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The governance of innovation centers in large established companies

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Abstract

This paper presents a model for the governance of radical innovation (RI) efforts within the firm. A longitudinal study of 12 large established companies committed to develop and institutionalize a radical innovation capability are used to inform our work. Thus the firm, rather than the RI project, is the unit of analysis for this work. We draw on Agency Theory, Firm Level Governance, Stewardship Theory and Stakeholder Theory as well to enrich the model. We find that none of these theoretical frames adequately describes the issues faced by companies as they build governance systems to oversee high risk, high uncertainty innovation portfolios. A series of propositions is offered based on the data analysis and extant literature that address board composition, decision style and decision processes that, we believe, enhance a company's ability to generate and commercialize radical innovations.

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1. Introduction

Recent changes in the strategic priorities of large established firms suggest that the overriding focus on cost cutting as a means to increased profits is nearing its limits (Hamel and Schonfeld, 2003; Rigby, 2001; Thomke, 2001). Additionally, new and “creative” methods related to accounting practices no longer exhibit the allure they once may have had even in the recent past. This leaves firms to search for new paths for growth and renewal. Incremental innovation, through leveraging current platforms and markets, cannot truly provide the opportunities for “step out” growth, which modern firms require. Radical or breakthrough innovation is

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increasingly relevant in today's technologically competitive environment for the growth, renewal and even long term survival of most firms (Jelinek and Schoonhoven, 1990; Morone, 1993).

Organizations typically grow by gaining efficiencies of scale and scope in specific core competency areas that may, ultimately, become core rigidities (Leonard-Barton, 1992), or core incompetencies (Dougherty, 1995). In organizations that actually do try some form of basic innovation, fewer than 1 in 60 new ideas ever see daylight, from concept to commercialization (Ettlie, 2000). Radical innovation is even more difficult due to higher levels of uncertainty stemming from long development times (Leifer et al., 2000), conformist decision making cultures (Benner and Tushman, 2003; Pech, 2001) and potential confusion of roles as the entrepreneurial function is pushed down to the lower levels of the large organization (Jones and Butler, 1992). While some scholars claim that large organizations are unlikely to develop this competency (Christensen, 1997; Zollo and Winter, 2002), others disagree and argue that radical innovation is an underdeveloped capability that requires better understanding (Ahuja and Lambert, 2001; Covin and Miles, 1999; Hill and Rothaermel, 2003; Jelinek and Schoonhoven, 1993; Leifer et al., 2000; Morone, 1993).

Our perspective is that radical innovation is not dependent on any single management element, such as an appropriate process. Rather, it requires a management system whose elements combine to encourage learning, experimentation, and multiple paths to the market. This system must consider issues of culture and leadership, governance and decision making, skills and talent development, processes and tools, metrics and organizational structure (O'Connor and Ayers, 2005). There is a need to understand the approaches firms are taking to each of these elements systematically and uniquely, as well. In this paper, we explore the governance and decision making aspects of radical innovation management systems. Specifically, we examine the challenges firms face in developing the decision-making mechanisms and institutions that oversee radical innovation portfolios in the midst of the large established enterprise.

From the firm level governance literature, "Corporate governance deals with the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment" (Schleifer and Vishny, 1997). In this paper we focus on the governance and decision making elements of a management system designed to promote and enable radical innovations (RI) deep within the established firm. In this analysis, the RI governance board resides at a lower level within the corporation than does the firm level governance board (i.e. the board of directors), but not so deep as to be considered part of project management. Like firm level governance boards, RI governance boards are concerned with supplying support and financing to those groups in the company responsible for radical innovation output, and with obtaining commensurate return on their investment.

To be specific, we seek to answer the question "how is an effective RI governance system created so as to sensibly circumvent the predominant culture of most large established companies, in which minimizing variation, exploiting the known and developing repeatable processes are most highly valued?" In situations of high uncertainty (i.e. radical innovation), these operating guidelines, designed to promote efficiency and short-term profits, are not only ineffective, but also deleterious to the RI effort (Morone, 1993). Governance boards evaluating RI opportunities frequently are comprised of individuals who have succeeded in the operational excellence culture and have thereby been promoted to positions of power and influence. Thus, numerous challenges face any RI governance system whose role is to find and nurture opportunities that stretch the organization beyond its current capabilities and boundaries.

In an attempt to answer this question we leverage the wisdom from already established bodies of work, including Organization Theory, Strategy and Management of Innovation, Firm Level

Governance Theory, Psychology, Agency Theory and Stakeholder Theory. However, because these theories were neither developed nor tested specifically in the context of high uncertainty in large bureaucratic organizations at decision-making levels below Senior Management, they may not suffice in the radical innovation context. Our objective is to articulate a model of RI governance under conditions of high uncertainty for organizations that are driven by operational excellence cultures where command and control is used, and hierarchy clarifies who has responsibility and authority for various levels of decisions.

2. Theoretical background and literature review

Focus on RI governance is warranted even though the incidence of radical innovation is low, since there is evidence that the payoff from an investment in commercializing radical innovation is more than proportionate (Ettlie and Rubenstein, 1987; Sorescu, 2002; Sorescu et al., 2003). Configuring for success on innovation efforts becomes more difficult as the complexity of the organization increases due to its own success. A number of literatures and theories touch on the issues relevant to our research question. There are several concepts related to RI governance boards and success in innovation efforts that arise, including coupling and goal alignment, RI governance board decision quality, RI governance board size and composition, and RI governance board decision style. Each of these draws from different theoretical bases.

Coupling and goal alignment issues are examined by organizational theorists, who seek to explain variations in structure related to this concept. The strategy and management of innovation literatures explicate incentive mechanisms in this area. Firm level governance theory elaborates the decision quality concept and explicates the elements that contribute to high quality governance board decisions, with special attention paid to the attributes of those comprising the board. Group decision-making literature from psychology also informs RI governance board decision quality. The concept of decision style of the RI governance board is probably the least straightforward of those constructs identified. The conditions resident in firms' RI innovation centers and RI governing boards' decision styles are potentially mutually influenced. Characteristics related to the level of tension or trust manifest in the center could be either exacerbated or quelled by RI governance board decision style, which is explored in agency and stakeholder theory.

2.1. Coupling and goal alignment

The problem of managing organizational ambidexterity (Tushman and O'Reilly, 1996) requires a consideration of the RI system's coupling with the mainstream organization. Weick (1976) prescribes loose coupling to enable the flexibility requisite for decisions to be made in high uncertainty situations. Loose coupling is defined as a state where events are responsive, but they also preserve evidence of their own separateness (Weick, 1976). Applying this definition in the context of RI governance, the correct locus and reporting relationship of the governing board in relation to both the activities of the innovation center and the participation by other important constituencies in the greater corporation is vital to firms endeavoring for RI success.

Where bureaucratic procedures are present, it is difficult for a team to be different from mainstream operations. Since one of the purposes of the RI governance board is to foster non-incremental and new to the world innovations by project teams working in the innovation center, it is unlikely that the governing board would have the capability to do so if it was *itself* bound in bureaucratic procedures. Because of this, some isolation for teams, *and by extension*, for the RI

governance board, from the rest of the organization may be beneficial for producing radical new offerings (Ancona and Caldwell, 1992).

