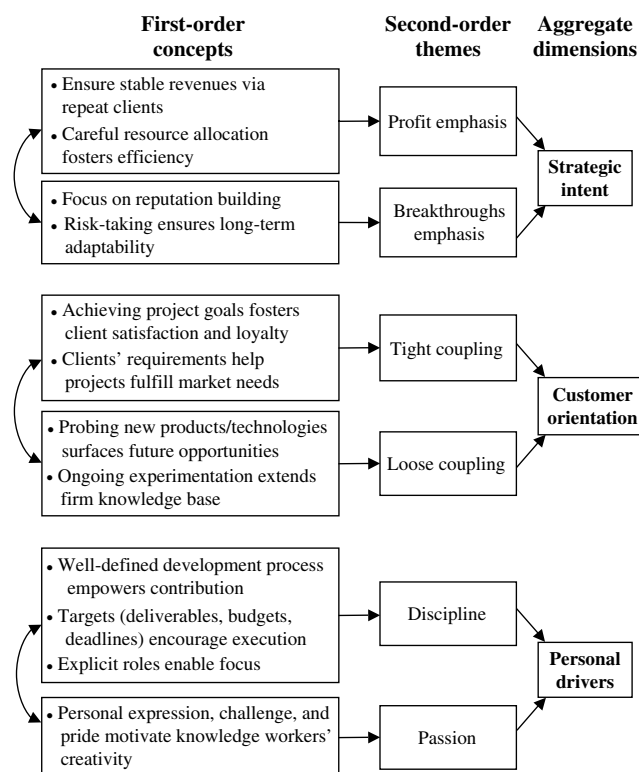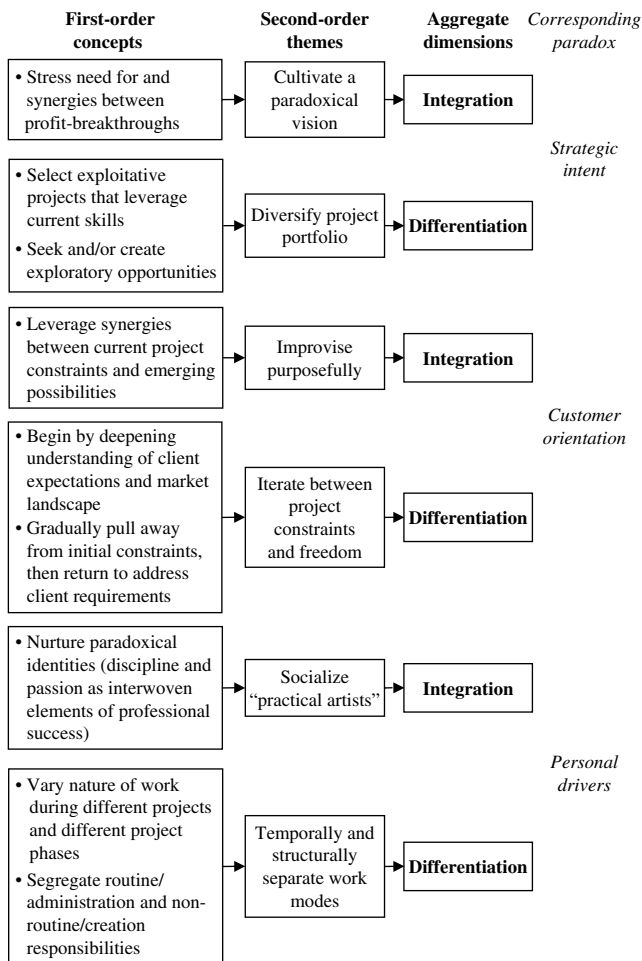**Figure 1(a)   Data Structure: Paradoxes of Innovation**

Figure 1(b) Data Structure: Corresponding Management Approaches

First-order concepts	Second-order themes	Aggregate dimensions	Corresponding paradox
• Stress need for and synergies between profit-breakthroughs	Cultivate a paradoxical vision	**Integration**	
			Strategic intent
• Select exploitative projects that leverage current skills • Seek and/or create exploratory opportunities	Diversify project portfolio	**Differentiation**	
• Leverage synergies between current project constraints and emerging possibilities	Improvise purposefully	**Integration**	
			Customer orientation
• Begin by deepening understanding of client expectations and market landscape • Gradually pull away from initial constraints, then return to address client requirements	Iterate between project constraints and freedom	**Differentiation**	
• Nurture paradoxical identities (discipline and passion as interwoven elements of professional success)	Socialize "practical artists"	**Integration**	
			Personal drivers
• Vary nature of work during different projects and different project phases • Segregate routine/administration and non-routine/creation responsibilities	Temporally and structurally separate work modes	**Differentiation**	

managing each paradox. Although informants repeatedly and across all cases described these tensions and corresponding management practices, variations were apparent, particularly between the smaller and larger firms. Cross-case comparison data tables (see appendix) and illustrative quotes help present these patterns.

To further interpret our findings, we leveraged paradox literature as well as past studies of innovation and ambidexterity. Like other researchers, we came to apply paradox as a valued lens, integral to our emerging framework (e.g., Lewis 2000, Poole and Van de Ven 1989). Similarly, Dougherty (1996) wrote of innovation as a series of complex tensions, whereas Smith and Tushman (2005) called for paradoxical thinking to enable ambidexterity. Indeed, Raisch and Birkinshaw (2008, p. 377) review how March's (1991) influential treatise on exploitation-exploration tensions spurred a gradual movement from a trade-off to a paradoxical mindset. Our results make that mind-set explicit, accentuating paradoxes of innovation revolving around strategic intent (profit-breakthroughs), customer orientation

(tight-loose coupling), and personal drivers (discipline-passion). To unpack each paradox, we examined its underlying tension and corresponding management tactics. Underlying tensions, as Lewis (2000) explains, are the sources of paradoxes and evident in interrelated, yet seemingly contradictory polarities. Like the Taoist symbol of yin yang, the more actors move toward one pole (e.g., profit), the more they feel pull toward the other (e.g., breakthroughs). The resulting sensation is a cognitive tug-of-war. Although the typical reaction is to pull in one direction or the other, without its opposite, each side in isolation is incomplete (Slaatte 1968).

Managing paradox does not imply resolution or eliminating the paradox, but tapping into its energizing potential. According to Eisenhardt (2000, p. 703), effective management leverages paradox "in a creative way that captures both extremes." Our cases highlight integration and differentiation approaches to paradox management. *Integration* efforts stress interdependence between seeming opposites and enable coordination. As noted earlier, advocates of contextual ambidexterity depict social (e.g., Birkinshaw and Gibson 2004) and behavioral (e.g., Lubatkin et al. 2006) means that help actors share and connect divergent knowledge. Similarly, paradox literature encourages actors to find means of linking contradictions, thereby leveraging their synergies (Lewis 2000). In contrast, *differentiation* focuses efforts on either exploitative or exploratory qualities of the paradox. Studies of architectural ambidexterity propose structural and strategic means of differentiation (e.g., Puranam et al. 2006, Tushman and O'Reilly 1996). Paradox literature also articulates this approach. As Poole and Van de Ven (1989) explain, by splitting a paradox, actors focus on each pole to accentuate its distinct value. We now leverage this paradox framework to examine three interwoven paradoxes of innovation: strategic intent, customer orientation, and personal drivers.

