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Turning the Sword: How NPD Teams Cope with Front-end Tensions

Abstract

Front-end NPD is fraught with tensions that fuel *and* inhibit innovation. According to paradox theory, tensions pose a double-edged sword, sparking learning and creativity or anxiety and counterproductive responses. NPD teams' shared understandings – how they think about (cognition) and approach (motivation) tensions – may turn the sword. Existing literature offers insights into NPD tensions and their management. Yet scholars call for research to dive deeper, unpacking cognitive and motivational drivers underlying how innovative teams cope with NPD tensions. Absent studies of these drivers in practice, their nature, interplay and influence remain speculative.

In response, we conducted a four-year inductive study of 5 NPD consultancies. In the innovative firms studied, our findings explicate the roles of paradoxical cognitive frames and regulatory motivational focus. Across the firms, we found that front-end NPD teams framed tensions paradoxically. Three frames – guided freefall, benevolent dictatorship and cohesive diversity – helped teams develop shared understandings of innovation tensions as paradoxical, posing competing yet interdependent demands. Teams varied, however, in their regulatory focus, influencing how they applied the frames to approach tensions. In the most innovative case, teams approached tensions with a promotion focus, energized to explore tensions in search of more creative alternatives and synergies. In less innovative cases, teams applied a prevention focus, motivated to avoid risk and loss. Together, paradoxical frames and regulatory focus shaped teams' coping behaviors and resulting innovation.

In our discussion, we theorize the dynamic interplay between cognitive, motivational and behavioral drivers of innovation. Results offer three contributions. First, this study extends understanding of antecedents to team innovation broadly and front-end NPD specifically. Second, findings deepen insights into team cognition and paradoxical frames. Lastly, we explicate how cognitive-motivational interactions enable coping behaviors that may fuel innovation.

We conclude with managerial and research implications. Building from paradox theory we propose means to foster shared paradoxical frames and promotion focus in NPD teams. Noting study limitations, we encourage research to extend its generalizability and further elaborate underlying drivers of innovation.

Keywords: *NPD; front-end; cognition; motivation; paradox; regulatory focus; qualitative research*

Practitioner points

1. Adopting paradoxical frames and a promotion focus helps teams at the front-end of NPD cope with tensions and fuel virtuous cycles of innovation.
2. Training front-end NPD leaders and team members in paradoxical thinking will help them frame competing demands as synergistic and tap into the energizing potential of tensions.
3. Positive messaging about NPD tensions that emphasizes gain, risk and movement, over cautiousness and vigilance, aids adoption of a promotion focus – motivation that helps further mobilize front-end innovation.

Introduction

Scholars stress that the early stages of NPD are critical and tenuous. Front-end NPD sets the bounds of any new product and its eventual success (Markham, 2013). However, teams at the 'fuzzy' front-end face intense and competing demands that challenge their innovation efforts (Kock et al., 2015). Amidst rising market and technological uncertainty, they need to take risks, push boundaries and break away from existing paradigms in their pursuit of creativity (Poskela and Martinsuo, 2009; Eling et al., 2013). Yet, at the same time, front-end NPD teams must work within financial and deadline constraints, target their efforts towards the company's goals, and endorse seamless coordination of their typical cross-functional, project-based members to ensure efficiency (Khurana and Rosenthal, 1998; Backman et al., 2007; Leenders et al., 2007; Edmondson and Nembhard, 2009).

Existing literature offers valued insights into practices that help teams manage these tensions. For instance, scholars argue that integrating group processes aid NPD teams' simultaneous pursuit of creativity and efficiency (Poskela and Martinsuo, 2009). Likewise, studies find that quality-focused information acquisition, together with speed-focused idea screening and rigorous idea selection, enhance the quality and efficiency of generated ideas, fueling innovation (Schmidt et al., 2009; de Brentani and Reid, 2012; de Oliveira et al., 2014; van Ende et al., 2015).

Yet scholars increasingly call for research to dive deeper, examining underlying drivers that help NPD teams cope with innovation tensions (Nakata and Im, 2010; Liu et al., 2015). According to paradox theory, tensions pose a double-edged sword fuelling learning and innovation or triggering anxiety and counterproductive responses (Lewis, 2000). Shared understandings – how team

members think about (cognition) and approach (motivation) tensions – may turn the sword (Schad, Lewis, Raisch and Smith, 2016). NPD scholars note that shared understanding helps teams cognitively adjust to competing demands 'on the fly' (e.g., Açıkgöz et al., 2014). Moreover, cognitive and motivational drivers may work together, reinforcing a shared purpose that supports team innovation (Montoya-Weiss and O'Driscoll, 2000; Zhang and Doll, 2001; Chang et al., 2007). To date, however, the field lacks studies that unpack cognitive and motivational drivers of innovation.

Scholars have proposed that paradoxical cognitive frames and regulatory motivational focus may enable shared understandings that help teams cope with innovation tensions. Paradoxical frames denote particular types of understandings "that individuals use to embrace seemingly contradictory statements or dimensions of a task or situation" (Miron-Spektor et al., 2011, p. 229), and may foster a shared 'both/and' mindset that help teams work through and even thrive amidst tensions (Andriopoulos and Lewis, 2009; Lin and McDonough III, 2014). Cognitive psychologists posit that regulatory focus – motivation reflecting a promotion or prevention focus – influences how teams use and reinforce shared understandings to approach issues (Florack and Hartmann, 2007). For example, NPD teams applying a promotion focus are more likely to collectively view and then approach challenges as opportunities for learning, while prevention-focused teams may be more wary and risk adverse (Spanjol et al., 2011). Yet absent studies of both cognitive and motivational drivers in practice, their nature, interplay and impact on innovation remain speculative. To address this gap, we took a rigorous, theory-building approach (Fischer and Otnes, 2006), conducting a four-year study of 5 NPD consultancies.

We begin by reviewing NPD, paradox and cognitive psychology literatures that provided our theoretical base. We then present our methods from research design

and case selection to our data collection and data structure. In the innovative firms studied, our findings explicate the role of paradoxical frames and the energizing influence of a promotion focus in helping teams cope with NPD tensions. In our discussion, we theorize how innovation drivers – cognitive, motivational and behavioral – interact, fueling virtuous cycles of innovation in the front-end of NPD. This inductive study offers at least three contributions to research. First, our study broadens understandings of the antecedents of team innovation, depicting and elaborating the value of paradoxical frames and regulatory focus. Second, this research contributes to paradox theory, demonstrating how paradoxical cognitive frames enable mechanisms for coping with innovation tensions. Third, we extend research on the interplay between cognitive and motivational factors, showcasing how a team's regulatory focus can dim or enhance the effect of cognition on team innovation efforts. We conclude with implications for practice, examining how management interventions may foster shared mindsets and approaches to fuel innovative performance of front-end NPD teams.