Galbraith (1973, p. 53) advocates that “the greater the task uncertainty for a team, the greater the number of levels at which the team should operate, and the greater should be their range of discretion”. In support of this team research and emphasizing the positive impact of a broad range of discretion (Finkelstein and Hambrick, 1990) argue that upper echelon manager tenure combined with a broad range of discretion is positively correlated with strategic persistence, or the degree of discipline in sticking with strategic decisions that are not low in uncertainty. This would be a very positive trait in the pursuit of RI due to the long lead times and high levels of uncertainty inherent to these endeavors. So once again, *by extension*, the governing body for teams striving under great task uncertainty, always in evidence for RI project teams, should exhibit some of the same positive characteristics in order to be effective. Hence, the RI governance board should have access to a wide range of levels in the firm and be provided with a great deal of discretion in their operation. What is not clear from the literature, and may be difficult to extrapolate is the precise level of autonomy most appropriate for the RI governing board such that RI success is maximized.

An additional issue with respect to the RI governance board is how to achieve enough goal alignment between the RI center and the rest of the firm so that the RI center will be in a position to have impact on the broader corporation. Strategy and management of innovation literatures advocate for incentive mechanisms structured so as to create a tight alignment of the goals of the firm with those of the shareholder (Amit et al., 1995; Jensen and Murphy, 1990; Shleifer and Vishny, 1997; Sykes, 1992). This works at the firm governance board level, but the assumptions break down deep within the firm. Changing compensation structures creates all manner of organizational problems (Jones and Butler, 1992).

In order to achieve a modicum of alignment between the RI governance board (and with it, the RI innovation center) and the rest of the organization, “participation” as opposed to “compensation” is an alternative mechanism. The appropriate mix of senior corporate leadership taking part in the RI governance board activities will facilitate alignment (Leifer et al., 2000). Researchers note, however, that this senior corporate leadership participation should not be dominant in its presence nor should this involvement be weighted toward decision-making on the early initiation stages of the RI center activities. Rather, the nature of senior corporate leadership participation should be skewed toward helping align the company’s strategic intent to promising new growth opportunities emerging from within the RI portfolio and also post hoc rationalization of decisions (Burgelman, 1983).

2.2. Decision quality

Academic research on firm level board decision quality typically examines the relationship between the ratio of firm insiders to firm outsiders on top management teams and the firm’s broad strategic orientation (Chaganti and Sambharya, 1987). A mix of inside and outside directors is correlated with high decision quality and by proxy, high performance for the board in this research. Still other researchers on firm level governance go further and assert that weighting the board’s composition too heavily towards external members results in poor performance (Bhagat and Black, 1999, 2002).

There are two levels of interpretation for this research in the context of the innovation center governing board. The literal interpretation would call for a simple extrapolation of the work to suggest that RI governance boards should be made up of those from within and outside of the

company. A more figurative translation for a board overseeing the RI portfolio suggests that there must be participation balance between project managers/team members and members of the board from the greater corporation. For the purposes of our analogy, insiders are those with specific technical knowledge *and* a strong interest in innovation as opposed to operational issues. Outsiders have broad knowledge of the workings of the greater corporation and their interests are less known or declared. This issue of balanced representation is an important one to consider for governance of the RI portfolio.

2.3. Board size and composition

Whether at the firm level or at the RI governance level, a board is essentially a functioning team. Studies of senior level boards indicate that a moderate degree of heterogeneity among the top management team is beneficial (Hambrick et al., 1996; Hambrick and Mason, 1984). More specifically, firm level board composition has been examined from the perspective of cognitive diversity. Langevoort (2001) advocates for firm level governance board composition that exhibits a “collegial” as opposed to a “highly diverse” cognitive orientation. Prolonged debates during meeting times may interfere with the members’ knowledge and skills if the firm level governance board is *too* diverse. Conversely, there are disadvantages to a board comprised of members that are too collegial in that there is a danger that such a board may become too homogenous and susceptible to “groupthink” (Janis, 1989; Langevoort, 2001). We extract from these literatures and infer that moderate degrees of both heterogeneity and collegiality among RI governance board members may influence RI success.

Individual board members’ skills and attitudes are also addressed in the firm level governance board literature. There should be present among the individual board participants themselves a mentality of openness that encourages, or at least does not interfere with the use of resources for competitive management schemes taking place at lower levels of the firm directed toward increasing managerial skills related to innovation pursuits (McGuire, 2000; Vafeas, 1999). In RI, this mentality is typically present in the individual who has had either explicit or coincidental broad exposure to many business and life situations throughout the course of their career (Leifer et al., 2000). From Psychology, there is guidance related to team decision-making and group size, which may be invoked to explore our research question. Group decisions are proven to be superior to individual decisions in 98% of the cases studied in complex work situations as groups work together over time (Watson et al., 1991).

Finally, the issue of appropriate size of an RI governance board arises. Group dynamics research has demonstrated that as group size grows in the range of 5–12 members, the degree of consensus among the members decreases (Hare, 1952), thus reducing decision quality proportionately. Teams composed of five or six team members were found to be most appropriate for efficient performance (Cummings et al., 1974; Michaelsen et al., 1989). Management of Innovation literature suggests that customary team size for cross-functional NPD teams with high-level authority typically comes in at six to eight core members (Wheelwright and Clark, 1992). Beyond that number, the trade off between variety and efficiency driven by consensus appears to be unworkable.

2.4. Decision style

Efforts to be transparent and predictable regarding group decisions made by the very best bankers and government leaders of the first world are widely understood to lend credence to their

decisions and to inspire composure among market participants. Some of these same dynamics, we assert, are at work deep within the firm at the RI governance board level. Agency theory and the more trust-based management theories would suggest quite different approaches as they relate to the decision style of the RI governing board.

To illustrate, when a “tournament” attitude toward increasing roles and responsibilities prevails within the firm (Langevoort, 2001), and this attitude is also grounded upon acquisition of scarce resources under control (budget size and manpower), pressure will be added to those at the project leader level within the innovation center to succeed. If the previously described state is combined with an RI governance board decision style that is capricious, poorly managed, lacking transparency, or all of the above, then agency tensions (Akerlof, 1970; Kazanjian and Drazin, 1987) between the RI governing board and RI innovation center project leaders gain the potential to “explode”.

This phenomenon is driven to some extent by RI governance board members functioning in recursive principal-agent roles (Jones and Butler, 1992; Williamson, 2002). In addition, the great majority of project leaders and participants in RI innovation center efforts are highly educated, persuasive, and has often developed skill sets so specific that they may not be transferable readily to the rest of the corporation. In plain words, these agents are stunningly well equipped and sometimes have the incentive to manipulate circumstances or shirk (Eisenhardt, 1989a; Fama, 1980b; Fama and Jensen, 1983; Kazanjian and Drazin, 1987; Langevoort, 2001) in the high uncertainty of the RI environment. Couple this with the knowledge that many of the project leaders consider their continued employment in the innovation environment to be a perk and it becomes clear that making the effort to keep the relational contract between the RI governance board and innovation center participants straightforward and transparent through the board’s decision style is of the essence.

The strict agency prescription for these problems would be to institute more intensive monitoring systems by the RI governance board (Barney, 1986; Fama, 1980a; Jensen and Meckling, 1976), to screen in advance by reputation (Busenitz and Barney, 1997; Leifer et al., 2000), or to invite middle management participation (Bhagat and Black, 1999, 2002) to ensure that RI center employees are working in the strict interest of the firm. The characterization would be one of behavioral control originating from a source external to the participant (Jackson et al., 1986, p. 302).

Stakeholder and/or stewardship theories both fundamentally advocate a “trust-based” approach to management that is quite different from the agency viewpoint. They relax monitoring and control mechanisms in favor of a more organic approach driven by the assumption that the goals of all parties are aligned (Davis et al., 1997; Donaldson, 1990a,b; Freeman, 1984). These theories advocate against the use of decision-making styles such as ‘command and control’ and other methods that do not take into account innovation project team members’ motivations or their own internal sources of control. These theories would predict increasing information asymmetry issues stemming simply from the boards’ assumptions and their institution of countermeasures against shirking or self interested behavior (Ghoshal, 2005; Pfeffer, 2005). In other words, there is a self-fulfilling aspect to any Theory X (McGregor, 1967; Pierce, 1991) approach.