4.1. Paradox of Strategic Intent: Profit and Breakthroughs

> We focus on it every day, in everything we do—balance the business side with the creative side to ensure that we are making money, because we are a business, but we are also doing the world's best creative work.
>
> (Senior Manager, Firm C)

This quote exemplifies the strategic intent paradox as tensions emanated from needing to emphasize profit and breakthroughs (see Appendix 1(a)). Similarly, previous research presents strategic intent as a firm's reason for being, often encompassing contradictions. Cameron and Quinn (1988), for example, claim that high-performing organizations seek to maintain internal morale while meeting external demands. In their study of cultural industries, Lampel and colleagues (2000) depict a tug-of-war between commercial success and artistic

expression, proposing that firms must target both to ensure long-run survival.

4.1.1. Underlying Tension. Our findings suggest that case informants viewed the profit-breakthroughs tension as paradoxical. Firm E's CEO explained, "You must be profitable *and* creative . . . . You need everybody thinking like that, right down to the interns. People must fully internalize and understand both sides of that equation—they are both important." As March (1991) explains, exploitation and exploration seek opposing goals—stable revenues that enable higher mean performance or frame-breaking opportunities that foster greater performance variation, respectively. Taylor and Greve (2006) elaborate. They explain that product extensions fuel positive and consistent returns. In contrast, radically new products are characterized by high risk and uncertainty, resulting in varied mixes of high-visibility successes and dismal failures.

Across the cases, a profit emphasis seemed infused with conservatism, as informants stressed the value of repeat clients and efficiency. Indeed, most firms placed a high priority on retaining key clients. A senior industrial designer in Firm B explained,

> We have this one, long-time client that has brought millions and millions of dollars into this company . . . . In addition to that steady income, you are also looking to the other opportunities that the client might bring to the table, especially if the company has several brands under their control.

Efficiency appeared to be a secondary, yet valued, tenet. Informants noted how managers carefully allocate resources and select projects to leverage and hone organizational capabilities. This was most evident in Firm A. Numerous informants stressed how specialization in an industry enables efficiency. As a product design director in that firm explained, "So we try to put the right people on (a project), those who have the background to be most efficient because of their experience."

In contrast to profit's conservatism, a breakthrough emphasis entails risk taking in search of opportunities that may enhance the firm's reputation and adaptability. Reputation building was a paramount goal for all firms, but the nature of the desired reputation varied. The smallest firms (A and D) wished to be viewed as "visionary," thereby making a name for themselves. The other firms, however, sought high-profile projects to attract repeat clients and prospective employees. According to a senior engineering director at Firm C: "People like to work on high profile projects, like X and Y, because they are Fortune 500 companies, so you feel like creating the future of the industry." Often informants stated that being on the cutting edge is why they joined the profession in the first place. A secondary and related advantage of breakthroughs was that such risk taking enhances long-run adaptability. Continuously exploring new domains fosters the flexibility vital in this intense, dynamic field. As a designer noted, "I mean this company always has to stay cutting edge, keep young, you are forced into this position" (Firm B).

Interviews also highlighted the paradoxical link between profit and breakthroughs emphases. Profit, for instance, can provide the slack and opportunity to tackle potentially breakthrough projects. Firm D's CEO explained how repeat clients seek numerous, incremental iterations on their products, building trust to employ the firm for more radical innovation. "We have some very long-term clients, but we've been fortunate because they see us as the group to go to for the next new technology, the next new introduction." Breakthroughs also complement financial goals. One director summed their interdependence: "If you're doing world-class work, then you're going to be happy; you're going to be paid well. You know that (success) will follow" (Firm E). Likewise, reputation-building breakthroughs can reinforce current, and build new, client relationships. In Firm A, the Director of Product Design noted, "We are up there (*Business Week* Top 10) with other innovative firms since we are well-respected for pushing the limits. At the same time we have a reasonably stable type of products we do, so if someone says 'I want to do a desktop' and know that this company is good, they will come to you."

4.1.2. Management Approaches. Seeking profit and breakthroughs and achieving both, however, are different matters, the latter demanding deft ambidexterity. In these firms, managing the strategic intent paradox involved varied mixes of integration and differentiation. Integration entailed cultivating a paradoxical vision that accommodates the dual emphases. Existing studies posit that holding competing strategies need not mean drifting toward some mediocre compromise. Collins and Porras (1994, p. 44), for instance, depict great, enduring firms as espousing *pragmatic idealism*. Such a vision calls for firms to be highly profitable *and* highly idealistic. Likewise, these leading design firms embraced a "both/and vision." According to Firm C's CEO, "I don't believe that you can truly drive profitability if you don't focus on creativity." A senior director in that same firm noted the flip side, remarking that "as long as your group or projects make money, you can pretty much do whatever you want . . . which should foster more creativity." Informants across cases described how distinctive designs attract clients, whereas incremental innovations fund risky work. Such an explicit, paradoxical vision helped actors at all levels value the paradox. A principal of industrial design at Firm B explained the result as "the ability to be creative in a controlled way that deals with project profitability."

Supportive communications help avoid paradoxical visions being interpreted as oversimplified or unrealistic. Reiteration also may build trust and avoid mixed messages, such as employees perceiving cost controls as assuming priority over innovation (Dougherty 1996). Communication was most frequent in the two smallest firms. For example, whereas Firm A holds staff meetings twice a month and Firm D communicates its vision in every project review, Firms B, C, and E have firmwide meetings once a month. Firm A's president explained how his managers seek to provide enough business information to make employees feel at ease with firm decisions, but not so much as to feel micromanaged for financial purposes. A director in Firm A illustrated how their dual purposes are reinforced: "In the first staff meeting that I went to, the CEO was talking to the company about the fine percentage, which is how much time is about current clients versus how much time is spent on exploratory projects." Similarly, a design director in Firm D explained the need to infuse their paradoxical vision throughout the firm: "It's a daily struggle between making money and doing what's true to your heart. Because your ability to make money the next day depends on how true you are to your heart the day before."

In contrast to such integration, differentiation practices target distinctive efforts at each strategic goal. Specifically, these firms diversify their portfolios with more routine, profitable projects and high-risk, breakthrough projects. Wheelwright and Clark (1992) similarly prescribe aggregate project plans. In their view, portfolios ideally include incremental projects that pay the bills and radical projects that build new capabilities and morale. This tactic spatially separates the tensions, enabling focus within distinct projects, yet building a diverse portfolio. Mauzy and Harriman (2003) further describe inventive firms as leveraging current strengths, while taking risks that could drive future business. Case informants applied these tenets. To aid exploitation, the firms sought projects to leverage and hone their existing specializations and knowledge. In Firm B, a principal explained, "we go after certain types of projects based on current skills and interests." Similarly, a director described Firm D's careful selection of incremental projects: "We are trying to have . . . a diverse range of programs that really appeal to what we are really all about: action, sports, but we still do our computer projects because that is the money making activity."

Exploratory projects often require more proactive searches. Informants described widely varying means, such as collaborating with clients and/or suppliers in joint ventures or working for potential equity with start-up ventures. Because breakthrough projects are rare, firms initiate their own as well. Again size played a

distinguishing role between cases. Informants across Firms A and D, the smallest firms, claimed to take the greatest initiative in creating exploratory projects. Indeed, these firms formalized the process (e.g., each has a director of ventures) and seemed highly attuned to seizing entrepreneurial opportunities. Firm A's CEO explained: "By creating new companies we can make work for ourselves rather than having to go out and chase new clients. Instead of waiting for opportunities to come, we create them ourselves." Whereas such examples depict tensions swirling around strategic intent, we now examine how tensions also appeared nested within particular projects, posing a paradox of customer orientation.

