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# Developing a Resilient Network Ambidexterity Scale

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Developing A Resilient Network Ambidexterity Scale

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A Dissertation

Submitted to the PhD in Leadership and Change Program of Antioch University  
in partial fulfillment for the degree of  
Doctor of Philosophy

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#### Dissertation Committee

- Mitch Kusy, PhD, Committee Chair
- Donna Chrobot-Mason, PhD, Committee Member
- Elizabeth Holloway, PhD, Committee Member

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As with most of my life, a bit of divine intervention has once again played a central role throughout my research. I am one of those people who is fortunate in inexplicable ways...undeservedly, with the wind at my back and the sun on my face. To say I am thankful degrades the profound gratitude I have for my life and my community.

A decade ago in the military, I worked for a man who was a staunch believer in short meetings. In fact, he would commonly refer to them as *briefings* to ensure the Latin etymology of *brevis* was included in the description. Four bits of information were required, and nothing more: First, “briefly state your business;” second, “briefly state facts on why this is relevant to our briefing;” third, “briefly state any *other facts*;” and fourth, “state your recommendations.” We would go around the room, he would point to each soldier and say, “go!” We each had 10 minutes—max. Ironically, after going around the room with precise military timing, he would hold us hostage for another hour meticulously describing the epochal flashpoint in time we were experiencing; it was always a call to action. He would close with a loosely articulated version of Malcolm X’s words: “*A new world order is in the making and it is up to us to prepare ourselves so that we may take our rightful place in it.*”

These meetings were lopsided and sometimes disproportionately long, yet I welcomed these “briefings.” To me, they were a perfect example of unrestrained paradoxical behavior, something I spent four years grappling with while writing my dissertation. To this end, I won’t hold you hostage but for a “brief” moment while I express my deep-seated gratitude and acknowledge the debt I will never be able to pay for your unconditional love and support:

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*"A single tree cannot make a forest."*

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*“This is a very complicated case Maude. You know, a lotta ins, a lotta outs, lotta what have yous.”—The Dude (The Big Lebowski)*

—So much for brevity!!!—

## Abstract

The purpose of this study was to develop a resilient network ambidexterity scale. While numerous research efforts have considered the dimensions of social capital, resilience, and adaptive capacity to evaluate organizations and communities, few have explored social network indicators within organizations that can be used to mobilize ambidextrous strategies during times of disruption. The emphasis here was to understand the tendencies and behaviors that networks possess to sustain or achieve success along the parallel strategies of optimization and exploration. This study progressed in three specific phases toward filling this void in organizational development literature, using a mixed-methods approach. Phase 1 was the development of the item pool and analysis of the scale to establish face and content validity. Phase 2 included administering an online survey to 344 participants. Data collected were analyzed using exploratory factor analysis, followed by a partial confirmatory factor analysis. These revealed a two-factor solution central to identifying resilient network ambidexterity: Optimizing Organizational Boundaries and Exploring Novelty. Phase 3 involved getting feedback on the revised scale from organizational leaders and practitioners working in innovative fields to refine the final RNA instrument. This research made connections between resilience and ambidexterity in organizations through ongoing inquiry on ways that fusing distinct paradigms impacts organizational outcomes. The development of this scale can serve as a useful tool for organizations to assess their level of resilience and mobilize the features of optimization and exploration. This dissertation is available in open access at AURA: Antioch University Repository and Archive, <http://aura.antioch.edu/> and Ohiolink ETD Center, <https://etd.ohiolink.edu/>

*Keywords:* Adaptive capacity, Ambidexterity, Mixed methods, Social networks, Social capital, Resilience, Scale development, Organizations



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## Chapter I: Introduction

Systems are continually alternating between periods of chaos and order. Given the complexity of human systems, a coherent future state cannot always be clearly defined; however, the present can be scrutinized. This takes into consideration Walker, Holling, Carpenter, and Kinzig's (2004) assertions that, "in particular the stability dynamics of humans and nature emerge from three complimentary attributes: resilience, adaptability and transformability" (p. 74). In an era marked by globalization and technological growth, formulaic organizational strategies undervalue the important features of optimization and exploration not realizing this exposes them to greater vulnerability.