From this brief literature review, we identify a variety of issues to consider in developing a theory of governance for a RI governance board within the large established company. However, the interpretations of these theories are not straightforward, given the differences in the contexts in which they were developed and that considered here. Still, we have extrapolated into the context of high uncertainty situations operating within a rigid context, and highlight board

composition, individual member background, and board decision style and process as key for examination. These, in fact, emerged as critical issues in our longitudinal study. We find that few companies abide by the prescriptions offered by these theories, and they have rationales for their choices. This observation, then, calls for grounded theory development to enrich our understanding.

3. Methods

3.1. Research approach

Our on-going research program is a longitudinal research study developed to build a deep body of knowledge related to managing RI competency development within the large firm context. During the first phase of the research program, the unit of analysis was the RI project team. We observed the uncertainties faced by RI innovation center teams and the mechanisms used to cope with these tremendous uncertainties (Leifer et al., 2000). Based on a study of 12 potential Radical Innovation projects in 10 large firms, the research team found that firms must move beyond managing individual projects and invest in the development and institutionalization of larger scale organizational capabilities to enable firms to commercialize Radical Innovations. Firms must move away from reliance on singular heroic individuals who championed their own pet projects to facilitate the development of any reasonable degree of RI frequency. An organizational system called a Radical Innovation hub was proposed, to provide infrastructure and support for those champions and those who do not exhibit such passion but who also have breakthrough ideas.

The second phase of the research program (ongoing since late 2001), upon which this paper is based, examines the management systems of 12 large US based firms striving to develop a competency to manage Radical Innovations in an organized manner. The unit of analysis for this second phase was not the individual project, but the corporate RI initiative. In some of the firms that are newer to RI, the focus was the actual building of a competency to do RI repeatedly.

Phase two tracks the approaches large established organizations are using to build competencies for nurturing and commercializing radical innovations not once every 10 years, but repeatedly. Each participating firm has a declared strategic intent to develop capabilities to systematically commercialize radical innovation—not one specific project, but multiple projects. Rather than assuming a particular organizational form (e.g. incubator, corporate venturing unit), we examine companies who have a declared strategic intent to develop a radical innovation competency, whatever form that takes.

In this particular paper we examine two of the more important intermediate steps between the start-up of the RI initiative and eventual commercial success of offerings for the firm as performance relationships. These steps are: (1) the building of confidence in the overall RI effort and (2) the development of a capability within the firm and the ability to transition offerings out of the RI innovation center and into the strategic business units (SBUs). This research is challenging in that history shows that very few of these internal organic growth organizations (a) have lasted very long (Fast, 1979) and (b) have had real impact on their companies' growth and renewal patterns (Birkinshaw and Hill, 2004; Campbell et al., 2003; Christensen, 1997).

The long-term formal objectives of phase two are to understand how organizations can systematically develop and sustain their RI capabilities. We have tracked (a) what firms are currently doing from a descriptive perspective to develop and support radical innovation as a distinctive activity requiring distinctive management techniques; (b) what mechanisms can be

developed to enhance the RI capacity in organizations from a prescriptive perspective and lastly; (c) what the most effective prescriptive or normative implementation techniques are for instituting those mechanisms. Our working hypothesis has been that RI cannot be managed as a process like incremental innovation can, but rather requires a distinctive management system that is different from that which works in a culture of operational excellence (the predominant culture in most large established companies) (O'Connor, 2005). Two elements of primary importance for the purposes of this paper regarding the RI management system are governance and decision-making (O'Connor, 2005). These elements, related to, but not identical to the four concepts introduced in the second section of this paper, drive questions related to composition of the RI governance board, size of the board, the location or formal placement in the company of the board and as a final point the decision-making criteria and style.

3.2. Building and qualifying the sample

The companies were screened for inclusion in the study based on their declared strategic intent to develop a RI capability. Since our overriding objective was to understand the variety of approaches firms could use and to track the success or failure of those approaches to commercializing RI (inclusive of important intermediate steps on the way to commercialization), we did not screen based on any particular organizational form. At the beginning of the study, nine firms had an identified organizational group responsible for initiating and overseeing RI in the company, while three did not. These three stated that RI was part of the company's culture and could happen as the result of a process or a call from senior leadership. In addition, the 12 firms varied in terms of the length of time they had been working on these initiatives. Companies ranged from just beginning their RI efforts at the outset of the observation period to having been developing their RI capabilities for 7 years. In terms of firm size, we were actively seeking large mature organizations. The largest of the 12 firms in annual total revenues topped \$150 billion while the smallest came in at just above \$2 billion. The median for total annual revenues of the cases in our sample was approximately \$15 billion. Table 1, titled "RI board governance characteristics by firm", provides information on the firms that participated in our study.

3.3. Data collection

A multidisciplinary team of researchers interviewed managers at different levels of the participating firms and with varying relationships to the Radical Innovation initiatives. The team included nine researchers with strengths in entrepreneurship, strategy, marketing, finance, risk management, technology management, organizational behavior, political science and one management doctoral student.²

The initial round of data collection involved day long, onsite visits to each company. The research team interviewed senior leaders, R&D managers, business unit managers, project leaders and other managers involved with corporate entrepreneurship activities. A total of 118 interviews were conducted, with between 8 and 14 managers per company. One co-author of this paper was present during each of these interviews. Having multiple observers present during each

² It should be noted that the Industrial Research Institute (IRI) has sponsored the program since 1995. The IRI is a professional organization of R&D managers of Fortune 1000 firms.

Table 1
 RI governance board characteristics by firm

	Firm (1)	Firm (2)	Firm (3)	Firm (4)
Board composition				
Board orientation	Advisory/loose coupled, initial interviews	Centralized/bureaucratic. Close coupled	No board. Decisions made solely by CR&D Director	Advisory. Moving from loose coupled to tight coupled
Level in organization	V.P. level. From business units. Senior Management involvement medium	Low level. Senior Management involvement low	High (decision maker)	Mix of high and medium
External I/internal members	No external members (initial external input from consultant)	No external members	No external members	External members always included on board
Size/number of members	Approx. 10 members	Undefined. Product Advisory Committee	Project Leaders Advise CR&D Director. Team leaders important	Eight to ten members
Diversity across the board	Diverse by discipline: operations, finance, HR, engineering	Not diverse/science personnel. No contact with marketing	Not diverse. Science/R&D personnel	Diverse
Diversity of board members	CFO/CTO/operating V.P.s/Director of Corporate Development	Operations/sales	Personnel cross-functionally exposed within businesses	Generally specialists in 1 area
Tenure within organization	Very senior by design	High seniority/most members	Medium (team leaders)	High and medium
Line V. Staff experience	Mix of line and staff	Line orientation	Staff orientation	Staff orientation
Process				
Decision style	Financially driven. Deliberate	External crisis driven	Long-term. Deliberate.	Deliberate moving toward crisis-driven
Decision criteria	Close-coupled to business units	Close-coupled to business units	One person decision maker	Loose coupled moving to tight coupling
Controls				
Company size	Medium	Small	Large	Medium
R&D intensity	Focus on P/E ratio. Future growth. Medium	Low	High	Medium
Industry environment	No longer growth. Approaching stable	Mature/stable. Cost driven	Varies by industry. Many industries competitive	Mature/stable moving to crisis
RI portfolio characteristics				
White space vs. aligned	Eighty percent to existing businesses. Twenty percent white space	Highly aligned	Aligned (firm deriving revenue from many industries)	Fifty percent aligned. Fifty percent white space
Portfolio size (number of projects)	Eleven medium. Down from 100. All funded approx. same dollar amount	Few	Five small in number. Highly funded	Ten medium. Funding varies by project
RI systems success				
Expert ratings	Low	Low	High	Medium
Indications of confidence	Unclear	Unclear	High	Low