4.2. Paradox of Customer Orientation: Tight and Loose Coupling

There is usually a tension between what we believe should be done and what the client believes should be done. . . . Although the person we deal directly with may believe that the X we recommended is best, other forces might make it second best, like a dominant marketing department or their CEO has a strong opinion or a prerequisite in the market. That is always a tension to manage.
(Industrial Design Director, Firm B)

Informants depicted a paradox of customer orientation surfacing during projects, grappling with the need to be tightly and loosely coupled to the client (see Appendix 1(b)). Whereas clients stress competitive, market, and their own constraints, case firms seek to explore emerging technologies and trends. Similarly, Dougherty (1996) describes how product development projects rarely leverage both current needs and future possibilities. Developers of cultural products (e.g., movies, music) face a related struggle, striving to meet mass market demand, and construct new niches (Delmestri et al. 2005, Lampel et al. 2000). Tight coupling to the customer becomes blessing and curse, aiding insight into the current market, but potentially inhibiting development of new segments (Danneels 2003). A designer explained that regardless of project type—exploitative or exploratory—this tension persists. "Everybody is really dedicated to their project and (the client), but they also want to push it further" (Firm D).

4.2.1. Underlying Tension. These cases present a tension underlying customer orientation: Tight coupling stresses needs and constraints, whereas loose coupling notes possibilities and freedom. It is the combination, however, that can fuel innovation success. According to one designer, "It's a tug-of-war . . . between the different priorities of (our) departments . . . and the clients' and market needs. It's the friction of these priorities that gives rise to higher levels of creativity" (Firm C).

Informants demonstrated great client respect, valuing their insights into their market and competition, and seeking to ensure their satisfaction and loyalty. Client-driven boundaries link a project to explicit market needs and to the client's capabilities. As the Vice President of Program Development at Firm B explained, "The client is the expert at what they do, specifically to their category of goods or their industry." Further, tight coupling helps ensure that projects meet client expectations. In the words of one creative director, "If we don't serve the clients first...then we can't develop those client relationships" (Firm C).

On the other hand, loose coupling to clients was stressed, even in the most exploitative, incremental projects, because development teams yearn to probe emerging opportunities and experiment continuously. Project-driven probing was stressed in all firms, because informants shared their desire to push client-set boundaries. According to a senior vice president, "We do it (break the rules) in every project. Because I think that's necessary...there's a high potential that in that process you'll develop some ideas that are very applicable even with all the parameters put back on" (Firm A). Probing in Firms A and D, however, was also internally driven. Informants noted how they felt encouraged to investigate areas unrelated to any current projects, hoping to identify new possibilities in different industries. On a related theme, informants in all five cases advocated ongoing experimentation to extend their firm's knowledge base. As explained by a senior designer in Firm B, "In this kind of business you have to evolve and try to stay ahead of potential trends and have a good understanding of what is going to be around forever and what is truly a temporary fashion trend and a style...you have to look at the bigger picture all the time."

The paradoxical link between these orientations, however, was clear in repeated claims that the interplay of tight *and* loose coupling enables project success. Without efforts to push project constraints, clients may force their views to a point that inhibits innovation. A likely result was described as the regurgitation of mundane, overcommercialized products. Similarly, Danneels (2003) finds that by building close ties with clients, projects can meet market demands, but at great expense as myopic vision curbs longer-term potential. At the opposite extreme, projects driven predominantly by future-oriented designers can lack clear targets and become wasteful. As problems arise, these knowledge workers may become less willing to involve the client, intensifying reliance on their own views. Explained by Firm A's founder, "With designers, they can get so interested in doing cool design, that sometimes they miss the big picture, ignoring the actual business, and even missing opportunities within a project to do something

fun." Likewise, Miner et al. (2001) warn of excessive opportunism. Continuously seeking blue-sky possibilities can create "opportunity traps" that ignore market demands in favor of designer whims. In addition, just as designers may stretch a client's comfort zone, clients may inhibit case firm complacency. As one industrial designer boasted, "We don't have a 'house style.' Our style is very client-driven, very project driven" (Firm B).

4.2.2. Management Approaches. These firms sought a customer orientation that is both tightly and loosely coupled to their clients. Integrative approaches were evident in descriptions of purposeful improvisation. Project work seemed to stress exploiting existing routines and knowledge, while exploring within and pushing project boundaries. Such descriptions fit the Miner et al. (2001) definition of improvisation as recombining existing elements in new ways, much as a musician reassembles previously performed bundles of notes into a unique melody. These efforts enable serendipity, helping link the right idea at the right time with the right need (Robinson and Stern 1998). As one director noted, "We have to be flexible and see things as opportunities, not as constraints...see potential in things that initially look limited" (Firm E). A Firm A designer reiterated, "You have to cater to what the client wants and be creative within the restrictions they set." In many of the firms, knowledge brokering—seeking unconventional connections between varied, existing ideas (Hargadon and Sutton 1997)—fueled improvisation.

Differentiation seemed to entail temporal separation, splitting the tensions by iterating between project constraints and freedom. Most often, informants described starting a project by listening intently to the client, seeking to "walk in their shoes" to fully grasp project goals. Teams then begin to pull away from initial constraints, most often using brainstorming to explore new domains. As projects progress, constraint-freedom iterations may increase in frequency. A design director explained, "When we first start our brainstorming session we try to let (client constraints) go...because usually the really crazy ideas tend to trickle down..." (Firm D). Danneels (2003) depicts the effect of such iterations as tight and loose coupling between creator and customer, enabling creative expression and commercial success. A designer described this ebb and flow as helping clients expand their thinking. "This is part of what they are paying us for—to push them. And you have to come up with creative ways to push them" (Firm B). However, such tensions of customer orientation appeared further nested, as project participants expressed their own tensions, proposed now as a paradox of personal drivers.

4.3. Paradox of Personal Drivers

Why does a lack of constraints equal creativity in people's minds?.... You can argue that mathematicians are

probably the most creative people on the face of the earth—how they come up with something new in such a highly constrained science.

(Industrial Design Director, Firm B)

Informants across cases described discipline and passion as interdependent, fueling their own innovative efforts (see Appendix 1(c)). Such depictions suggested a dual and paradoxical inner drive, whereas discipline, control and structure power execution, passion, pride, and risk taking mobilize creative expression. Such images extend studies noting similar tensions among knowledge workers (e.g., Brown and Duguid 2001, Leonard and Swap 1999).

4.3.1. Underlying Tension. Informants articulated discipline and passion as interwoven. In their view, product development challenges—clients seeking exciting, new products in short time frames with limited budgets—demand both sides of the coin. Successful projects require knowledge workers who "live and breathe design," but also take advantage of streamlined processes to speed development. A Firm B vice president explicated: "A lot of times (clients) will come to us when they have a tricky problem and they need the product to get out a lot faster than they have ever done before. So it is important to have a certain degree of discipline."