Literature Review

The front-end of NPD is receiving increasing attention, given its considerable impact on firm innovation and the ultimate success of new products (de Brentani and Reid, 2012; Markham, 2013). Early front-end activities include opportunity identification, opportunity analysis and idea genesis (Koen et al., 2001; Koen et al., 2013). In opportunity identification, front-end teams explore business and technological opportunities that they may want to pursue (Leifer et al., 2000). Such opportunities could relate to modifications of current products (de Brentani and Reid, 2012) or spark an entirely new direction for the company, requiring changes to existing technological and/or market infrastructures (Garcia and Calantone, 2002). Teams then

assess and refine identified opportunities (Koen et al., 2013), translating them into concrete ideas. This requires thinking 'outside the box', but also iteration in refining generated ideas (Koen et al., 2001). Late front-end activities then involve idea selection and concept and technology development (Koen et al., 2013). NPD teams select ideas with an aim to pursue those that bring the most business value (Kester et al., 2011). Refining the concept further focuses efforts on appropriate technology development (Reid and de Brentani, 2004). Rather than a clear, sequential process, however, there is much iteration among these activities.

NPD Tensions and Front-end NPD Teams

The front-end of NPD is inherently tenuous, challenging project teams (Khurana and Rosenthal, 1998; Stevens, 2013). NPD teams require high levels of freedom and independence to take risks, push boundaries and break away from existing paradigms in their pursuit of creativity (Poskela and Martinsuo, 2009). Yet unclear beginnings, uncertain parameters, multiple goals and dynamic decisions can impede team dynamics and coordination (Chang et al., 2007; Edmondson and Nembhard, 2009). A certain amount of control is, therefore, necessary to foster efficient use of resources, target efforts towards the company's goals and enable effective collaboration (Backman et al., 2007; Leenders et al., 2007).

The ability of teams to cope with NPD tensions has been identified as an important source of innovation (Leenders et al., 2007). Although our knowledge of such processes is still in its infancy, NPD studies have started to explicate enabling practices. Schmidt et al. (2009), for instance, identified effective screening of ideas and concepts and fast decision making as key to optimizing the front-end of NPD. De Brentani and Reid (2012) similarly stressed that although ideas and concepts must be

allowed to grow flexibly, the quality and speed of information acquisition and processing is equally critical. De Oliveira et al. (2014) argued for introducing criteria, procedures and methods that lead to more systematic and clear decision making for front-end NPD teams. van den Ende et al. (2015) added that rigorous idea selection enhances speed, but also helps set direction and enhance the quality of resulting ideas.

Increasingly, NPD studies call for research into underlying cognitive and motivational drivers that may jointly shape behavioral team processes and fuel innovation (Nakata and Im, 2010; Liu et al., 2015). Examining cognitive drivers at the front-end, Zhang and Doll (2001) highlighted the value of a 'common framework' or shared understandings that guide team efforts. Chang et al. (2007) argued that it is important to identify that nature of team members' cognitive frames and potential variations between members so the team can discuss how to best deal with differences. Shared understandings may help NPD teams more quickly and efficiently adjust to changing demands, coordinate their actions, and positively impact their performance (McDonough III and Barczak, 1992; Açıkgöz et al., 2014). Yet we lack empirical studies of cognitive frames shared by font-end NPD teams. In practice, what kinds of shared understandings help teams cope with innovation tensions?

Moreover, scholars note that the motivational drivers of front-end NPD teams may affect innovation performance (Zhang and Doll, 2001). Montoya-Weiss and O'Driscoll (2000) discussed the importance of front-end NPD teams having a shared purpose, motivation and plan of action. Chang et al. (2007) similarly underlined the need for a team vision at the front-end. However, we lack empirical research that unpacks how motivational drivers impact NPD teams' innovation in the fuzzy front-end. To further explore the relationship between cognition, motivation and innovation, we now turn to cognitive psychology and paradox theory.

Team Cognition and the Promise of Paradoxical Frames

Cognition researchers focus increasing attention on cognitive drivers that impact team behaviors and performance (Mathieu et al., 2000; Lin and McDonough III, 2014). Through interaction, teams construct a shared understanding of their context, enabling cognition to be distributed across its members (Madhavan and Grover, 1998; Cannon-Bowers and Salas, 2001). Resulting cognitive frames influence how members will interact relevant to team goals, thereby impacting their coordination processes and performance (Kozlowski and Ilgen, 2006). In sum, shared cognitive frames provide lenses that allow teams to collectively interpret, make decisions regarding and act upon different situations (Mathieu et al., 2000).

Paradox research conceptualizes paradoxical cognitive frames as a valued aid to managing innovation tensions (Andriopoulos and Lewis, 2009). Paradoxical frames cognitively juxtapose contradictions in ways that allow actors to recognize and accept the simultaneous existence of competing demands, and to embrace, rather than avoid or deny, the tensions (Lüscher and Lewis, 2008). Such a "both/and" mindset may help actors identify links between opposing forces and aid generation of new frameworks and ideas (Smith and Tushman, 2005). In laboratory studies, paradoxical frames have been linked to greater exploration, sensitivity to unusual associations and generation of new combinations, which enable creativity to flourish (Miron-Spektor et al., 2011). Given scarce field studies, insights into how paradoxical frames aid innovation and front-end NPD teams in particular are limited (Lin and McDonough III, 2014).

Regulatory Focus: A Motivational Complement to Cognition

Motivational processes may complement cognition in shaping team behaviors (Liu et al., 2015). Regulatory focus theory proposes that individuals differ in how they pursue

goals, focusing either on aspirations and accomplishments (promotion focus) or on responsibilities and safety (prevention focus) (Higgins, 1998). For individuals, a promotion focus has been found to direct emphasis on the presence and absence of gains, favor action and pursuing risk, and encourage movement and eagerness strategies (Higgins, 1997; Kruglanski et al., 2002). Such focus can boost idea generation by facilitating the consideration of new possibilities (Friedman and Förster, 2005). In contrast, a prevention focus stresses the avoidance of losses, prefers cautiousness and vigilant strategies, and accentuates details and 'doing the right thing' (Higgins et al., 2003). Idea screening, for example, should benefit most from the vigilance embodied in a prevention focus, so that any potential losses are minimized or prevented (Kröper et al., 2011).

As the effects of regulatory focus have primarily been studied at the individual level, the impact of regulatory focus on teams is less clear (van Knippenberg and Schippers, 2007). Team regulatory focus has been portrayed as a malleable property that emerges or is shaped by team leaders and team behaviors (Owens and Heckman, 2016). Motivations in team settings are regarded as more complex, and potentially more impactful, than in individual tasks because people bring their own regulatory foci and more diverse knowledge to the tasks at hand (Schmidt et al., 2001; Spanjol et al., 2011). A shared regulatory focus, therefore, is likely to reinforce and magnify individual motivational tendencies (Tindale and Kameda, 2000).

Team regulatory focus has been linked to varied risk preferences (Florack and Hartmann, 2007). Promotion-focused teams are more likely to be motivated by the risk of sacrificing a promising opportunity and thus have a more 'eager' bias, which encourages a high degree of action (Scholer et al., 2008). Conversely, prevention-focused teams are more likely to be driven by the risk of not realizing the desired

return on their effort and, hence, tend to be more risk averse (Florack and Hartmann, 2007). Consistent with these findings, Spanjol et al. (2011) argued that NPD teams whose members share a promotion focus may exhibit a greater tendency to pursue new opportunities, than NPD teams whose members share a prevention focus. As such a promotion focus has thus been suggested to be of particular value in R&D (Lanaj et al., 2012).