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	Firm (5)	Firm (6)	Firm (7)	Firm (8)
Board composition				
Board orientation	Moving from loose coupled to somewhat more tightly coupled	Working toward establishment of board	Loose coupled/disbursed. No board "per se" (Sr. V.P. strategy)	Loose coupled with both R&D and business units
Level in organization	Medium. Senior Management turnover high	Senior Management involvement low	Senior Management involvement very high	Senior Management involvement medium moving to high
External/internal members	No external (use of consultants initially)	No external (consultants initially)	No external	One external. One member recent hire from outside firm
Size/number of members	Seven business R&D executives	One Director and five team leaders	Five strategy/technical managers support BU efforts	One strategy/one CFO/one HR/two BU heads/one business development
Diversity across the board	Not diverse. Science/R&D orientation	Not diverse. All science and engineering.	Not diverse. Business orientation	Diverse
Diversity of board members	All personnel R&D. Much movement between labs and business units	Generally specialists. Some strategy exposure	Strategy personnel. Exposed to other parts of the organization	Business focus. Minimal exposure to other functions
Tenure within organization	High	Medium	High	Mixed. High and Low
Line V. Staff experience	Mix of line and staff	Line	Line	Staff
Process				
Decision style	Impulsive moving toward more deliberate	Work to create appearance of external crisis	Deliberate. Driven by corporate growth targets	Deliberate moving toward impulsive
Decision criteria	Very loose coupling	Loose coupled	Actively seek loose coupling. Participate in BU boards	Moving from loose coupled to tight coupling
Controls				
Company size	Medium	Large	Large	Medium
R&D intensity	Medium. Pay incentives geared toward innovation	Low	High	Low
Industry environment	Varies by industry. Several industries stable	Mature/stable/commodity	Varies by industry. Generally competitive	Stable/commodity. Mergers and acquisitions impacting some firms
RI portfolio characteristics				
White space vs. aligned	Primarily aligned	Primarily aligned due to business unit pressures	20% White space. 30% Aligned with business units	Unclear
Portfolio size (number of projects)	Hundred plus low level funding	Twenty low level funding	Five to ten high level funding	Four projects. Low level funding
RI systems success				
Expert ratings	High	Low	High	Medium
Indications of confidence	High	Unclear	High	Low

	Firm (9)	Firm (10)	Firm (11)	Firm (12)
Board composition				
Board orientation	Loose coupled with business units	Loose coupled with business units. No hub. Disbursed structure	Medium coupling with business units. Frequent review	Medium coupling with business units
Level in organization	Senior Management involvement high	Senior Management involvement low	Senior Management involvement high	Senior Management involvement medium-low
External/internal members				
External/internal members	No external members	External consultant inputs to board	No external members	One external consultant. Founded board
Size/number of members	Seven members. One CTO/five BU leaders/one V.P. corporate planning	Five members. Science and engineering backgrounds	Six members. Business research/HP/business unit leaders	Fifteen members (subgroup of 5) science oriented/recent add one marketing
Diversity across the board	Very diverse	Not diverse	Diverse	Not diverse
Diversity of board members	Very diverse. Business leaders have growth track records	Somewhat diverse. Science people with new business dev. exposure	Diverse	Not diverse. Exposure with other R&D efforts only
Tenure within organization	High	Low-medium	High	High
Line V. Staff experience	Mixed of line and staff	Staff	Staff	Staff
Process				
Decision style	Deliberate. Somewhat driven by corporate growth targets	Impulsive. Somewhat driven by growth targets	Deliberate. Loosely financial driven	Unclear
Decision criteria	Loose coupled moving to slightly more tight coupling	Loosely coupled. Autonomous	Medium coupling moving to close coupling temporarily	Loose coupling to business units and strategy
Controls				
Company size	Large	Medium	Medium	Small
R&D intensity	Medium-high	Low	Medium	Low
Industry environment	Varies by industry. Stable/commodity to competitive	Varies greatly by industry. Stable to highly competitive	Unstable industry experiencing external shocks	Stable/mature. Mergers and acquisitions affecting some firms
RI portfolio characteristics				
White space vs. aligned	Sixty percent white space. Forty percent aligned	Unclear	Primarily aligned. Approximately 10% white space	Primarily aligned. Low percentage white space
Portfolio size (number of projects)	Fifty-five to sixty projects. Funding varies by project	Five to six radical projects	Ten to twelve breakthrough projects	Five to six projects. Low level funding
RI Systems success				
Expert ratings	High	Medium	Medium	Low
Indications of confidence	High	High	High	Low

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interview contributed significantly to data interpretation (Eisenhardt, 1989b). Follow up phone interviews were made when data needed expansion and/or clarification.

Interviews were semi-structured and one researcher led the questioning, but flexibility was maintained in order to probe issues arising during these interviews. Interview length varied, but the average interview lasted 1 hour. Detailed notes were recorded during the interviews by one researcher while others recorded impressions and observations. Immediately following the interview, members of the team present during the interview reviewed their recorded notes together. Impressions and observations were added, and corrections or clarifications were made. In 11 of the 12 cases, tapes of the interviews were transcribed. Both the field notes and the transcribed interviews were used in the data analysis.

Data were analyzed through multi-case analysis methods (Eisenhardt, 1989b; Miles and Huberman, 1994; Yin, 1994). Specifically for this paper, the authors benefited from the periodic meetings held by the entire research team, in which subteams of the research team systematically reviewed transcripts and field notes of subsets of the companies during several intensive multi-day meetings. The reviews occurred along the lines of the dimensions of our overall conceptual framework, including (a) culture and leadership, (b) RI organization structures, (c) RI governance and decision-making, (d) skills and talent development for RI, (e) RI tools and processes, and (f) metrics for RI. Team members reduced the data into a worksheet, in which key events, demographics, and perceptions of respondents were summarized on each dimension for each of the interviews over the study period. The entire research team then debated these results until consensus had been achieved. For this paper, the authors reviewed all aspects of that summary worksheet on the issue of governance, and then re-reviewed the original transcripts for anecdotes and evidence substantiating the summary statements.

4. Data analysis and research findings

4.1. RI center governance model

The model that emerged from our data analysis is shown in Fig. 1. This model conceptualizes the set of challenges that we observed firms facing as they built and evolved their RI governance systems. We draw on additional literatures as they inform or conflict with our observations, to elaborate theory development, as prescribed by Eisenhardt and Schoonhoven (1996). From the model we craft a series of propositions and proposition-derived hypotheses in a manner similar to

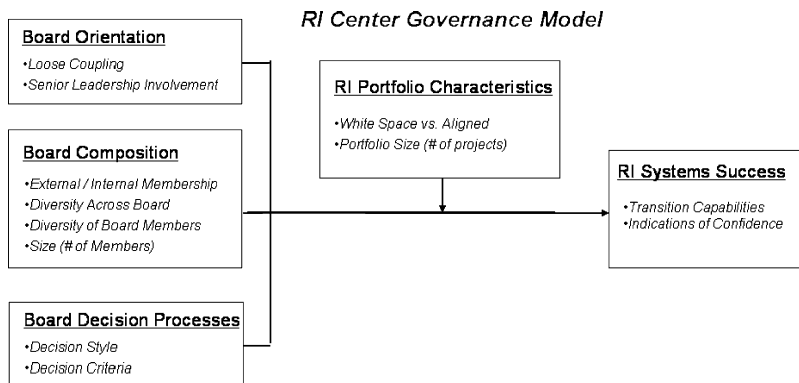


Fig. 1. RI center governance model.

other qualitative researchers in management (Bourgeois and Eisenhardt, 1988). Our propositions convey the relationship between the more abstract constructs (conceptual definitions) within our theoretical system while the hypotheses deal with the variables (operationalizable measures able to take on at least two values) (Bacharach, 1989). As we move forward through the model, where we offer a series of propositions and in most cases, but not every one, we then follow the proposition with a more fine-grained set of hypotheses that further detail the construct originally presented in the proposition.