Discipline was described in terms of control, accountability, and structure. Informants stressed how well-defined processes empower individual contribution, targets help ensure project execution, and explicit roles enable focus. Similarly, Benner and Tushman (2002) stress that repetition of activities embedded in standardized best practices increase the speed and efficiency of innovation. A principal engineer explained, "We have people...quite creative but if they are lazy, they are not really useful. You can sit around and come up with a great idea but if you don't execute it..." (Firm B). In Firms A and D, senior management defined employees' targets and roles, whereas project leaders assumed this responsibility in the larger firms. Firm D's CEO described how his senior managers support designers and engineers: "basically (we tell them) 'here is the project, here is what we have to do, here are some deadlines, some deliverables to make'—that gives them some structure." Interestingly, roles seemed most dynamic in Firm C, the largest organization. Although roles are clearly assigned by project leaders, their informants noted how employees are likely to move around and between projects as their skills are needed.

In these firms, passion seemed to signify a powerful blending of personal expression, challenge, and pride. Informants described their zeal as emanating from an intense desire for work that is engaging and challenging. They often noted how design permeates their lives, stressing that internalizing their work can open opportunities for unexpected inspiration and artistic expression. A director at Firm C described his hires as follows: "extremely passionate...emotional...we are in an industry that kind of speaks to emotions, people take very seriously what they are doing and it's part of who they are." Such depictions exemplify the centrality of intrinsic motivation to creativity (Amabile et al. 2005).

Interestingly, rather than lament their contradictions, informants described discipline and passion as synergistic. Firm D's CEO stated the link as follows:

My personal philosophy is that designers are like free radical electrons. You let them do their thing, and every once in a while you gather them up and focus them on something, and they become very powerful. Then as soon as that is done, and they produce what they needed to produce, you let them go back and be free radicals again.

Indeed, this and other studies suggest the dangers of discipline without passion, or vice versa. On the one hand, excessive standardization may engender alienation and rigidity (Brown and Duguid 2001). Such results were described as a worst-case scenario by informants— a workplace devoid of inspiration. A senior industrial designer warned about using structure to impose discipline: "When you do that, people can start only acting on the responsibility frame that you give them, and you kind of lose the passion...you become a little screw in the machine" (Firm E). Likewise, passion without discipline can fuel chaos (Levitt 2002). As stressed by one designer, "In such a creative environment, unless you have some structure, it gets out of control very fast" (Firm B). Results can be escalating obsession for individuals and inefficiency for firms.

4.3.2. Management Approaches. To manage the paradox of personal drivers, integration fostered both/ and thinking, while differentiation compartmentalized opportunities for routine and nonroutine work. Integration entailed cultivating paradoxical work identities. Designers, engineers, and managers stressed the importance of socialization—from hiring to mentoring to ongoing reviews—in helping firm employees identify themselves as "practical artists." This seeming oxymoron highlights the simultaneity of discipline and passion. A vice president explained how designer socialization, for example, starts with hiring and self-selection:

You need the designers to be here because they enjoy having the engineers around to help them not create a piece of sculpture, but create a product. People here are *not* sculptors. They decided *not* to be artists. They decided to be designers, and we feed on each other that way. (Firm A)

The Creative Director of Firm C similarly elaborated:

> Well, there's right and left brain—we constantly talk about teaching people how to switch from one side to the other because it is realistic, and as a business, we cannot stay in business if they don't do their timesheets, or if they don't fill their reports out because this is not an art studio where we can sit around and paint all day.

A hybrid of temporal and spatial differentiation appeared to help manage the paradox of personal drivers. Varying the nature of work at different times—during different projects and project phases—enabled knowledge workers to leverage their discipline and their passion. For instance, as projects evolve, a team member's focus systematically shifts between exploitation and exploration. Likewise, individuals rotate across projects, from the incremental product extension to the potentially frame-braking invention. An industrial designer at Firm B elaborated how mixed projects are vital for knowledge workers as well as for the firm:

> We have some exciting projects and some less exciting projects, and I think that the firm consciously tries to give designers a mix because if you are doing hard time all the time, it pressures your soul. We do projects that are much more blue sky.... It is this wonderful deep water that designers can swim in for a while.

In contrast, distinct roles enabled spatial separation as different individuals or units focused on either the discipline of execution, budgeting, and other administrative elements, whereas others tapped into the passion fostered by experimentation and ideation. For instance, the larger firms (B, C, and E) used more division of labor, whereas employees in the smaller firms wear multiple hats. That said, all firms relied on paradoxical identities. In larger firms, this might be vital to help prevent knowledge workers from feeling like administrators. Therefore, although directors, who have risen through the firm, might now focus on billing, client relations, etc., they still see themselves as practical artists. Spatial separation, however, frees other designers and engineers to create.

> Designers think in pictures, certainly not numbers but it doesn't always work well on all projects and all clients. Some clients want clear minutes distributed the day after the meeting and they want to be able to talk to someone about the billing, and the expenses and this and that. Even if designers are good at it, "do we really want them to spend 3% of their time going over bills as opposed to designing?" So, that is why we have project coordinators.
> (Director, Firm E)

We now step back from case details to discuss the paradox of personal drivers, as well as those of customer

Figure 2   Virtuous Cycles of Ambidexterity

orientation and strategic intent, and propose a more comprehensive framework.

5.   Discussion: Fueling Virtuous Cycles of Ambidexterity

Through this comparative case study we sought to contribute an alternative framework for examining exploitation-exploration tensions and their management. Our findings highlight three nested tensions, presented as paradoxes of innovation. Further, managing these paradoxes involved a mix of integration and differentiation tactics. We now build from our case findings and existing literature to theorize how firms might manage innovation paradoxes and thereby fuel virtuous cycles of ambidexterity (see Figure 2 for illustration). More specifically, we propose that three factors interact to reinforce and sustain organizational ambidexterity: a multilevel approach, complementary tactics, and learning synergies. We now leverage existing literature and case study examples to explicate each factor.

First, we propose that a multilevel approach is vital to managing nested paradoxes of innovation. As illustrated in Figure 2, the identified paradoxes are interwoven across levels. Supporting previous claims (e.g., March 1991, Smith and Tushman 2005), exploitation-exploration conflicts spawn a host of tensions throughout organizations. Indeed, the recent review by Raisch and Birkinshaw (2008) called for ambidexterity research that examines multiple levels and reflects this complexity. These case studies enable a more holistic perspective. For instance, the strategic intent paradox appears

predominant at the firm level, whereas customer orientation particularly affects efforts within projects, and personal drivers appear most impactful on knowledge workers themselves. By managing innovation across levels, firms reduce the threat of mixed messages. As Dougherty (1996) warned, efforts to manage only one tension may be contradicted by efforts aimed at other, interconnected tensions. In these design firms, for instance, claims of seeking a both/and strategy aimed at profit and breakthroughs could be easily discounted by one-sided efforts in projects or individual efforts (e.g., overemphasis on tightly coupling projects to their clients and on disciplined work practices might signal that exploitation reigns supreme).

By managing innovation paradoxes across levels, management also becomes the responsibility of actors throughout the firm. Executives set the context, providing strategic leadership and allocating resources that determine their firm's portfolio of projects. Directors and project leaders, in turn, guide specific projects, ensuring adherence to clear development processes and encouraging improvisation as well as iterations between work modes. Finally, knowledge workers themselves choose when and how to best apply their discipline and passion to enhance product development. Together, these efforts reinforce each other in a virtuous cycle as ambidexterity becomes pervasive.