Conclusions from the Literature

Despite growing agreement that the way NPD teams think about and approach tensions may influence their innovation efforts, we lack empirical research that unpacks the roles of cognitive and motivational drivers in dealing with these tensions. Team cognition and team regulatory focus literature stress that this could be a crucial omission in our understanding of innovative teams (e.g. Mathieu et al., 2000; Florack and Hartmann 2007). This gap motivated our inductive study.

Methodology

As the literature review demonstrated, previous research has not investigated how NPD teams' cognitive and motivational drivers fuel innovation in the fuzzy and tenuous front-end. To address this gap, we used a modified grounded theory design, whereby emerging lines of inquiry are motivated by theoretical sampling and constant comparison among extant literature, data and emerging theory (Fischer and Otnes, 2006). This discovery-oriented approach has been proposed as particularly helpful for exploring paradoxes, tensions and process issues (Beverland et al., 2016).

Research Setting and Theoretical Sampling

We considered several industries that could shed light on our research question (e.g. video gaming, NPD consultancies, consumer electronics). By reviewing previous studies (e.g., Alvesson, 1995; Hargadon and Sutton, 1997) and initiating discussions with other academics and practitioners, we concluded that the NPD consultancy industry was exceptionally well suited. Given their focus on the front-end of NPD and nature of their daily work, innovation tensions pervade this setting (Sutton and Hargadon, 1996). NPD consultancy teams strive to deliver highly creative solutions within tight schedules and budgets (Hargadon and Bechky, 2006). Their work is characterized by project complexity and fluid boundaries (Edmondson and Nembhard, 2009). Moreover, team membership in these firms spans functions (industrial design, engineering, graphic design, etc.) and levels (executives to middle managers and knowledge workers), and is temporary (project based) and dynamic.

As Eisenhardt and Graebner (2007) recommend, we focused our sampling to address the specific gaps we sought to fill, while limiting potentially confounding factors. For this research, studies across NPD, cognitive psychology and paradox literatures concur that cognitive and motivational drivers help teams manage tensions and thereby foster innovation. Gaps, however, are significant in terms of *how* these drivers operate in the practice of front-end NPD teams. Applying rigorous conventions (Strauss and Corbin, 1998), we worked with other academics and practitioners in the NPD field to theoretically sample cases using two criteria. First, case firms had to be highly and consistently profitable, while also receiving numerous awards and top rankings for cutting-edge innovation. As such, team efforts to optimize *both* efficiency *and* creativity in front-end NPD work would be observable.

Studying front-end NPD teams in successful firms could then enable deeper insights into how such teams cognitively frame tensions to foster innovation and how their motivational drivers further affect this process. Second, cases had to be headquartered in the US and offer similar services (such as product design, engineering, and branding among others) for clients ranging from start-ups to Fortune 500 corporations, but also differ in industry specializations, size, age, and revenues. This aided our aim of inducting accurate, parsimonious and generalizable theory (Eisenhardt and Graebner, 2007). Based on academic and practitioner recommendations, information available on the Internet, reviews by the business press (e.g. Business Week, I.D.), data provided by industry associations (e.g. PDMA) and company documents, we included five NPD consultancies in our sample (Table 1 provides an overview of the case firms and data collection).

Insert Table 1 about here

Data collection

Over a four-year period, we collected data from multiple sources, primarily semi-structured interviews, supplemented with archival documents and non-participant observation.

Interviews. Consistent with our inductive research approach, we conducted a total of 83 interviews with senior executives, directors, designers and engineers directly involved in the front-end of NPD (66 men and 17 women). We first interviewed the firms' founders/CEOs, also asking them to nominate employees across levels, disciplines and tenures. We then asked initial informants to highlight

others within their firm who could provide further insight. This ensured representative sampling. All interviews (lasting 70 minutes on average) were tape-recorded and transcribed verbatim to ensure reliability (Eisenhardt and Graebner, 2007).

An interview protocol was designed with NPD tensions in mind, but did not include terms like ‘tension’, ‘contradiction’ or ‘dilemma’. Rather, following Spradley (1979), interviews began with warm-up questions about the informant’s work history and general topics: company history and structure, current projects, relationships with team members and clients, competitors, a typical workday and typical projects. To avoid being too abstract, we would also dive more deeply into specific issues and concrete examples. We asked informants to consider their front-end NPD team experiences and answer our questions based on this experience (Barczak and Wilemon, 2003). For example, we asked them to discuss what their teams grappled with in everyday work, inquired for examples, and explored coping mechanisms. Given our inductive aims, we encouraged informants to wander freely in their answers, probing whenever possible. Our interview protocol evolved systematically. Following Glaser and Strauss (1967), 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, 1998).

Archival documents and observation. Before each visit, we gathered articles and web material related to the case firm. During the visit, we also collected documents produced by the firm, such as employee handbooks, marketing material and press releases. Moreover, informal, non-participant observations were also made during site visits. Within the firms, we shadowed members in their daily routines (e.g., designing

on computers, handling client calls) and in team meetings and impromptu discussions. Information from archival documents and observations assisted interview preparation and added insights in our understanding of the phenomenon (Souitaris et al., 2012).

Data Analysis and Trustworthiness

Following Miles and Huberman (1994), our data analysis started by compiling separate case studies for each of the five firms. Examining all interview transcripts, we identified paradoxical frames by looking for contradictory statements or dimensions of a task or situation within the same transcript (Miron-Spektor et al., 2011). We used language indicators such as: tension, friction, yet, but, on one hand… on the other hand, juggle, balance, how can you… and still… (Andriopoulos and Lewis, 2009). Table 2 summarizes our coding definition, language indicators and offers illustrative quotes of paradoxical frames for front-end NPD tensions.

Insert Table 2 about here

Coding was done by the first two authors, while the third challenged their interpretations. We frequently met, compared and discussed our findings and disagreements involved a refinement of the emerging theory. The analysis began with open coding (Strauss and Corbin, 1998), using in-vivo codes (e.g. the actual terms used by the informants to identify key emerging concepts). For example, “democracy”, “deliberation”, “coordination” and “central authority” emerged as open codes at this stage. Axial coding then involved understanding how our open codes fit together to suggest more abstract, theoretical categories. For example, “democracy” and “deliberation” both related to a “high degree of freedom”, while “coordination” and “central authority” related to “strong leadership”. Selective coding then surfaced

the paradoxical frame of *"Benevolent dictatorship"*. Four more paradoxical frames emerged from our data analysis: *"Guided freefall"*, *"Cohesive diversity"*, *"Serious play"* and *"I design for others"*.

Drawing on Dutton et al. (2001), we performed a simple count of the number of informants who mentioned each paradoxical frame within each case firm, as our exploration focused on cognitive frames evident of a 'shared understanding'. Following Elsbach (2003), we defined strong evidence for a paradoxical frame as one indicated by the majority of informants. Moderate evidence was defined as a frame discussed by several case informants, and weak evidence as a frame indicated by only few informants. We decided to focus on the paradoxical frames with strong and moderate evidence. Therefore, we did not include the "Serious play" and "I design for others" paradoxical frames in further analysis as these were mentioned by only few informants. Figure 1 depicts the data structure for paradoxical frames.