4.2. RI system success

Radical Innovation system performance is conceptualized along two dimensions for the purposes of this analysis. It should be noted that the most logical and frequently used measure in the literature is financial success associated with RI projects that have graduated from the firm's RI system (Chandy and Tellis, 2000; Sorescu et al., 2003). Previous research, however, has shown that commercial success requires long time horizons and is fraught with high levels of risk and uncertainty (Burgelman, 1985; Leifer et al., 2000; Van de Ven, 1986). Our on-going longitudinal research study is now entering its fourth year, which is early on for RI performance results. Therefore, while we do have some very early indications of financial success the data is not yet robust enough to include a financial conceptualization for a performance indicator.

With that said, there *are* interim success indicators that we do have vis-à-vis our interview data that are developed enough to provide germane information on performance. These are: (a) perceived RI capability as judged by external experts, and (b) the degree to which senior leadership has confidence that the RI system is producing value for the firm. With regard to perceived RI capability, expert rankings were elicited from three Professors and one Ph.D. student working on the Radical Innovation project. These academics were asked to give an intuitive broad rating on a seven point Likert scale of the observed corporations Radical Innovative capability. High scores indicate strong capability.

An average of the academics' scores was used as a proxy for the corporation's real world capability. Firms 3, 5, 7 and 9 shown in Table 1. Titled "RI board governance characteristics by firm", ranked the highest with little variance among the raters. The inter-rater reliability statistic was .828. Senior leadership confidence in the RI capability was asked in the final rounds of the interviews, as the observation period ended. Responses were given to the question "Looking back over the past 3 years' evolution of your RI capabilities, how successful would you say the company has been? Are you more innovative today than you were then? How confident are you that the firm will continue to institutionalize an RI capability?" Results point out the RI centers within firms 3, 5, 7, 9, 10 and 11 show indications of confidence from their Upper Management, while the others do not.

4.3. RI portfolio characteristics

4.3.1. White space versus aligned

"White space" is a term that many of the managers in the firms within our sample cases use to describe innovation opportunities or offerings that are outside of that firm's traditional revenue boundaries. It is universally understood that associated with the development of white space opportunities there will be greater efforts required in the areas of learning and decision-making because unknown and typically highly dynamic markets are the target. Concomitant with that

extra effort, however, is often the prospect of higher returns for the firm or the possibility of adding assets that are wholly “top-line” in their contribution to the corporation. For our study, this attribute is derived from managers and RI governance board members statements over multiple interviews regarding the characteristics of their RI portfolios. We report our results on white space versus aligned portfolio characteristics in Table 1.

4.3.2. Portfolio size (number of projects)

This attribute is derived from both the number of projects and dollar amount spent by the firm on the RI portfolio. Portfolio size implies a level of risk and complexity. Larger portfolios are assumed to require more investment over time and to have a broader level of diversity. When risk and diversity are heightened, we expect this to influence the relationship between the RI governance board characteristics and the RI system success. A portfolio of projects that are homogenous with respect to markets and/or technology requirements will not tax the RI governance board so much as one that is very heterogeneous. Portfolio characteristics related to project size are reported in Table 1.

4.4. Board orientation

4.4.1. Board's coupling with the mainstream organization

Proposition 1. *Firms whose RI Boards are moderately coupled to the mainstream organization will be more successful than firms whose RI boards are either (a) very loosely coupled, or (b) very tightly coupled. The relationship takes an inverted u-shaped form.*

A loosely coupled style with regard to the function of the governing board would be beneficial and important for success of the firm's innovation efforts (Weick, 1976). Due to the unique challenges posed by RI efforts, a separate structure is needed to allow appropriate competencies to develop without being stamped out by reified rules (Dougherty, 1995; Hill and Rothaermel, 2003; Leonard-Barton, 1992). Our project data supports this position. Included below are quotes from governance board members in firm numbers 7 and 9.

[We have] high level representation on [Project Decision Making Board], and what we do is present the piece to them. . .but it has a different set of criteria. So instead of looking at a financial business case necessarily [the usual practice], as we're looking at funding, we're looking at what is the market potential. . .can this become a 100 million dollar business for microelectronics, does this utilize our strengths in technology? Does it utilize our strengths in research? (Project manager, Firm 7).

The ultimate authorizer on these [projects] is. . .the CTO. So he is the final sign-off on deals we do. But he'll want to know [due to the fact that routine valuation methods are not employed] – we have a sign-off sheet that indicates support from Ventures, support from the various functions involved, legal finance, et cetera. Support from M&A, support from the SBU that's going to provide the input – the market input, so there's many places for people to register they're on board here (Board member Firm 9).

The comments above could be interpreted to be speaking strictly of decision criteria for the RI governance board. However, if interpreted in a more allegorical manner, within the context of

degree of coupling, they show a separateness of function from the greater corporation. The more successful RI governance boards in our study, firm numbers 7 and 9 among them, understand that discount evaluation tools requiring specific and detailed financial analyses (utilized widely by the greater corporation) are ineffective in the high uncertainty domain of early phase RI. What we are viewing in firms 7 and 9 are responsive groups that know that they must preserve their own separateness in order to be successful.

It has also been argued further and demonstrated (Daily et al., 2002; Rice et al., 2000) that a loosely coupled, stand alone organizational unit should be established to commercialize radical technology, so that it can evolve appropriate business models and processes necessary to accelerate rapid growth without the pressures of conforming to current mainstream operating models. One measure of this coupling may be the evaluative criteria used to screen projects. To the extent that the criteria used are the same as those used within SBUs to evaluate projects, where uncertainty is likely lower, the tighter the coupling of the RI Board.

4.4.2. Senior leadership involvement

Proposition 2. *In firms that are successful at RI, senior leadership involvement will be high.*

Senior leadership involvement is vital. This is a unanimous conclusion both in our data and also in the Internal New Venture and Innovation Literature (de Brentani and Kleinschmidt, 2004). The specific form that that involvement should take, however, is under debate. Some researchers assert that involvement should come only as a force for post hoc or “retroactive” rationalization and support of the new Radical offering (Burgelman, 1983), wherein the project is given official approval once it is already been matured to the point that it can prove its worth and much of the uncertainty is reduced. Later studies describe the importance of linking Radical Innovation work to overall firm strategic intent and the function of senior leadership in facilitating this (Burgelman and Doz, 2001). For this position, we have strong support taken in the words below by one of the highest-ranking executives of one of the largest firms in our sample (firm number 3) who participates on the governing board of the firm’s innovation center.

I don’t commission the guys to say, go off and figure out how to be in something different than we’ve never been in before, but I do tell them, you know, keep an eye out. I mean, that’s how we got into some of the businesses we are in today. . . . I mean you want people [Innovation Teams] to have room. It’s not like here is the exact plan, stay on the plan. So you have to let the programs change over time. You have to let them kind of fail in this path, and change and go try something different. [Referring to project specifics] I mean I’m not a chemist, you know. I mean I took one class. . . you had to in college, right? I’m not safe to be left alone with the stuff. . . but you see the business potential for it.