Second, we posit that integration and differentiation offer powerful, complementary tactics for fostering ambidexterity. This combination helps reduce the anxiety and defensiveness that tensions spark and that can spur vicious, rather than virtuous, cycles. As Lewis (2000) explained, actors' typical reactions to tensions are defensive, trying to resolve or eliminate their anxiety by stressing their preferred pole. The results are counterproductive. "In attempting to reduce the frustrations and discomfort of tensions, actors' defensive behaviors initially produce positive effects but eventually foster opposite, unintended consequences that intensify the underlying tensions" (2000, p. 763). Such is often the case in innovation, as studies note the potential traps of one-sided, escalating efforts toward either exploitation or exploration (e.g., Gupta et al. 2006, Tushman and O'Reilly 1996).

Virtuous cycles, in contrast, stem from embracing tensions, valuing their synergies, and their distinctions (Lewis 2000). Blending integration and differentiation fosters this effect. Integration tactics accentuate the importance of both poles of exploitation-exploration tensions. These social and cultural approaches (e.g., organizational vision, project norms for improvisation, and socialized identities as practical artists) enable a paradoxical mindset. However, differentiation is also vital. Clearly focusing actions (e.g., on projects targeted at different strategies, at constraints or freedom during project phases, and with segregated work modes) helps maximize the distinct benefits of opposing poles.

The final factor that may sustain ambidexterity is the learning synergies enabled by exploitation and exploration efforts. Although March (1991) depicted these as disparate learning activities, he stressed that success stems from their simultaneity. Jansen et al. (2006) elaborated, explaining that the interplay between exploitation and exploration enables absorptive capacity. Conceptualized by Cohen and Levinthal (1990), absorptive capacity denotes a firm's ability to recognize, assimilate, and apply new knowledge. Exploitative efforts help transform knowledge into commercial ends, but without exploration a firm's stock of knowledge will wane (e.g., being utilized repeatedly until a firm is stuck in a specific product or industry niche). Likewise, exploratory efforts help continuously renew and expand a firm's knowledge base, but without exploitation that knowledge may not be utilized fully (e.g., recombined in varying ways across projects or product iterations). In essence, the two modes of innovation are mutually reinforcing. According to Smith et al. (2005), innovation is a dynamic capability, demanding attention to both existing knowledge and knowledge creation.

Our five case studies exemplify such learning synergies. Absorptive capacity is demonstrated in their ability to thoroughly utilize their knowledge base, deepening, honing, and leveraging their industry and product specializations, while broadening their competencies by seeking more radical innovation and even developing their own projects to investigate emerging technology and market domains. The results are impressive. Each firm has remained at the top of the product design field in terms of financial performance and cutting-edge products.

In conjunction, a multilevel approach, complementary tactics, and synergistic learning fuel virtuous cycles of ambidexterity. For instance, a paradoxical vision of the firm as seeking both profit and breakthroughs may foster improvisation as project teams value client-set boundaries, while pushing those boundaries to probe new possibilities unconsidered by the client. In turn, the need to exploit and the opportunity to explore may foster the discipline and passion that energize individual knowledge workers. As the cycle continues, interactions reinforce ambidextrous practices, positioning the firm to meet financial goals and leverage frame-breaking opportunities. Resulting benefits validate paradoxical thinking and actions, and thereby sustain ambidexterity. However, given the need to manage such complexity in consistent yet paradoxical ways, it is not surprising that ambidexterity remains a much lauded, but rarely achieved, organizational capability. For this reason, we hope that these

case firms may serve as exemplars and motivate further research. In this light, we now examine the implications of our study and suggest directions for future research.

6. Implications and Future Directions

Leveraging comparative case studies and blending innovation and paradox literature enabled development of a framework that explicates exploitation-exploration tensions and their management. More specifically, our work identifies nested tensions, posed as paradoxes of innovation, illustrates the value of blending differentiation and integration approaches, and theorizes the potential for interwoven paradoxes, and their management to fuel virtuous cycles of ambidexterity. Given our goal of developing a model that might spur more comprehensive empirical research, we now examine opportunities for testing and extending our framework.

Seeking to learn from ambidextrous exemplars, we studied firms that excel at exploitative and exploratory innovation. The NPD industry is acclaimed for its innovative intensity, and these five firms are industry leaders in terms of profits and awards. However, whether and how their lessons apply elsewhere raises important questions. We encourage future studies to extend our work to other services as well as more conventional manufacturing. Existing research notes similar tensions in cultural industries (Lampel et al. 2000) and product development groups within more traditional industries (Taylor and Greve 2006). Whether linking integration and differentiation tactics enables ambidexterity in such contexts, however, requires investigation. Likewise, the relationship between organizational size and this blended management approach needs assessment. The patterns presented here were robust across cases, but size differences were evident. For instance, the smallest firms seemed more intent on reputation building and risk taking than their larger counterparts. Size, however, is relative. All five firms would be deemed small in most industries. However, researchers note the need for such alternative models of ambidexterity because managing innovation tensions is increasingly vital in large corporations (e.g., Dougherty 1996, Sharma 1999). Lubatkin et al. (2006), for example, suggest that executives of larger firms reconsider separating units to focus on either exploitation or exploration, and instead create units capable of pursuing both. Further, we are left questioning how/if nested tensions and their management would vary in less ambidextrous or even poorly performing organizations. Research indicates the potential for vicious, rather than virtuous, cycles in nonambidextrous firms, but call for more targeted, empirical research (e.g., Jansen et al. 2006).

Another direction for future research lies in applying other research lenses. Our study stressed the role of management. Tapping innovation and ambidexterity literature, we delved into *how* firms might cope with innovation tensions, proposing that management is itself paradoxical—requiring integration and differentiation efforts throughout the firm. This finding connects studies of architectural (e.g., Tushman and O'Reilly 1996) and contextual (e.g., Gibson and Birkinshaw 2004) ambidexterity. It also elaborates calls in practitioner literature for paradoxical, both/and approaches to management (e.g., Collins and Porras 1994). However, our management emphasis begs future studies of more underlying processes such as sensemaking and cognition. As Smith and Tushman (2005) note, effectively managing exploitation and exploration may require a paradoxical mindset. Indeed, paradox literature stresses that paradoxical thinking is vital to combating natural, often counterproductive tendencies to overrationalize or avoid tensions (Eisenhardt 2000, Poole and Van de Ven 1989). Delving into underlying sensemaking and cognition may suggest powerful enablers and deterrents to pervasive ambidexterity.

7. Conclusion

In today's dynamic world, innovation may pose the ultimate advantage and challenge for organizations. These leading design firms embrace paradox as exploitation-exploration tensions swirled around seemingly contradictory but interwoven forces. Informants richly articulated the benefits of both poles of exploitation-exploration tensions and their synergies. Furthermore, their use of both integration and differentiation approaches to managing paradoxes of innovation demonstrate managerial creativity. The cases presented and resulting theory offer insights into the intricacies of ambidexterity and may spark future attempts to refute or elaborate our findings and the potentially valuable role of a paradox perspective.