Insert Figure 1 about here

As we continued to work on our data analysis, it became apparent that applications of the three paradoxical frames varied across the five case firms. We sought alternative theories that could explain this variation. We identified the regulatory focus theory (Higgins, 1997; 1998) as a possible framework and then coded the emerging paradoxical frames as promotion focused (characterized by positivity, gain and an energizing quality) or prevention focused (depicted by negativity, loss and fear). Table 3 summarizes our coding definitions, language indicators and offers illustrative quotes of a promotion and prevention focus.

Insert Table 3 about here

Issues of research trustworthiness were assessed through standard grounded theory criteria (Strauss and Corbin, 1998). Similar to other studies (e.g. Flint et al., 2002; Beverland et al., 2016) we sought: credibility (used the same researchers to collect data; sent a summary of initial interpretations to representatives from each case firm), transferability (theoretical sampling), dependability (informants reflected on many recent and past experiences), confirmability (third author challenging interpretations; feedback on preliminary findings from two researchers in this field), integrity (interviews of professional, anonymous and non-threatening nature), generality (interviews were of sufficient length) and understanding (summary of findings presented to informants; presented summary to colleagues and practitioners).

Results

Our data revealed two robust and overarching patterns across the case firms (see Table 4). First, informants across the cases deployed three paradoxical frames (guided freefall, benevolent dictatorship and cohesive diversity) as cognitive drivers in teams' efforts to manage innovation tensions at the front-end of NPD. These frames facilitated corresponding coping mechanisms (improvisation, working consensus and collective interdependence, respectively). Second, variations in regulatory focus – promotion or prevention focus – appeared to shift applications of the paradoxical frames in subtle, but impactful ways. Interestingly, in Firm C, which exhibited the highest levels of innovation (measured by design awards, Table 1, as per Blau and McKinley, 1979), paradoxical frames were most consistently promotion focused, while in the remaining firms a prevention focus prevailed. We now detail our results.

Insert Table 4 about here

Guided Freefall

Guided freefall served as a paradoxical frame, helping teams cognitively structure conflicting, yet interwoven needs to search broadly for new opportunities, while remaining bounded by project constraints and/or focusing advice. Across cases, informants discussed how they grappled with having to think outside the box, but also within specifications, budgets and deadlines set by their clients and their firm. The COO of Firm A explained how this tension challenged NPD team members:

> *"This challenges the thinking that some designers have. They believe that in order to do good design, a company must always overrun project budgets or do mediocre projects within budget."*

Informants noted that too much emphasis on coming up with original ideas and concepts, with little focus on budget, time, client or market constraints was ineffective. The CEO of Firm D warned about the paralyzing effects of focusing on creativity at the expense of efficiency:

> *"If we did nothing but free radical without structure we wouldn't get anything done..."*

At the same time, they argued that overemphasis on specifications and constraints would thwart the flexibility that they required for creativity to flourish.

Likewise, informants depicted how horizontal and vertical advice both pushed and constrained innovation, helping encourage broader exploration to move ideas forward, while keeping project constraints in sight. A Senior Graphic Designer in Firm E explained how such advice aided creative expression:

> *"There is always this mentality that anybody can figure it out. But a lot of projects have a point where they feel a little bit like 'Oh my God! Now what?' My director is almost always the one I talk to."*

Given the high-risk nature of some projects, NPD team members valued knowing that their peers or project manager would keep them on track, without sacrificing needed creative accidents. A Creative Director in Firm C stressed this point:

> *"Stretching, everybody needs to be stretched a little bit but not stretched to the point where it hurts… if you're not stretching, you're not challenged, but you can't let people stretch to the point where it can be too damaging to them or the project."*

Emphasis was placed on stretching to strive for ambitious objectives, while knowing that support was firmly in place. A Graphic Designer in Firm A explained:

> *"Yes, and then we have to get these graphics that I am designing on the cloth and that is going to take a lot for experimentation, and we have to buy a bunch of different types of clothes and try putting these through a printer, and we have to try a lot of different stuff… I feel really backed up by people here, like I can ask them anything that I would like, there is a huge breadth of experience."*

This paradoxical frame appeared most often in the early front-end activities (opportunity identification, opportunity analysis, idea genesis), or exploratory efforts within the later phase of concept and technology development. By helping front-end NPD teams cognitively structure discovery-constraint tensions, guided freefall frames mobilized *improvisation* as a coping mechanism. Informants described how such thinking encouraged them to 'push the envelope' through experimentation and problem solving, while feeling secure within project specifications. This allowed them to recombine existing elements in new ways, for instance, within an existing product domain. A Firm A designer discussed this coping mechanism:

> *"You have to cater to what the client wants and be creative within the restrictions they set."*

Benevolent Dictatorship

Informants across cases argued that embracing a high degree of deliberation and rigorous screening of ideas was vital to innovation at the front-end. *Benevolent dictatorship* frames appeared to aid teams' understanding, and indeed appreciation, of this tension. The Firm D CEO explained the need to gather divergent contributions during deliberation *and* ensure convergence through clear decision-making:

> *"Typically, it is like a benevolent dictatorship. It is kind of 'I want to collect everybody's ideas, collect everybody's input on the project. What do you guys think? Where should we emphasize the direction? Is our point of view this and articulating that?' And then at some point they may have to make the decision."*

Across the five case firms, informants highlighted the needed flexibility to debate diverse ideas and solutions, while also valuing clear 'go/no go' decisions to progress effectively. Creativity necessitated non-routine problem solving and deviation from existing knowledge and, therefore, relied on bottom-up influence of subordinates within vertical relations. Referring to a recent project, the Vice President of Programs in Firm B recalled:

> *"Everybody has a say, but ultimately, when a tough decision has to be made, somebody has to make it… Usually the senior person is responsible for that...Everybody pretty much has an open voice, so your voice can be heard, but it doesn't mean that that's going to be the final decision. But you will be heard and that is encouraged."*

Project leaders would nurture divergence, even conflicts, because these increased the ability to combine knowledge. Yet, at the same time, centralized authority was sought to guide and speed innovation. The top-down influence of project leaders facilitated information-processing efficiency and collaboration. Authority was, therefore, valued for the resources and coordination it provided. Across cases, benevolent dictatorship frames helped front-end NPD teams build a common perception of how decisions were made, while enabling needed deliberation.