In the above quote, spoken by a Senior Manager, it is apparent that there is clear introspective recognition that involvement must be limited in order to be effective. Likewise, the comment below, spoken by a person at the project manager level from firm number 1 of the innovation center illustrates this same recognition, albeit from a completely different perspective.

So, when you start getting visibility with a group president, they want dates. You know, you’re sitting there on a one out of ten shot. It is bringing more attention to them. . . . It’s a mixed thing. . . You’ll have a project run along before you get ready to launch and she won’t like the color [speaking figuratively about color]. . . and not understand that that just

imposed a three-month delay. I mean, there are very senior people who still think their job is to design the product. . . you know, it's not empowering the folks under them. I know that they're getting ready to launch a product, and this [Senior Management] person goes, you know, I prefer the thing to be blue.

Interestingly, while there is agreement in principle on the involvement and role of Senior Management in the innovation center activities, it is clear that Senior Management from the first firm quoted above does not have a "hands off" approach with respect to the innovation efforts. Senior Management could be perceived as inappropriately involved in the detail of the firms' innovation efforts. In actual fact, the firms from which the quotes flow above have a key difference. The first firm is more interested in RI projects that are in alignment with their current businesses, while the second firm is pursuing opportunities that are more readily classified as targeting "white space" or areas where the firm has no current lines of revenue. It may be that for firms with innovation efforts that are more aligned in nature, Senior Management will not feel the pull to be explicitly involved in the details of the innovation center. Thus,

Hypothesis 1. In firms exhibiting RI success, the *higher* the degree of alignment of the innovation offerings under development, the *lower* the explicit involvement there will be from Senior Management.

The next hypothesis stems from Senior Management's apprehension with the higher uncertainty associated with innovation efforts targeted at completely new "white spaces".

Hypothesis 2. The positive relationship between Senior Leadership involvement and RI success will strengthen when the projects are unaligned with current businesses.

4.5. Board composition

4.5.1. Internal/external membership mix

Proposition 3. *In firms that are successful at RI, RI governance boards will be comprised of a mix of innovation center participants and members outside of the innovation center, perhaps outside of the firm who have ties to established lines of business.*

The Innovation Center Director for firm number 4, participates on an RI governance board overseeing the portfolio of RI projects, that makes use of external members. He comments on what he feels has been successful practice at the RI governance board level, which warrants transfer throughout the innovation center.

I believe that every project ought to have a board of advisor, external and internal. I mean, somebody who's exploring say a commercial printing space ought to go out to that space and find the premier expert in that space and have that person on their teams in an advisory capacity.

The firm level governance literature supports our proposition. This literature maintains that outside membership on the on the firm level board is advantageous for breaking down information asymmetry issues that emanate directionally from the internal to external (Baysinger and Hoskisson, 1990; Bhagat and Black, 1999, 2002). Additionally, from the Internal New Venture Literature, Kazanjian and Drazin (1987) claim that review committees with outsiders

(consultants or academics) supplementing the decision process expressly for the purpose of expanding the firm's knowledge base will culminate in more effective selection decisions, thus minimizing the information asymmetry risk associated with those decisions. The assumption implicit in this statement is that external participants in board proceedings and decisions will partially reduce Agency tensions related to information asymmetry because of their broad knowledge. The external board member will have knowledge of, or experience with, areas that the standing members do not have (Kazanjian and Drazin, 1987). Conversely, individual project participants from inside the innovation center, who have very specific technical knowledge, and are able to “educate” standing RI governance board members will lessen asymmetry issues that emanate directionally from internal to deeper internal (within the innovation center).

Three of the 12 firms in the sample have board members that are external to the firm participating in RI governance board deliberations (Table 1). Interestingly, however, and contrary to the literature's prescriptions, those three cases rank at or close to the bottom of the list of firms in terms of our preliminary RI success measures. It is quite possible that the more successful firms do not feel that there is a need for participation by external members and that the weaker firms recognize that they are unsuccessful and consciously seek to alleviate information asymmetry problems with the outside world. Confirming this observation, one relevant comment comes from a firm, which shows promise with regard to Senior Leadership confidence along the dimension of RI system success.

We struggle with that issue [inclusion of people from outside of the firm on the board] Ultimately we have come to the conclusion that because of the breadth of our technology it is too difficult for outside members to handle it. The effort it takes in order to keep the outsiders up to speed in terms of context is not worth the effort in our opinion. We do believe, however, in bringing people in case by case. But not as sitting members on the board.

This quote, from firm number 11, a firm which is by all appearances poised for RI success, seems to indicate contentment with current arrangements of the governing board. The evidence taken together leads us to two potential hypotheses related to “cycles” of innovation success. It may be that the firms currently in an “innovation trough” are aware of such and as a result, they reach out to the external business world for help in their efforts from external participants. In fact, each of the three companies that used external board members hired process consultants to be the external members. In other words, they felt the need for help in developing criteria and learning what questions to ask of teams during the portfolio evaluation reviews. They were not leveraging the external members for specific knowledge with respect to each of the RI projects' content. This leads us to suggest the following:

Hypothesis 3. External member participation on the RI governing board (*those external to the firm*), will be negatively correlated with RI success.

4.5.2. Board diversity

Proposition 4. *In firms which are successful at RI, effective innovation center Governing Boards will exhibit functional diversity among board members.*

Participation on the RI governance board by a variety of individuals from different functions and constituencies helps to assure that these different constituencies will have an outlet with

which to express their viewpoints on early stage offerings. In the entire sample of 12 firms under study (Table 1), 5 of the 12 actively work to shape their Innovation Center Governing Boards with members representing different disciplines from within the organization. Some with a more jaded view may assert that part of the Radical Innovation function itself is intended to exploit the creative quarter of the corporation in order to generate encouraging internal and external press releases. Perhaps this is a partial explanation for what drives the highly varied board selection behavior in those five firms. However, we believe that what is more likely is that organizers of RI governance boards are cognizant, of the risks associated with group decision-making, namely, groupthink, group polarization, and failure to discuss unshared information are minimized by diversity of membership (Hastie and Dawes, 2001; Henry, 1993; Janis, 1989).

Interestingly, the ratio of highly diverse RI governance boards by function is much lower than 5 out of 12 in the firms viewed as successful from the expert rankings and senior leadership confidence measures. In fact, only one of the firms ranked among the more successful firms has a highly diverse governing board by function as shown in Table 1. This equates to a one out of four ratio for firms judged to have strong transition capabilities and one out of six for firms with strong indications of confidence in the RI systems. As alluded to in our background and theory section, it may be that the more adept firms are cognizant that diversity is good, but only up to the point where collegiality among members diminishes (Langevoort, 2001; Vafeas, 1999). This point would detract from Proposition 4. Then again, there may be another more reasonable explanation, which reconciles our proposition and the observed data. The three firms most successful at RI whose governing boards were not classified as very diverse by function were also firms who in a relative sense report fewer “white space” projects in their RI portfolios than the firms in the sample do in general. For the entire sample of 12 firms, 2 out of 10 report significant activity in the white spaces for innovation center projects while for the remaining two firms this dimension is unclear. The successful firm (number 9), with high functional diversity on the RI governing board also exhibited a high proportion of “white space” projects in the portfolio. Portfolio characteristics is our moderating variable from the model shown in Fig. 1. From this observation, we derive another hypothesis:

Hypothesis 4. The relationship between functional diversity and RI success increases as the proportion of the RI portfolio devoted to ‘white space’ projects increases.