> A paradox is an idea involving two opposing thoughts or propositions which, however contradictory, are equally necessary to convey a more imposing, illuminating, life-related or provocative insight into truth than either fact can muster in its own right.... What the mind seemingly cannot think, it must think. (Slaatte 1968, p. 4)

Appendix 1(a). Data Table for Cross-Case Comparisons: Strategic Intent

Exploitation—exploration tension		Management approaches	
Profit emphasis	Breakthroughs emphasis	Integration: Cultivate a paradoxical vision	Differentiation: Diversify project portfolio

Profit emphasis	Breakthroughs emphasis	Integration: Cultivate a paradoxical vision	Differentiation: Diversify project portfolio
1. Ensure stable revenues via repeat clients *Firm A—Strong** "We do a lot of work for X and this has helped us last year to remain financially strong" (CEO). *Firm B—Strong* "We have this one, long-time client that has brought millions and millions of dollars into this company" (Senior Industrial Designer). *Firm C—Strong* "We have had a few big projects for longer term clients, where we have done dozens of TVs, for example, or dozens of cell phones" (Director, Mechanical Engineering). *Firm D—Moderate* "…and the other thing is, did we help our client make money? If you get to satisfy them they'll bring you more business" (Design Director). *Firm E—Moderate* "If you do work for this company (computer peripheral), you might have some breakthrough thinking, but then that breakthrough thinking gets applied to three different products, which becomes more about execution" (President). 2. Careful resource allocation fosters efficiency *Firm A—Strong (Weekly resource scheduling meetings by senior management, stress industry specialization)* "So we try to put the right people on (a project) to have the background to be the most efficient because of their experience, we need to work within parameters in order to do this" (Director, Product Design).	1. Focus on reputation building *Firm A—Strong ("Visionary" through experimental projects, awards, press)* "I think the other part of our reputation is really good creative work…we are trying not to put too much stock in awards, but they are really nice. They are great because I basically like the whole idea of saying things to Business Week…because (clients) are going to call these top firms and if we don't stay there we are in trouble" (VP). *Firm B—Strong ("High profile" via breakthrough products, awards, press)* "You do great work, more clients who want you to do great work come to you…company Y does all these really high profile projects that everybody knows about…and the projects have to be sexy to begin with" (Senior Industrial Designer). *Firm C—Strong ("High profile" via breakthrough products, awards, press)* "We were doing this shoe project for the MOMA (Museum of Modern Art)…that was one of the most satisfying I would say, to me and the company, because that won an ID award, and went on to be in several magazines, it got a lot of press" (Industrial Designer). *Firm D—Strong ("Visionary" through experimental projects, awards, press)* "Another project, it's a very high profile award for a TV show so it's pure kudos. It's just an opportunity to creatively show off" (Design Director).	Stress need for and synergies between profit-breakthroughs *Firm A—Strong (Formal communication involving all staff reinforces dual-emphasis; two staff meetings per month)* "In the first staff meeting that I went to, the CEO was talking to the company about the fine percentage, which is how much time is about current clients versus how much time is spent on exploratory projects" (Director). *Firm B—Moderate (Formal communication involving all staff reinforces dual-emphasis; one staff meeting per month)* "Every month we have a staff meeting where we update people on business that we have done, new business coming in, awards or products featured in press, how each group does financially" (Principal, ID). *Firm C—Moderate (Formal communication involving all staff reinforces dual-emphasis; one staff meeting per month per office)* "We have a management meeting where we talk to each other on a formal, but frequent basis…and then we have employees who are confidently working on projects that share stuff with other offices. So that tends to create cross-communication. Within each office, we meet the first Monday of every month, the whole office, and have everyone describe what they are doing" (VP Creative Media).	1. Select projects that leverage skills *Firm A—Strong* "You may do computer hardware for a year" (Director, Product Design). *Firm B—Strong* "We go after certain types of projects based on current skills and interests" (Principal, ID). *Firm C—Strong* "Maybe you take on a client where the work is not so creatively joyful…say something that we have done 100 times…" (Senior Manager). *Firm D—Strong* "We are trying to have…a diverse range of programs that really appeal to what we are really all about: action, sports, but we still do our computer projects because that is the money making activity" (Design Director). *Firm E—Strong* "I think that the focus here is more on commercial, mass-produced products. That is what we're really good at doing" (Industrial Designer). 2. Seek/create radical opportunities *Firm A—Strong (Initiating own projects, receiving equity in high-risk clients, and developing joint ventures—managed by the Director of Ventures)* "By creating new companies we can make work for ourselves rather than having to go out and chase new clients" (CEO). *Firm B—Moderate (Initiating own projects and receiving equity in high-risk clients)*

Appendix 1(a). (cont'd.)

Exploitation—exploration tension		Management approaches	
		Integration: Cultivate a paradoxical vision	Differentiation: Diversify project portfolio
Profit emphasis	Breakthroughs emphasis		

Firm B—Moderate (*Monthly resource scheduling meetings by heads of groups, stress industry and problem specialization*) "I think ultimately the best way to do it is by having a reputation for doing really amazing things in difficult areas so people that have difficult problems call you" (CEO).	*Firm E—Strong* (*"High profile" via breakthrough products, awards, press*) "Design is design, so we're pursuing bigger, more Fortune 500 companies" (Director, Industrial Design).	*Firm D—Weak* (*Project reviews reinforce dual-emphasis*) "We try to do a review after every project, just to look at what we accomplished what we got out of it" (Design Director).	"We may decide to take a project in where it is a small company that they have no money but we will get an equity interest in the thing" (CEO).
Firm C—Moderate (*Monthly resource scheduling meetings by heads of groups, stress industry and problem specialization*) "For efficiency, and the understanding that you develop—like if you worked on cell phones for a while, you know a lot about them, and you are going to be very effective at doing the next one" (Director, Mechanical Engineering).	2. Risk-taking builds long-term adaptability *Firm A—Strong* "The company does take risks: employees are willing to do something differently in terms of materials, trends, etc." (Design Director). *Firm B—Strong* "I mean this company always has to stay cutting edge, keep young, you are forced into this position…" (Industrial Designer).	*Firm E—Moderate* (*Formal communication involving all staff reinforces dual-emphasis; one staff meeting per month per office*) "…sometimes, they go down to talking figures, I think that the more explicit they are, the better. They also tell us if they are not doing that well, and what they'll do about it. There is also a part in which they discuss marketing—the projects coming in and the proposals that we have sent out, and where we are. There is also one part which I think is pretty cool. It is called work in progress" (Industrial Designer).	*Firm C—Moderate* (*Initiating own projects, receiving equity in high-risk clients and developing joint ventures*) "We developed a new kind of product development partnership where the design firm, the retailer, the manufacturer, the license brand are all sitting at the table" (Senior Manager).
Firm D—Moderate (*Resource scheduling meetings by senior management for new projects, stress industry specialization*) "When we get a new project we decide who's the best qualified to do this" (Design Director).	*Firm C—Strong* "People like to work on high profile projects, like X and Y, because they are Fortune 500 companies, so you feel like creating the future of the industry…a few worked on the X TV and it's selling really well" (Senior Director, Engineering).		*Firm D—Strong* (*Initiating own projects, receiving equity in high-risk clients and developing joint ventures—managed by the Director of Ventures*) "We have hired a managing director just for that. He's developing this as a separate business on how we get compensated for the design work that we do and the ideas that we come up with. It's royalty or equity in projects" (CEO).
Firm E—Moderate (*Monthly resource scheduling meetings by heads of groups, stress industry and problem specialization*) "Everybody here is working on like, 3 or 4 projects at a time…so they might have a forté in certain areas of product design" (Director, Industrial Design).	*Firm D—Weak* "We try to stay focused on the top position of the marketplace and we get certain types of projects that fortunately are usually fun, fast, aggressive ones" (CEO). *Firm E—Strong* "We are responsible for shaping the future and trying to make people's lives easier and better" (Designer).		*Firm E—Moderate* (*Initiating own projects and receiving equity in high-risk clients—managed by one of the founders*) "We've done about 200 or 300 X products since we sort of co-founded the company" (Director, Industrial Design).