Informants across cases discussed deliberation-decision tensions most evident when screening and selecting of ideas took place, for instance, in the stages of idea selection and concept and technology development. Informants explained how front-end NPD teams would reach points where unless a decision was made, they would drift into endless arguments, surfacing frustrations of 'getting stuck'. A Design Researcher in Firm E, for example, noted:

> *"… we waste so much time talking about theoretical stuff… it can be frustrating when you spend more time on that than talking about the things that you are actually doing."*

During such activities, the benevolent dictatorship frame mobilized a *working consensus* as a coping mechanism within teams. This encouraged project members to work through valued disagreements. Project leaders facilitated decision making, but centralization did not preclude high degrees of participation by lower-level personnel. An Industrial Designer in Firm C summed the evident interdependence:

> *"I don't want to be a designer that's like doing what somebody is telling me, right, like almost a dictator. But at the same time, I also want to have the knowledge that…he knows what we are doing here."*

Through their benevolent dictatorship frames, team members had common expectations of leaders' roles and their working relationships in screening/selecting ideas and concepts. Vertical relations were seen as reciprocal. A Creative Director in Firm D explained this further:

> *"Design is an inclusive process but it's not a democratic process... where it starts to fail is if no one is taking the leadership."*

Cohesive Diversity

The *cohesive diversity* frame supported shared understanding of the need to recognize and mesh varied social practices in NPD teams. Informants' descriptions of valued

team interactions during their front-end efforts accentuated the power of individual differences, as well as a strong sense of cohesion. Indeed, informants often described their collaboration in terms of tensions, chaos, and energy. The President of Firm A, for instance, noted during his interview:

> *"So we benefit from different viewpoints and benefit from creating enough chaos. Enough happy accidents have happened that go with the best results at the end. So, we are going out and searching in the forest for good ideas, you got some people that just look under rocks, right, and you got other people who tend to look up in the trees."*

Of the three, most prominent paradoxical frames, cohesive diversity was the most prevalent, appearing repeatedly throughout all stages of front-end NPD, as well as across the five case firms. Informants applied the frame as they described how they grappled with tensions between needing a highly diverse membership (e.g. discipline, experience, nationality), as well as a common ground in collaboration. A Designer in Firm D explained:

> *"It is like building a professional sports team, you have to find people that fill certain roles and excel at certain positions or certain places…learn to balance those skills."*

Informants stressed that both breadth and depth were critical in front-end NPD work. The CEO of Firm B noted the shortcomings of diversity without collaboration:

> *"…we are all somewhat like the joke of the blind man touching an elephant … all describe the elephant by what they can touch… expecting people to be collaborative but also being comfortable with the creative friction."*

Cohesive diversity frames appeared to help front-end NPD teams cope through *collective interdependence*. This coping mechanism helped balance unity and diversity, as team members simultaneously agreed *and* disagreed. In the words of a Creative Director in Firm C:

> *"A contrasting opinion enriches how you are thinking…and could actually lead you down different paths."*

Amidst the diversity, front-end NPD team members were able to depend on each other. Enough overlap was in place to aid coordination, while enough division helped maximize coverage of varied possibilities. A Senior Designer in Firm B explained:

> *"I feel that there's respect that we all have for each other and among the disciplines… Of course there are tensions between engineers and designers, people who come from different perspectives, but we tend to see the fact that someone comes from a different perspective as really positive, and it's really important to utilize that."*

The interplay of regulatory focus

Although informants across all cases deployed the three paradoxical frames, a closer investigation revealed differences in regulatory focus. These variations appeared to shift front-end NPD team applications of the paradoxical frames in subtle but potentially powerful ways. As noted previously, in Firm C, which received the most design awards, paradoxical frames were promotion-focused, emphasizing risk and eagerness. In the other case firms (A, B, D, E), guided freefall and benevolent dictatorship frames were prevention-focused, highlighting cautiousness and vigilance. Cohesive diversity frames exhibited a promotion focus across the five case firms.

The combination of guided freefall frames and promotion focus in Firm C appeared to encourage more aggressive improvisation by front-end NPD teams. A Senior Director in Firm C stressed the need to take risks in guided exploration:

> *"You don't have to tell somebody to draw in a certain way, you just have to give them the right space to do that drawing and have them know what is expected at the end of it and then let them create within this process zone."*

Informants accentuated their eagerness to improvise, feeling secure in the constraints of a project and the guidance of more senior team members. As a Senior Designer in Firm C explained:

"…the fact that (a team member) is so confident and…he just says, "ok, let's do this", and that makes you say, "ok, let's do it!" And you get kind of excited about it. Sometimes, you know, you don't agree with him…in the end…I wouldn't say that it is compromised, but it is more like, well, I trust his judgment."

In contrast, guided freefall frames in firms A, B, D and E were more prevention focused. Informants placed greater emphasis on 'avoiding losses' during improvisation. The President of Firm A, for instance, highlighted the dangers of excessive experimentation:

"So I build the ship and put people on it and put it in the water and then I am done. Sometimes, if the ship falls apart or goes to the wrong port or gets caught in a storm I might step in and help get it back."

Informants talked about the need to maintain operational continuity in teams' bounded exploration efforts. Controlling risk was emphasized as important when improvising in the front-end. A Designer in Firm A explained:

"Yes, it is a controlled risk… they think that something could be a cool thing, and they will propose a way without having too many serious impacts."

Moreover, vigilance was lauded as a valued approach. The Principal of Industrial Design in Firm B, for instance, argued:

"It doesn't mean that you can't take risks at all, and if you can justify being on the edge, with some facts supporting what you're doing, then that's fine too. But you just can't be wild and outta control."

A close examination of benevolent dictatorship frames in Firm C also revealed a promotion focus. Informants stressed seeking gains through embracing deliberation-decision tensions when teams screen and evaluate ideas. They talked about striving to couple bottom-up participation and influence of team members with strong decision making from project leaders. A Senior Industrial Designer in Firm C explained:

"So, he will say, 'OK, we want to achieve this by the end of the month', but as far as coming to us, he will tell us that, like, 'Let's just go crazy together' kind of thing."

Informants were eager about how this energized teams to concentrate on getting the job done and move forward in their projects. The VP of Digital Design in Firm C discussed this as the 90%/10% rule:

> *"That is the 90%/10% rule. 90% of the way, you may leave it as an open process, where people have a lot of input, but ultimately, that last 10%, it defines where something goes."*

Project leaders played a key role in empowering divergence in early exploratory stages, while they facilitated convergence when decisions had to be made and disparate views to be integrated. A Creative Director in Firm C, for instance, noted:

> *"To be a creative director you almost have to relinquish your ego because you have to be able to give somebody direction, and let them feel like they own it to empower them. Because similarly it is the same as not wanting to make people just implement your vision, but allow them to take it and own it."*

On the contrary, in Firms A, B, D and E benevolent dictatorship frames were more prevention focused. Informants in these firms highlighted the importance of avoiding potential losses stemming from deliberation-decision tensions in their team efforts. They talked about being vigilant about the risks of excessive deliberation and inertia. An Industrial Designer in Firm A, for example, emphasized possible downsides to the deliberation/decision conundrum:

> *"Sometimes I think that things can't get done because they're too concerned about the value of the employees' opinions… You want to make a decision and just go ahead and do it."*

Stressing the threat of performance shortfall accentuated team members' need for authority amongst deliberation. The CEO of Firm D explained:

> *"There's a point when decisions have to be made. Um… and a project isn't run as a democracy – a team leader does have the right and the ability to make decisions to keep the project moving forward."*

The role of project leaders in protecting front-end NPD teams against such 'dead ends' was highlighted. An industrial designer in Firm A discussed this role:

> *"Because sometimes I think that things can't get done because they're too concerned about the value of the employees' opinions. You know the whole thing of 'let's take a vote, let's talk it over', which is good but sometimes I know with people like myself it's kind of like 'OK well let's just do something', you want to make a decision and just go ahead and do it."*

Lastly, across firms, cohesive diversity frames had a promotion focus. This energizing focus helped shift emphasis from challenges and competition in cross-functional teams, to gains in creative problem solving. The Senior Vice President of Industrial Design in Firm A, for instance, noted:

> *"You get stronger by having a different voice and a different opinion, even a different creative problem solving approach."*

Promotion-focused cohesive diversity frames stressed the 'best of both worlds', helping team members value each other as individuals rather than as members of stereotyped groups. Diversity was lauded for enabling the creation and preservation of heterogeneous ideas, while collaboration helped diffuse the best ideas. A Senior Designer in Firm B argued:

> *"We also have to understand that we come from different perspectives and we have different agendas on projects, but I think that the overarching agenda is still the same in that we want to create the best damn product or experience or result… in general it's a positive tension."*

This promotion focus enabled a common meaning around gains that fueled collective action and aided knowledge generation. A Director of Industrial Design in Firm E explained further the gains in terms of collective interdependence:

> *"You want people who are a little different from each other to really utilize the idea of working in a team a bit better."*

Discussion

We began this research with a question: how do cognitive and motivational drivers help front-end NPD teams cope with tensions and thereby fuel innovation? Through a four-year study of NPD consultancies, we observed robust variations as well as

similarities among case firms. Findings highlighted the roles of paradoxical frames (guided freefall, benevolent dictatorship and cohesive diversity) and regulatory focus (promotion and prevention) in facilitating coping behaviors (improvisation, working consensus and collective interdependence, respectively). We now go beyond the findings to theorize the interplay of innovation drivers – cognitive, motivational and behavioral – in the front-end of NPD. Illustrated in Figure 2, we propose that these drivers interact to fuel virtuous cycles of innovation.

Insert Figure 2 about here

Paradox theory proposes that tensions pose a double-edge sword, enabling or impeding innovation depending on whether individuals experience tensions as threatening – anxiety and defense provoking – or energizing – as valued albeit challenging opportunities for learning (see Schad et al. 2016). Effectively coping with tensions thereby entails more than prescribed practices; coping requires continuous, double-loop learning to gain comfort and confidence in confronting tensions (Lewis, 2000). Rather than resist or avoid tensions, individuals can learn to accept, even embrace tensions "as persistent and unsolvable puzzles" (Smith and Lewis, 2011: 385). Yet acceptance of tensions is socially constructed and thereby reinforced or dismantled by teams over time (Lüscher and Lewis, 2008). As such, shared understandings – how teams think about (cognition) and approach (motivation) innovation tensions – appear vital to sustaining NPD excellence.

In these innovative firms, we theorize that the paradoxical frames of NPD teams enabled shared understandings that fostered cognitive comfort with innovation tensions. Certain frames were more pronounced at different phases of the NPD

process. For example, the guided freefall frame was more prevalent in exploratory activities, while the benevolent dictatorship framed aided teams during screening and selection phases. Yet together the three frames appeared to help team members think paradoxically about innovation tensions. Rather than threatening their sense of order and rationality, team members' frames helped hold tensions together to view opposing demands as mutually defining and supportive. Tensions, however, raise emotional as well as cognitive discomfort (Smith and Lewis, 2011). A shared promotion focus tapped into the positive potential of emotions, further supporting use of paradoxical frames. In the most innovative case, a promotion focus encouraged team members to approach tensions as opportunities to gain novel insight. In conjunction with paradoxical frames, promotion-focused teams were more likely, even eager, to enact coping behaviors that helped them confront, explore and leverage tensions for innovation. In contrast, a prevention focus appeared to dim the use of paradoxical frames. In less innovative cases, teams approached tensions warily, stressing potential downsides of mismanaging the competing demands of innovation. Fearing loss and risk, they were less likely to engage tensions and explore more creative alternatives.

Theoretical Implications

Dissecting these insights further accentuates their theoretical implications, offering three, primary contributions. First, this study broadens extant understandings of the antecedents of team innovation in general and front-end NPD in particular. Drawing on West's model (2002), researchers have traditionally noted tasks characteristics, team members' knowledge and skill diversity, integrating team processes, and external demands (e.g. threat or uncertainty) as keys to team innovation. Answering calls for more emphasis on underlying cognitive and motivational drivers (Alexander

and van Knippenberg, 2014), this study unpacks how cognitive frames and regulatory focus jointly shape innovation efforts of front-end NPD teams.

Second, this work elaborates the role of shared cognition (e.g., Chang et al., 2007; Akbar and Tzokas, 2013), explicating how a 'shared understanding' can help teams manage NPD tensions and ultimately enhance their innovation performance. To date, what this 'shared understanding' involves and how it works in practice has been an enigma. Our study demonstrates how shared paradoxical frames help front-end NPD teams juxtapose conflicting demands as mutually interdependent and beneficial. In our findings, *guided freefall* framed tensions experienced during exploratory activities, as front-end NPD teams sought discovery through experimentation, as well as the certainty of project specifications. Most evident in screening and selection points, a *benevolent dictatorship* frame helped team members view project leadership as blending needs for democracy and autocracy, deliberation and decision making. The *cohesive diversity* frame was applied throughout the front-end of NPD, as product developers experienced the tug-of-war between individual expression and team unity.

These findings also extend paradox theory regarding the value of a paradox mindset in driving innovation (Smith and Tushman, 2005; Andriopoulos and Lewis, 2009). Our model explains that by enabling teams to think through tensions surfacing in the front-end of NPD, paradoxical frames mobilize coping behaviors that further drive innovation. As a rare, team-level study of cognitive frames, these findings extend results from laboratory studies that have shown that a "both/and" mindset can foster individual innovation (Miron-Spektor et al., 2011), as well as unpacking broader empirical results from SBU level studies (Lin and McDonough III, 2014).

Third, this research extends insights into the interwoven effects of cognitive and motivational drivers on team behavior (e.g. Liu et al., 2015). Front-end NPD scholars underline the importance of common priorities and goals (e.g., Montoya-Weiss and O'Driscoll, 2000; Chang et al., 2007), noting the potential value of NPD teams that share a promotion focus (Spanjol et al., 2011; Lanaj et al., 2012). Yet the effects of regulatory focus have been primarily studied at the individual level (Schmidt et al., 2001; van Knippenberg and Schippers, 2007). We extend this literature, explicating how a promotion focus complements teams' paradoxical frames to energize coping efforts that fuel innovation.

Managerial Implications

Calls are ever increasing for leaders to embrace paradox, developing cognitive strategies that reframe options as both/and possibilities (see Smith et al., 2016). Collins and Porras (1996) argued that great leaders shift strategic challenges from the 'tyranny of the or' to the 'genius of the and'. Likewise, Martin (2007) found that the most successful and innovative leaders engage 'an opposable mind', harnessing conflicting demands simultaneously. Our findings echo these calls, encouraging senior NPD managers and front-end NPD project leaders to foster shared paradoxical frames as fuel for innovation. Building from paradox research, we offer two suggestions on how to effectively do so.