4.5.3. Board member cosmopolitanism

Proposition 5. In firms that are successful in their RI efforts, a significant proportion of board members would be described as “cosmopolitan”.

The word “cosmopolitan” is defined as having exposure and comfort in all parts of the world. From the firm level governance literature, McGuire (2000), elaborates on a mentality among board members which encourages, or at least does not interfere with competitive management schemes (McGuire, 2000). By extension, one might reason that members who have been exposed either deliberately, or through unique circumstance, to many facets of a business and the world would be most likely to have the wisdom necessary in order to function in a position of guiding fragile early innovation efforts, yet delivering results. “Cosmopolitanism” on the part of the individual aids the board in its role as discerner and resource provider in that it is more likely that such individuals will have insight relating to pattern and opportunity recognition (Leifer et al., 2000).

We observe that the firms that are more successful in their RI governing efforts make very conscious efforts to populate their governing boards with cosmopolitan or highly exposed members.

The [Governing Board] should be peopled with folks who are familiar and comfortable with the ambiguous end of the [Innovation] process, all right? The amorphous end of things. Senior Manager from firm #7 participating on RI governance board.

Five people[with science backgrounds] were picked for the board, and the people that were picked, were people who [also] had some track record of growing a business. Middle Manager from firm #9 who serves on RI governance board.

Those firms rated as less successful in their RI efforts seemed to miss this point entirely. While every high RI success firm works actively to incorporate members with broad exposure on the board, none of the lower ranking firms make a similar effort. The board members of those firms are typically comprised of individuals with narrow exposure in one functional area, such as operations, R&D or business (Table 1).

4.5.4. *Governing board size*

Proposition 6. *In firms that are successful in their RI innovation efforts, the size of the governing board will range from 5 to 8 members.*

Governing boards that are too large in number have difficulty functioning. From Table 1, the average size of an Innovation Center Governing Board, where a board is present, is between seven and eight members. The firms exhibiting better success potential in their RI efforts typically have between five and seven members resident on their boards. The two firms rated as the weakest in the study as it pertains to RI Success had 10 and 15 members on their governing boards. One of those firms acknowledged during one of their follow-up interviews that the Governing Board was unwieldy, and that a “sub-team” of members counting five in number actually had to make most of the decisions.

On this point, our data is in complete agreement with the past Management and Psychology Literature conducted so as to advise on group decision making efficiencies (Cummings et al., 1974; Hare, 1952; Michaelsen et al., 1989).

4.6. *Board decision processes*

4.6.1. *Decision style*

Proposition 7. *In firms that are successful in their RI efforts, “command and control” management and decision-making style by the Board will not be present.*

A typical command and control RI governance board decision-making style as opposed to an openly transparent and predictable style would suggest that as a project is eliminated, the personnel associated with it would suffer job loss or be summarily dispositioned back to the SBUs. Similarly, with a closed decision making style a new project would be populated by those chosen by the board without regard for the individual’s interest in the endeavor. One particular firm number 9 in the sample openly recognizes and discusses their understanding

that fear of job loss in the innovation center related to participation on failing projects (or for RI governing board members, a failing innovation center) impacts candid reporting as to project progress or learning. They effectively alleviate the above-described agency tension by keeping a highly detailed information index in the form of a reserve portfolio of projects that in the past showed great promise, but for one reason or another the project was discontinued during more advanced stages of the funding process. Board Members and Sub-Board support staff review this “bench” portfolio regularly in a systematic way with an eye toward matching the specific skills of Innovation Center Project Leaders working in the capacity of Agent and informing them of matches. Participants in the innovation process contend that this mechanism provides an atmosphere of honesty and security. The two quotes following are from a manager in a top performing firm (number 9) and a firm that has been making great strides forward on performance following a difficult financial setback (number 11).

And then it can go to what we call it the bench which is the list of programs that are available to be activated, to be worked on. . .you’re looking at [Innovator] skills and availability of resourcing and that type of thing. So your bench is really a list of programs that are available to be activated. I mean on the one hand, like I said, there is no expiration date on things on the list. They [Project Leaders & Project Staff] probably innovate best if you use that. Senior Manager from firm #9 participating on RI governance board.

With regard to people, those who work in early stage new business development need a lot of support from their leader. It is sort of like a “no man’s” land with payoff years and years away. A lot of paper exercises. They need care and feeding by the leader. “we are all in the same boat” attitude as opposed to a sterile approach to this thing. [The Senior V.P. of R&D] wants a “bench of ideas or projects” waiting in the wings [for personnel coming off failed projects] so as to aid in honest decision making by the board. Middle Manager from firm #11.

The following quote comes from a firm in our study that has had difficulty in their RI efforts. The individual speaking recognizes that the people/manpower concerns related to portfolio funding and decision making issues needs to be improved. Issues of where to redeploy innovation center personnel are intruding on both with the boards’ decision to continue with the funding of individual projects and the fears of innovation center personnel on the projects related to ongoing employment.

I don’t even know if it’s still being done [documentation and skill matching for bench projects]. But to me it was just – how are key people motivated, feeling good? This part of the process when the overwhelming odds are that what they do is going to “Fail.” OK? And say what you want about learning about this kind of stuff, people still feel like all you evaluate is the success or failure.

[An unfunded project with promise] Goes on the shelf so to speak, to be reactivated when, in point of fact, it is reactivated when people want to reactivate it [sometimes for job security reasons]. What I’d like to see is to be reactivated when the [strategic] reasons that put it on the shelf change. That’s how I’d like to see them come off the shelf. Middle Manager and RI governance board participant from firm #4.

The innovation literature calls for balance (Dougherty, 1995) flexibility (in that RI innovation center players must be willing to “try and fail”) (Benner and Tushman, 2003; McGrath, 1995), and systematic inclusion of input from many levels of the organization (Hornsby et al., 2002) for innovation success to occur in the large established firm. In the context of the RI center, if deliberate and rational measures are not undertaken to communicate and retain information in the broad sense, then agency tensions stemming from information asymmetry between Principal (the RI governing board in this scenario) and Agent (innovation center participants) will stifle RI. The Agent, who is advantaged as it pertains to specific, detailed knowledge, may be tempted to prolong projects for which his/her skills are matched. A high-level board member from one of the more successful RI firms comments on the mentality they work to develop.

The one thing that we’re hoping is that by having this strong bench list, if the people see other attractive things that they can work on that they will self-emulate. They [innovation center personnel] will say why am I wasting my money pushing a project that is not viable? From the boards’ point of view we want low viscosity, high toxicity. Senior Manager overseeing innovation processes firm #9.

The ‘bench mentality’, is most decidedly a compliment to strong RI portfolio management practices, but it runs much deeper in that it adopts a position that may at times be in conflict with short-term portfolio or profitability maximization. In successful RI firms, the bench mentality is an element of the acknowledgement by the RI governance board that the RI process is difficult for the individual participant due to its long cycle times and high failure rates. With the adoption of the bench mentality, the RI governance board is expressing the willingness to support innovation center participants with resources from the firm’s slack resources in order to store human potential for future utilization. Such a style helps to alleviate the agency tensions, described above, which have the potential to do insidious damage to the innovation center.

Hypothesis 5. A “bench” mentality towards innovation projects is positively correlated with RI success.

4.6.2. *Decision criteria*

Proposition 8. *In firms that are successful in their RI efforts, the RI governance board routinely obtains higher output aspiration among participants in RI efforts than from those in other parts of the firm.*

In many instances, the RI governance board has input or control of goals and metrics for the innovation center. Some examples of the important metrics developed and tracked by these boards within our sample are:

- new incoming ideas,
- number of, or percentage of projects in the RI pipeline,
- patent counts,
- projects transitioned between phases within the innovation center,
- offerings transitioned into business units,
- revenues generated by business units from offerings originating in the center.