Notes. Strong: repeatedly indicated by a majority of the case informants; *Moderate*: indicated by some informants; *Weak*: indicated by a few informants.
   *Strength of evidence.

Appendix 1(b). Data Table for Cross-Case Comparisons: Customer Orientation

Exploitation—exploration tension		Management approaches	
		Integration: Improvise purposefully	Differentiation: Iterate between project constraints and freedom
Tight coupling	Loose coupling		

1. Achieving project goals fosters client satisfaction and loyalty
*Firm A—Strong**
"While listening to the clients and trying to give them what they need, we will try to find opportunities to innovate" (Senior Industrial Designer).

Firm B—Strong
"We spend a lot of time with the client to understand what they are really trying to do and what we can do for them" (CEO).

Firm C—Strong
"That is where this firm's rationale comes in…if we don't serve the clients first…we can't develop those client relationships" (Creative Director, Industrial Design).

Firm D—Strong
"…and if you're successful the client keeps giving you more and more" (CEO).

Firm E—Strong
"So we kept raising the bar and they kept wanting to go with us because we were willing to raise the bar with them" (Director, Engineering).

2. Clients' requirements help projects fulfill market needs
Firm A—Strong
"We are in the business and work about creating user experiences that carry our clients…we take clients' technology and their brand and create user experiences out of that" (President).

Firm B—Strong
"The client is the expert at what they do, specifically to their category of goods or their industry" (VP Program Development).

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1. Probing new products and technologies surfaces future opportunities
Firm A—Moderate (Project and internally driven)
"We are trying to give employees the opportunity to be innovative and creative and think about things in the future and about possibilities" (Graphic Designer).

Firm B—Moderate (Project-driven)
"In this kind of business you have to evolve and try to stay ahead of potential trends and have a good understanding of what is going to be around forever" (Senior Designer).

Firm C—Moderate (Project-driven)
"We pull a lot from our history, but we are also constantly looking forward" (Senior Manager).

Firm D—Moderate (Project- and internally driven)
"We are trying to help establish strategies for markets to move forward" (Design Director).

Firm E—Strong (Project-driven)
"A product for a completely new target market that you have never really considered is challenging. Bringing something new in terms of materials" (Industrial Designer).

2. Ongoing experimentation extends firm knowledge base
Firm A—Strong
"They allow a lot of freedom to experiment" (SVP, Design).

Leverage synergies between current project constraints and emerging possibilities
Firm A—Moderate
"There are many pressures: ecological, businesses, opportunities to collaborate in new different ways, the capabilities of the internet to connect things and enable new things. You've got designers who can synthesize technology, reality (associated with our physical way with things that would be meaningful to society) and then they've got to take a point of view and put it together and use their own insight to do something with this. If you try to throw one out, it is easy to miss something" (CEO).

Firm B—Moderate
"I think it's very important to the company that we do work that has not only immediate but long-term impact on the world and people…that we do very thoughtful design…'how they are going to react to it?' 'how are they going to be affected by it?' … I think we are about respect…respecting the user, the client, each other" (Director).

Firm C—Moderate
"Another thing that improves creativity, I think, is creative abrasion, where it's just the friction of the development process…" (Industrial Designer).

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1. Begin by deepening understanding of client expectations and market landscape
Firm A—Strong
"For example, last Friday we went on the X store to see the products and projects that X is working on" (Senior Mechanical Engineer).

Firm B—Strong
"We take all these into consideration and what we try to do is always relate our recommendations back to the consumer or the user or the feedback of the marketplace" (Director, Industrial Design).

Firm C—Strong
"We look at other products" (Director, Mechanical Engineering).

Firm D—Strong
"We try to really collect as much information and immerse ourselves in that as possible, anything from magazines and movies to the internet to buying all the competitors' products and tearing them apart" (CEO).

Firm E—Strong
"The company's philosophy…or let's say the positioning which is somewhat based on the philosophy is that we are really trying to improve products for people…and we do that through really observing and we really try to understand how people live, how people behave, how people interact with the products and through that process we try to identify opportunities" (Senior Vice President).

2. Gradually pull away from initial constraints, then return to address client requirements
Firm A—Strong
"I am often motivated by working on the first phase, the

Appendix 1(b). (cont'd.)

Exploitation—exploration tension		Management approaches	
		Integration: Improvise purposefully	Differentiation: Iterate between project constraints and freedom
Tight coupling	Loose coupling		
Firm C—Strong "I have the people involved in the project right in with the client meeting. I want them to hear first hand what the client needs…because they need to understand the client's goal" (Senior Director, Engineering).	*Firm B—Strong* "There is something about carving stuff with your own hands that allows you to understand exactly what is going on with that form that you cannot necessarily get with the mathematical model of the computer" (Director, Industrial Design).	*Firm D—Moderate* "Everybody is really dedicated to their project and (the client), but they also want to push it further" (Designer).	conceptual phase…we give ourselves more freedom, like I told you before presenting a wide range of concepts and that is pretty fun versus the refinement phase made for a client, which does not involve taking risks, and it is going to be a matter doing a lot of CAD work…it is not going to be as much exciting" (Industrial Designer).
Firm D—Strong "We are very open and collaborative with our clients" (CEO).	*Firm C—Strong* "In that early phase of concept development, they might be better just building a quick model, or just communicating the idea differently" (Director, Mechanical Engineering).	*Firm E—Moderate* "There was a little bit of direction, like an underlying core of design language coming from the clients' side, that was developed there, and was part of their product lineage history, but they are looking for the next thing…this is a big trend 'planned obsolescence'; it's great for designers in a way, because companies need to update their products, so they are really looking for fresh ideas" (Director, Industrial Design).	*Firm B—Moderate* "Creativity actually is…to envision a possibility that does not exist. Designers remove constraints…to envision an alternate product, an alternate technology, an alternate life, something very different…." (Principal Engineer).
Firm E—Strong "So usually all the client criteria and marketing criteria and all these things don't hamper the creativity too much, because you expect these criteria" (Director, Industrial Design).	*Firm D—Strong* "We get mock-ups done" (CEO).		*Firm C—Strong* "People are more open, like the clients realize, like, 'yeah, let's go a little bit wider first, and then narrow it later'" (Senior Industrial Designer).
	Firm E—Moderate "…and also materials and technology—bringing something new in terms of materials is challenging" (Industrial Designer).		*Firm D—Moderate* "When we first start our brainstorming session we try to let (client constraints) go… because usually the really crazy ideas tend to trickle down and maybe a part of that can still be applied to what the end result will be" (Design Director).
			Firm E—Strong "Everybody contributes with their expertise in all stages. But I think that in an initial phase, everyone is still involved to generate ideas, we usually have brainstorming sessions, but then you definitely need the team leader to hold the vision of the product" (Senior Industrial Designer).

Notes. Strong: repeatedly indicated by a majority of the case informants; *Moderate*: indicated by some informants; *Weak*: indicated by a few informants.
  *Strength of evidence.