Each year a multitude of companies are forced to succumb to their disruptive competition. These organizations offer cautionary reminders that optimization and exploration are the linchpins of organizational strategic success. The following examples share one common thread—they all suffered from symptoms far more virulent than they were willing to acknowledge. Take for example Circuit City, the one-time electronic juggernaut, which went from 700 stores and \$12 billion in sales into filing for bankruptcy in 2008. The disruption in this case was Best Buy, a low-cost retailer of electronics that catered to a variety of consumers with different household discretionary budgets. In the words of Circuit City's former founder, Alan Wurtzel, "we thought we were smarter than anybody" (Romero, 2013, p. 32).

Another example is Yahoo; once a competitor of Google and Facebook, and valued at \$125 billion at its peak, it was recently sold to Verizon for only five billion (Solomon, 2016). The reasons attributed to the losses are as vast as the monetary losses themselves. In Yahoo's case a simultaneous strategy of optimization and exploration was difficult, if not impossible, to deploy. In the final analysis, any strategy former CEO Marissa Mayer pursued was received with

tepid enthusiasm and ultimately, exemplifies a case of “too little too late.” In the wake of ongoing competitive disruption there was Pebble, a smart watch manufacturer and first to market with their product. Pebble once raised \$10 million dollars in one month through the popular crowdsourcing website, Kickstarter. Early adopters embraced their product and Pebble was reportedly offered \$740 million by watchmaker Citizen in 2015. In 2016, Intel reportedly offered Pebble \$70 million. That same year, according to a Bloomberg report Pebble’s stocks declined by 73 percent. Recently, Pebble surrendered to acquisition by competitor Fitbit for less than \$40 million, a diminutive amount of capital compared to their valuation just two years prior. (Gurman & Zaleski, 2016).

These cases point to an overlooked tipping point occurring in the organizational landscape. Tipping points are considered periods of random organizational disturbance that require innovative solutions rather than lockstep predetermined ones (Gunderson & Holling, 2002). The organization’s response in this environment acts in ways analogous to a thermostat. Just as a thermostat modulates the climate to ensure adequate temperature is maintained, so too do organizational networks. This however, is a human sensor network rather than a mechanical one, interdependently optimizing their existing knowledge or exploring new ideas in ways that stabilize the day-to-day activities of the organization. As organizational contexts rapidly shift, this social network responsible for acting begins extending its boundaries in ways that demonstrates its stores of social capital and its capacity to cope with vulnerability.

To this end, understanding the social and adaptive capacity of organizations retrospectively (post-disruption) does not necessarily provide the anticipatory awareness needed to prevent future disruptions. At a basic level, anticipatory awareness is a capacity to recognize the emergent patterns capable of major organizational disturbances before they fully unfold.

Consequently, considering the underlying adaptive and social capacity organizations possess to harvest and diffuse knowledge at various levels of an organization may offer insights into how to develop strategies that keep organizations from reaching tipping points.

### **Defining Resilient Network Ambidexterity**

Resilience network ambidexterity posits that a latent adaptive capacity—here, defined as the underlying ability to adjust and transform during periods of organizational duress—exists in every organization; this combined with the lived experience of an organization’s constituents fosters networks capable of optimization and exploration.

Ackerman-Anderson and Anderson (n.d.) describe two distinct features of transformation:

First, the future is unknown at the onset of the change process and can only be created by moving forward with the intent to discover it. Second, the future state is so radically different than the preceding one that a shift of mindset is required to invent it, let alone implement and sustain it. (para 8.)

Bridges (2009) makes an important distinction between two interrelated yet distinct concepts that impact the outcomes of organizational change and the ultimate transformation—transitions and change. He distinguishes their differences by noting that change is situational and the desired result. Transitions, however, are psychological and involve individuals going through what Scharmer (2009), refers to as “letting go and letting in” (p. 20). This means first letting go of old behaviors and, second, beginning to demonstrate new behaviors that support change. According to Bridges (2009), the three processes of transition are:

- *The ending*—The way things used to be done is coming to a close. People’s identities are affected and understanding the effects associated with loss come into play.
- *The neutral zone*—The gap between old and new behaviors. Old behaviors are left behind yet new behaviors are not fully enacted. This is a critical stage for leaders as



the right environment should be cultivated in order to create a sense of safety.

Otherwise, threat rigidity may set in and the change may be thwarted because of fear.

- *The new beginning*—Demonstrations of new behaviors, synergy purpose and identities develop that align with the change effort.