Seventy-five percent of the firms in our sample reveal a tendency toward strategic and learning orientation, which contributes to sophistication along the dimensions of goal setting and monitoring by the RI governance board (Table 1). A strict interpretation of agency theory applied to the RI setting predicts that an RI governance board (the Principal) that adopts a process based control monitoring function that meters inputs (Alchian and Demsetz, 1972) and ties activities to stringent time deadlines for innovation center participants (the Agents) will be advantaged as compared to those boards with self-monitoring or trust-based approaches. In fact, the theory may predict correctly for the archetypal incremental innovation efforts, but the RI effort is exceptional because it tends to have long time lags stemming from the difficulties inherent in solving new-to-the-world problems for new-to-the-world offerings. The majority of the firms in our study acknowledges this state and relaxes expectations along the dimension of time. The exceptional companies, however, are successful in forging a pact with their personnel along the dimension of expectations and aspirations.

But that [time] looseness has attached to it a sense of high expectations so that the pursuit of this set of ideas will have a dramatic impact on our competitive position in a specific business by reducing cost dramatically, improving capital utilization dramatically, bringing a whole new functionality to the product line, which has been difficult. You know, those kinds of things and so the setting of those expectations is a very important part for a radical breakthrough, or establishing some potential for a radical breakthrough.” Senior manager from firm #7.

This debate has profound theoretical implications. If traditional agency theory (Alchian and Demsetz, 1972; Jensen and Meckling, 1976) shows weakness in the RI setting is it because the right monitoring system and monitoring frequency for the situation has not yet been invented (Holstrom, 1989)? Or, does the answer lay in further extensions of the more progressive positions taken by agency theorists who advance the concept of greater, but still not complete, internalization of the monitoring function within the individual as a solution to agency tension (Fama and Jensen, 1983). Competing management theories such as stewardship and stakeholder theories (Davis et al., 1997; Donaldson, 1990a,b) may also inform on the decision criteria aspect of RI governance. Our data is not conclusive at this stage of the project, but it is strong enough to offer the following hypothesis:

Hypothesis 6. In firms aspiring to RI success, a mentality of high internal or self-monitoring among innovation center participants will be positively correlated with success.

5. Discussion and conclusions

The study of RI in the large firm context has a relatively long history; however, the effort to create a governance system within the firm capable of aiding in the generation of RI on a repeated basis is new and quite challenging. The primary purpose of this paper has been to utilize several known and well understood theoretical bases to analyze the problem, and to stretch them into this new context. Our theories come primarily from firm level governance and team building and dynamics. Several propositions have been articulated that relate to RI system success within the firm. Research on 12 large firms with innovation centers offers a glimpse into the nature of the struggles firms face.

This paper sets a broad agenda for future research. A theoretical model has been offered to identify key elements of governance for an RI management system, and to consider the relationship between those elements and RI success. Some of the important questions that ensue

are as follows: Exactly how much and what manner of Senior Leadership Involvement optimizes the performance on the RI Center? What is the right mix of internal versus external members on the governance board? What role should external members play? Should their role be confined to process advisor or should it be much broader in scope? What is the best way to build diversity into the innovation center board; with individuals representing the different functional areas within the firm, or with individuals who have been exposed to different functions through the course of their careers? What strategies should innovation governance boards adopt to ensure that Agency tensions in the innovation efforts are effectively minimized?

5.1. Board orientation

Organization theory and management of innovation literature provides acceptable guidance on the separateness of the board structure needed to allow appropriate competencies to develop in the RI context (Dougherty, 1995; Weick, 1976). Proposition 1 captures this relationship. Unfortunately, this is not necessarily the case as it pertains to Senior Leadership Involvement captured under the auspices of board orientation. The literature universally calls for Senior Leadership Involvement (Leifer et al., 2000). Our data does show that senior leadership is important, but the proper nature of their involvement (Burgelman, 1983), is not clear at all. Our study suggests that the nature of the involvement is moderated by the RI Portfolio characteristics as we indicated in Hypothesis 2. That is, in the more successful companies, senior leadership involvement will be high and detail oriented in nature when a high proportion of the projects in the center are unaligned, or white space projects.

We theorize that this is because as the project portfolio decreases along the dimension of alignment, Senior Management becomes less confident in the outcome and consequently pushes for greater (and sometimes inappropriate) involvement. In addition, since unaligned investments are made from a strategic perspective, senior leaders who are fulfilling their responsibility as overseers of the firm's future health, must, in fact, guide those strategic choices. In contrast, business unit level leadership may appropriately oversee radical innovations that serve to strengthen a firm's foothold in a market or technology domain in which the firm already participates. Future researchers will need to identify and evaluate the motives behind senior leaders' behavior and design organizational mechanisms that help guide the appropriate degree of their involvement.

5.2. Board composition

The RI environment brings with it challenges related to decision making under uncertainty that can only be combated with a broad knowledge and experience base. With the exception of governance board size, the governance and management of innovation literatures have not yet provided insights into this specific problem. The governance literature advocates for building broad knowledge and experience into decision making boards through a mix of individuals from both different functions and internal versus external relationship to the company (Bhagat and Black, 1999, 2002; Langevoort, 2001). Propositions 3 and 4 reflect this thinking. Our data show that in fact, compositional correctness cannot be determined without once again considering the alignment of the projects within the innovation portfolio. Hypotheses 3 and 4 capture this phenomenon.

Further, the interview data at our disposal on the issue of external involvement on the RI governing board from outside of the company clearly shows that only the *worst* performing RI firms have such participation. In addition, we have seen that the successful firms assure this

diversity requisite for extremely high decision quality not through a mix of people who are steeped in distinct functions, but rather by including personnel on the board who have either intentionally, or serendipitously been exposed to different functions and varied experiences throughout their careers. This effect is captured in [Proposition 5](#), and mirrors the finding reported in [O'Connor and McDermott \(2004\)](#) regarding project team composition. [O'Connor and McDermott \(2004\)](#) found that RI teams were not cross-functional in their composition so much as they were comprised of multifunctional individuals. The specific backgrounds of individuals and their role in the group decision making process for selection and valuation of highly innovative offerings needs to be documented much more closely in the context of the portfolio mix that these individuals work with. Future research will take into account individual differences in a more comprehensive way and work toward tuning board composition specifically to an innovation center's portfolio characteristics.

5.3. Board decision process

Our data indicate that decision style and decision criteria may be related to transition capability and perceived success in the RI context. Difficult decisions made in an honest fashion by the governing board (Principal) are vital for success in the RI setting. One of the mechanisms highlighted in the data that appears to insure this integrity is the incorporation of a 'bench mentality' which assuages the concerns related to job loss for the personnel working within the center (Agents). [Hypothesis 5](#) addresses this issue directly by offering an avenue consistent with stakeholder and stewardship theories to lessen the agency tensions at work in the center. Finally, we offer evidence that the deployment of a stage gate mentality toward RI governance, which marks time and milestones rigidly in a rigid fashion, runs counter to success in RI systems.

5.4. Our model

With this information, future empirical research may be guided with the intent of explicating those attributes necessary to improve effectiveness of the firm level RI Governance board in producing successful performance results. We offer a rudimentary model of RI Center Governance that summarizes observed relationships between variables in [Fig. 1](#).

The importance and unique challenges manifest in RI endeavors make deriving such a model quite challenging. Nevertheless, to the extent that our results are valid and can be supported by future empirical work by other scholars; we are confident that we have moved one-step closer to a normative theory of governance of innovation centers for large firms in the RI context.

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