First, we recommend that leaders train NPD team members in paradoxical thinking. Project leaders can begin by encouraging their teams to proactively identify tensions (Smith and Tushman, 2005). They can then help team members refrain from framing demands as competing alternatives (A or B), but rather as synergistic, feeding off each other, and inextricably linked (A and B). As Lüscher and Lewis (2008)

illustrated in their work with middle managers at LEGO, such training requires altering the questions managers and team members ask. Ongoing 'both/and' exercises can promote the use of more paradoxical questions ("How can we simultaneously do both A and B?") that help teams explore a wider range of possibilities, building the habit of exploring means to enhance creativity *and* efficiency in their daily work. This in turn will open debate, encourage reflection and fuel double-loop learning to sustain innovation drivers in the fuzzy front-end of NPD.

Second, the development and consistent communication of an overarching, *both/and* vision can help NPD teams view tensions as valued opportunities for continuous learning. Such efforts combat the potential perception of mixed messages. As Smith et al. (2016) stressed, leading through paradox requires 'consistent inconsistency' to help members embrace competing demands as vital, interwoven and synergistic. In front-end NPD teams, this means positioning tensions as natural and vital – searching broadly for opportunities *while* remaining bounded by project constraints, fostering a high degree of deliberation *along with* rigorous screening of ideas and concepts, accentuating the power of individual differences *and* maintaining a strong sense of cohesion.

Moreover, such positive messaging about NPD tensions supports the motivation of a promotion focus. As our study finds, a promotion focus is integral to energizing supportive coping behaviors. Project leaders who wish to improve the innovative performance of front-end NPD teams must lead by example, using their words and actions to shape and maintain collective regulatory tendencies. Promotion-focused leaders can adopt rhetoric that emphasizes gain through goal setting, and exhibit behaviors that signal their preference for action, risk, movement and eagerness over cautiousness and vigilance. Such role modeling can elicit 'contagious' cognitive

and behavioral responses amongst front-end NPD teams. Project leaders can further prime teams' regulatory focus by rewarding those who exhibit a promotion approach.

Suggestions for Future Research

Several limitations of this inductive study pose opportunities for future research. First, our sample consisted of NPD consultancies headquartered in the US. This raises questions regarding the generalizability of our results to other countries. Given the potential impact of societal culture on paradoxical thinking (e.g. Keller and Loewenstein, 2011), it will be important to study the role of cultural context on team cognitive and motivational drivers. To date, research has focused disproportionately on North American and Western European samples. Cross-national research could expose potential differences in paradoxical orientation across regions and how those differences might influence innovation drivers at the front-end of NPD.

Second, this study examined firms in the NPD consultancy industry. While a focused sampling technique helped us rule out work and environmental variations, it raises the question of generalizability to other industries. We hope this work motivates future research that tests whether our findings are robust in diverse settings, such as large manufacturing corporations or financial services.

Third, the front-end NPD teams across the sampled case firms were collocated. We encourage studies that test how our findings might extend, or not, to teams whose members are dispersed geographically. Such teams may experience greater difficulties in building shared cognitive frames and regulatory focus due to communication and coordination challenges (Hinds and Bailey, 2003). Geographically distributed NPD settings may accentuate the impact of top

management teams, organizational culture and technological tools in fostering collective mindset and approaches.

Lastly, this study sampled teams within successful NPD firms – those recognized as highly and consistently profitable and innovative. We selected such firms to sharpen our focus on underlying drivers of innovation, helping us observe how front-end NPD teams manage tensions in practice. The resulting theoretical model illustrates how cognitive, motivational and behavioral drivers fuel virtuous cycles of innovation. Such positive cycles will need deeper investigation. Indeed, some early leaders in paradox research have shifted their focus to positive organization studies to drill further into means of sustaining such virtuous loops (see Cameron, 2012; Quinn, 2015). Yet another critical and complementary step will entail unpacking drivers of more vicious cycles. Researchers warn that tensions pose traps, triggering anxiety and counterproductive defenses that can undermine, as well as enable, innovation (e.g., Smith and Tushman, 2005; Andriopoulos and Lewis, 2009).

In sum, we hope this work will encourage efforts to develop more comprehensive theory, as well as greater managerial insights. Such extensions will require rigorous studies that examine, elaborate and contrast both the drivers and the impediments of innovation – cognitive, motivational and behavioral.

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Table 1. Overview of the Case Firms and Data Collection

Case Firm[a]	Services[b]	Specialty	Overview	Design Awards[d, e]	Size	Interviews[f]	Archival Documents	Work Observation
A	B., Eng., Gr.D., I.D.	Computer hardware (e.g. desktops, monitors, printers, memory cards)	Founded: 1984 Annual Revenue[c]: $6.0M	226 11.3/year	Employees: 45	TMT (6) MM (5) KW (18) Total: 29	Company Handbook, Appraisal Forms, Values Surveys, Marketing Material, Articles	2 weeks
B	B., Eng., E.D., Gr.D., I.D., In.D., P.D., P., R.	Consumer and health products (e.g. padlocks, digital thermometers)	Founded: 1983 Annual Revenue: $19.6M	170 8.09/year	Employees: 125	TMT (2) MM (4) KW (4) Total: 10	Company Handbook, Marketing Material, Articles	1 week
C	B., Eng., Gr.D., I.D., In.D., P.D.	Consumer electronics and services (e.g. mobile phones, retail environments)	Founded: 1969 Annual Revenue: $37.5M	541 15.45/year	Employees: 250	TMT (5) MM (2) KW (7) Total: 14	Company Handbook, Appraisal Forms, Marketing Material, Articles	2 weeks
D	B., Gr.D., P.D.	Computer hardware and sports equipment (e.g. video game consoles, golf)	Founded: 1994 Annual Revenue: $1.5M	22 1.45/year	Employees: 16	TMT (2) MM (1) KW (3) Total: 6	Company Handbook, Marketing Material, Articles	1 week
E	Eng., Gr.D., I.D., In.D., P.D., P., R.	Consumer products (e.g. kitchen tools)	Founded: 1985 Annual Revenue: $8.5	149 7.84/year	Employees: 65	TMT (5) MM (8) KW (11) Total: 24	Company Handbook, Marketing Material, Articles	2 weeks

[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] Annual revenue in 2004 when the study was completed

[d, e] First number is the total number of design awards won per firm from its inception until our study took place; second is the number of design awards per year for each case firm. Note that the number of employees was not constant over time in the case firms.