Appendix 1(c). Data Table for Cross-Case Comparisons: Personal Drivers

Exploitation—exploration tension		Management approaches	
		Integration: Socialize "practical artists"	Differentiation: Temporally and spatially separate work modes
Discipline	Passion		
1. Well-defined development process empowers contribution *Firm A—Strong** "The way that we do it (minimize failure) is by having processes in place…if you have a process, you build prototypes and you do things to test the design before you release" (COO). *Firm B—Strong* "I see the structure of the process, I understand the process, and how I can contribute to the process…. We don't want to say, 'this is our process, just memorise it' it's like a living body…it keeps changing" (Principal, ID). *Firm C—Strong* "We change the definitions of these things all the time, but right now, I would say that we have a 6-stage process that starts with zero, and goes to five" (Director, Mechanical Engineering). *Firm D—Moderate* "Product Design is A to Z…everybody kind of touches one point or another of that" (Designer). *Firm E—Strong* "…we have team leaders and a team structure to help make sure that the projects are staffed for successful results. I think that our process has become better refined over the years" (President). 2. Targets encourage execution *Firm A—Strong* (*Defined by senior management*) "I am responsible for understanding what is going on in the projects. I am also responsible for scheduling, profitability, etc." (Design Director). *Firm B—Strong* (*Defined by project leaders*) "We have a lot more internal structure and discipline, true project management…to make sure the project is going according to plan from both sides. So it is important to have a certain degree of discipline" (VP, Program Development).	Personal expression, challenge and pride motivate knowledge workers' creativity *Firm A—Strong* "The creative side for me is how I do my work, what new tools I can use, what I bring in, what kind of expertise I think we're going to be needing in the future" (Director). *Firm B—Strong* "Creativity occurs within some structure but the actual process itself is not overly structured" (VP, Program Development). *Firm C—Strong* "I think that the answer is to develop the right kind of flexibility, first of all, so that you can customize the process to address the particular client problem, and then secondly, just to communicate well enough within the team to make the new criteria and milestones clear in every case" (Director, Mechanical Engineering).	Nurture paradoxical work identities (discipline and passion as interwoven elements of professional success) *Firm A—Strong* "People have flexibility to exercise their passion and the company hires passionate people who are also balanced and diverse" (Design Director). *Firm B—Moderate* "I think there are opportunities in phases for people to be creative and open-ended about what they're doing…and then, this is where the senior people come in; my job is navigation and editing" (Principal, ID). *Firm C—Strong* "Well, there's right and left brain—we constantly talk about teaching people how to switch from one side to the other because it is realistic, and as a business, we cannot stay in business if they don't do their timesheets, or if they don't fill their reports out because this is not an art studio where we can sit around and paint all day" (Creative Director, Industrial Design).	1. Vary nature of work during different projects and project phases *Firm A—Strong* "You can definitely use your creativity for both things but it is a little bit different in the blue-sky projects; we give ourselves the subject and use our imagination, versus some less exploratory projects" (Industrial Designer). *Firm B—Moderate* "There are times where we may explore a bunch of different directions on what this project might work like, how it might function, what the architectural layout of the product might be, that is very open. While in other times we have to narrow the ideas down" (VP, Program Development). *Firm C—Strong* "The main point of phase zero, I would say, is to define the problem…let's gather all the information that we can about what this product should be and then distil that down to something that is very clear. In Phase one, it is basically concept exploration. And the goal there…is to come up with lots of ideas. And so it is sketching, it is building little models…it is trying to figure out what the possibilities are…" (Director). *Firm D—Moderate* "Making the product move along efficiently and successfully based on the fact that maybe one designer might be better at sketching, another might be better at modeling" (Designer). *Firm E—Strong* "Well, we have you know five phases that we all kind of follow, but within these phases there may be different kind of things that we may do…but generally, you know that in the beginning, you're this wide and your narrowing down, and narrowing down, that's understood" (Senior Design Researcher).

Appendix 1(c). (cont'd.)

Exploitation—exploration tension		Management approaches	
		Integration: Socialize "practical artists"	Differentiation: Temporally and spatially separate work modes
Discipline	Passion		

Firm C—Strong (Defined by project leaders)
"We set deliverables.... It is all about what is going to happen tomorrow, what is going to happen by the end of the week—that is like, as far out as we look sometimes" (Senior Industrial Designer).

Firm D—Strong (Defined by senior management)
"Basically (we tell them) 'here is the project, here is what we have to do, here are some deadlines, some deliverables to make'—that gives them some structure" (CEO).

Firm E—Strong (Defined by project leaders)
"Teams and clients understand what is meant by certain deliverables" (VP, Engineering).

3. *Explicit roles enable focus*
Firm A—Moderate (Static, assigned by senior management)
"There is one person who organizes everything well, he seems to be able to delegate things well and get people involved" (Graphic Designer).

Firm B—Strong (Static, assigned by project leaders)
"There is generally a fairly explicit structure, we know who is running it. We know generally what our roles are" (Industrial Designer).

Firm C—Strong (Dynamic, assigned by project leaders)
"The process is mapped out from the start ...as best as it can be, but it's always on shifting sand" (Industrial Designer).

Firm D—Moderate (Static, assigned by senior management)
"They (employees) need to feel like part of a team but they have their own role" (CEO).

Firm E—Strong (Static, assigned by project leaders)
"You would notice order because we're very serious about these infrastructures, you know, meetings happening regularly, team meetings and coaches, who are more experienced people, making sure that they're keeping tabs..." (Director, Industrial Design).

Firm D—Strong
"My personal philosophy is that designers are kind like free radical electrons. You let them do their thing, and every once in a while you gather them up and focus them on something and they become very powerful. Then as soon as that is done and they produce what they needed to produce, you let them go back and be free radicals again" (CEO).

Firm E—Strong
"Have a very common foundation but within that we allow more flexibility" (VP, Engineering).

Firm D—Moderate
"There is only a certain type of person who can really fit anyway...a person who could probably adapt, but it is definitely the more open, more self-motivated individual who can get stuff done and has to do both" (Designer).

Firm E—Strong
"Some things you may pick up through some of the culture...there are things that people pick up through osmosis" (Director, Industrial Design).

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2. *Segregate routine/administration and nonroutine/creation responsibilities*
Firm A—Moderate (Unclear)
"You're either billing to clients or you're billing to nonbillable categories like marketing, general administration, etc." (COO).

Firm B—Strong (Clear)
"I think that there's a lot of effort that is done with our business development group, our marketing group and with other key people in the company who are looking to bring in new business" (Director).

Firm C—Strong (Clear)
"We have a group of business development people, we have a group of strategists, a group of general managers...and then we have producers also.... These peoples' job is to think about the client, and the business objectives. So, the designers are somewhat insulated..." (Director).

Firm D—Moderate (Unclear)
"Everyone here wears a lot of hats...it's a pretty flat organization...we have a few titles" (Design Director).

Firm E—Strong (Clear)
"Designers think in pictures, certainly not numbers but it doesn't always work well on all projects and all clients. Some clients want clear minutes distributed the day after the meeting and they want to be able to talk to someone about the billing, and the expenses and this and that. Even if designers are good at it, 'do we really want them to spend 3% of their time going over bills as opposed to designing?' So, that is why we have project coordinators" (Director).

Notes. Strong: repeatedly indicated by a majority of the case informants; *Moderate:* indicated by some informants; *Weak:* indicated by a few informants.
  *Strength of evidence.

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