[f] Organizational level of informants was determined by the principal informants in each case firm. TMT stands for Top Management Team (e.g. CEO, Senior Vice President, COO, VP of Engineering); MM stands for Middle Management (e.g. Director Engineering, Design Manager); KW stands for Knowledge Workers (e.g. Industrial Designer, Engineer, Graphic Designer, Design Researcher)

Table 2. Coding of Paradoxical Frames for Front-End NPD Tensions

Definition	Language indicators	Illustrative Quotes
Mental templates used to embrace seemingly contradictory statements or dimensions of a task or situation at the front-end of NPD	Looking for contradictory statements or dimensions of a task or situation within the same transcript, using language indicators such as: tension, friction, yet, but, on one hand… on the other hand, juggle, balance, how can you… and still…	<u>*Guided freefall*</u> *Definition*: Frames used to embrace the need to search broadly for new opportunities *and* remain bounded by project constraints and/or focusing advice. *"Confidence in doing something is knowing that you've been thrown into the water, but they will give you the opportunity to learn how to swim… If you sink then they throw the life vest. It's also about defining expectations as explicitly as possible so that you don't sink completely." (Senior Designer 2, Firm B)* <u>*Benevolent dictatorship*</u> *Definition*: Frames used to embrace a high degree of deliberation *and* rigorous screening of ideas and concepts. *"I think we try to empower as much individual expression as possible, but…designers design for the higher level of dictatorship." (CEO, Firm D)* <u>*Cohesive diversity*</u> *Definition*: Frames used to embrace the power of individual differences *and* a strong sense of cohesion. *"I think people have to establish their own identity, they need to feel like part of a team, but they have their own role, their own identity. It is a really interesting balance."* (CEO, Firm D)

Figure 1. Data Structure: Paradoxical Frames for Front-End NPD Tensions

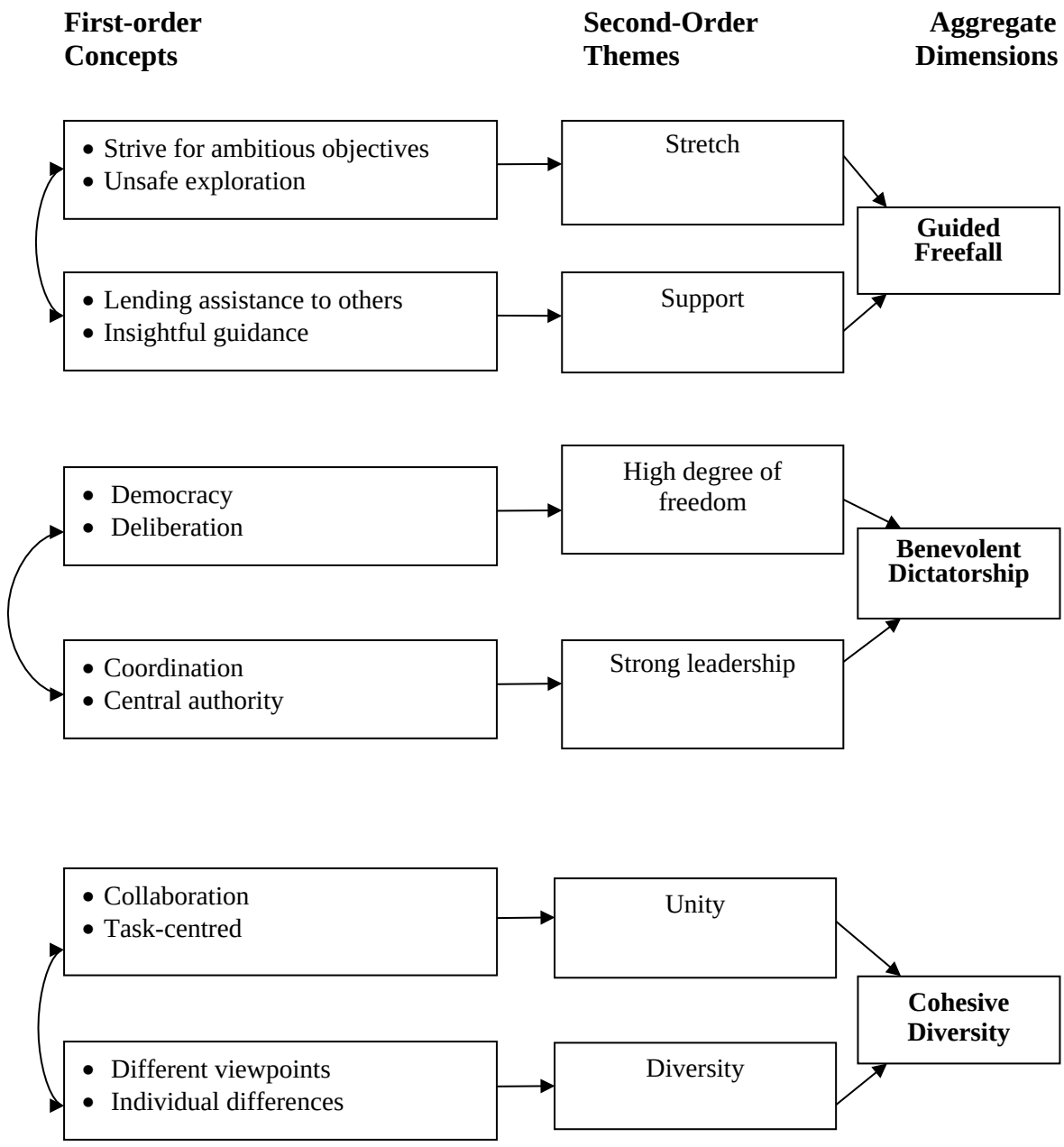

Table 3. Coding of Promotion and Prevention Focus

Framing	Definition	Language indicators	Illustrative Quotes
Promotion	Frames that emphasize positivity, gain and an energizing quality	Positive, good, gain, benefit, win, advance, reach, help, foster, advantage, earn, realize, empower, grow, excel, enrich, go forward, improve, encourage, fuel, motivate, learn, care, excite, create, enable, respect	*"The company values…they don't hire people that are coming from the same mold, and so everybody is unique, they have some kind of some special little things, you know, within them… so, you know, you can always learn from each other."* (Industrial Designer 1, Firm C)
Prevention	Frames that emphasize negativity, loss and the fear of extremes	Negative, bad, risk, avoid, lose, loss, problem, fail, expense, too long, not…, failure, decrease, cost, damage, waste, danger, pain, anxious, fear, lack of control, fall apart, wrong, hurt, prevent, serious impact, sink, friction, conflict, argue, fight	*"…If we did nothing but free radical without structure we wouldn't get anything done..."* (CEO, Firm D)

Table 4. Illustrative Quotes: Paradoxical Frames With Different Regulatory Foci

Paradoxical Frame	Promotion Focus	Prevention Focus
Guided Freefall	*"For each one individual, the individual has to figure out. We can help them…and encourage it."* (CEO, Firm C)	*"People shouldn't be like that, there should be checkpoints, where other people review what you are about to release, what you can prevent and you really should get other people's input." (Senior Product Designer, Firm A)*
Benevolent Dictatorship	*"I don't want to be a designer that is like doing what somebody is telling me, right, like almost a dictator. But, at the same time, I also want to have the knowledge that he knows what we are doing here."* (Industrial Designer 4, Firm C)	*"Everybody doesn't get a vote...it would take very long to make decisions."* (President, Firm A)
Cohesive Diversity	*"You are getting people who…grew up in different ways…and we are a consumer product design company so, um…having different experiences is what really helps you approach a problem differently." (VP of Engineering, Firm E)*	*--Not Available--*

Figure 2. Innovation Drivers in the Front-end of NPD