Optimization and exploration are only complementary if the previous assertions are considered proxies for understanding network ambidexterity. *Resilient network ambidexterity* (RNA) is defined as a social network's ability to shift its organizational focus between periods of optimization and exploration; this can occur either sequentially or simultaneously during periods of disruption (Raisch & Birkinshaw, 2008). Through this lens, social capital is understood as the extent to which network connections are either building or exchanging knowledge that can be either harvested or mobilized as a resource for building resilient network ambidexterity (Levinthal & March, 1993). Borgatti and Halgin (2006) assert "one of the legacies of the social capital approach in network research is the notion that ties, and position can be 'good,' that is, associated with positive outcomes such as performance or reward" (p. 1178). A RNA view of organizations attempts to solidify the meaning of resilience in terms of its interactions within the network. This is a hallmark of resilience and complex adaptive systems. Understanding network ambidexterity within a system must begin from the perspective of its interdependence with other levels of the system and being concerned with the feedback being exchanged (Folke et al., 2010; Gunderson & Holling, 2002; Walker & Salt, 2012).

### **Purpose of This Study**

The purpose of this study is to understand the tendencies and behaviors networks mobilize to sustain or achieve success along the parallel strategies of optimization and exploration during periods of disruption. This takes into consideration the distinct characteristics

organizational social networks inherently possess in achieving resilient network ambidexterity. Borgatti and Halgin (2011) cite the importance of understanding organizations from a social network perspective by asserting “that it is the researcher—by choosing a set of nodes and a type of tie—that defines a network” (p. 1169). Organizations have been consistently studied from a social network perspective (Krackhardt & Brass, 1994; Monge & Eisenberg, 1987). Contractor, Wasserman, and Faust (2006) argue that the network research “agenda needs to evolve from studying networks in (or between) organizations to grappling with the notion that the network *is* the organization” (p. 681). In this inquiry, a network is considered in the context of the social capital it can produce.

A large swath of the literature on network analysis focuses on characterizing and measuring the positions among actors and nodes, and relating the structures formed from these groupings to assess potential group outcomes (Borgatti & Halgin, 2011; Carley & Hill, 2001; Laumann, Marsden, & Prensky, 1983). However, in this study, measuring the density of the network is less significant than understanding the intentions and actions of actors within organizations that lead to specific organizational outcomes. Moreover, an organization’s networks are continually engaging the system through either tacit or explicit feedback. Tacitly, networks may opt to dampen certain organizational signals that are familiar and incite optimizing, rote responses. Conversely, the introduction of an unfamiliar scenario amplifies the network’s response as it attempts to reverse the level of unforeseen uncertainty through novelty and exploration. Within this milieu of emergent patterns is an interdependent complex human sensor network alternating between periods of optimization and exploration. During periods of disruption, stability may be achieved by optimizing the resources and knowledge that exist in the coffers of the network. However, the disruption may also require the network to pursue novelty

based on the type of perturbation. In other scenarios, both optimization and exploration may be required of the network simultaneously.

Levinthal and March (1993) theorized that an organization's long-term success rests on its capacity to optimize current capabilities while exploring new competencies. Resilient network ambidexterity from this perspective stimulates the organization as a whole. What this means is that optimizing knowledge, and the subsequent exploration of novelty and creativity are parallel processes modulated by the network continuously. In the space between optimization of current knowledge and exploration of future knowledge, reside the critical indicators of network ambidexterity. The organizational ambidexterity literature dedicated to understanding optimization and exploration from a network perspective is scant. Against this backdrop, there is a need to explore the merits of using both quantitative data and qualitative narratives that exist in organizations to develop a tool that measures the indicators networks mobilize to demonstrate the capacity for resilient network ambidexterity.

Natural ecosystems and organizational ecosystems are similar in that they both require nimble approaches to the feedback they receive and adaptive capacity to effectively cope with the disturbances they face (Berkes, Colding, & Folke, 2000, 2003; Dietz, Ostrom, & Stern., 2003; Levin et al., 1998). The fact that the lines of demarcation between stability and instability are not clearly defined within organizations, this is where understanding the attributes of resilient network ambidexterity are of specific importance. Folke et al. (2010) divide resilience into two broad categories: specified resilience and general resilience. The former type of resilience is applied to an explicit problem or situation in the system. General resilience is considered an all-inclusive view of a system to deal with any type of disruption (p. 4). By extension, these two

types of resilience have implications for how organizational social networks are mobilized during periods of disruption.

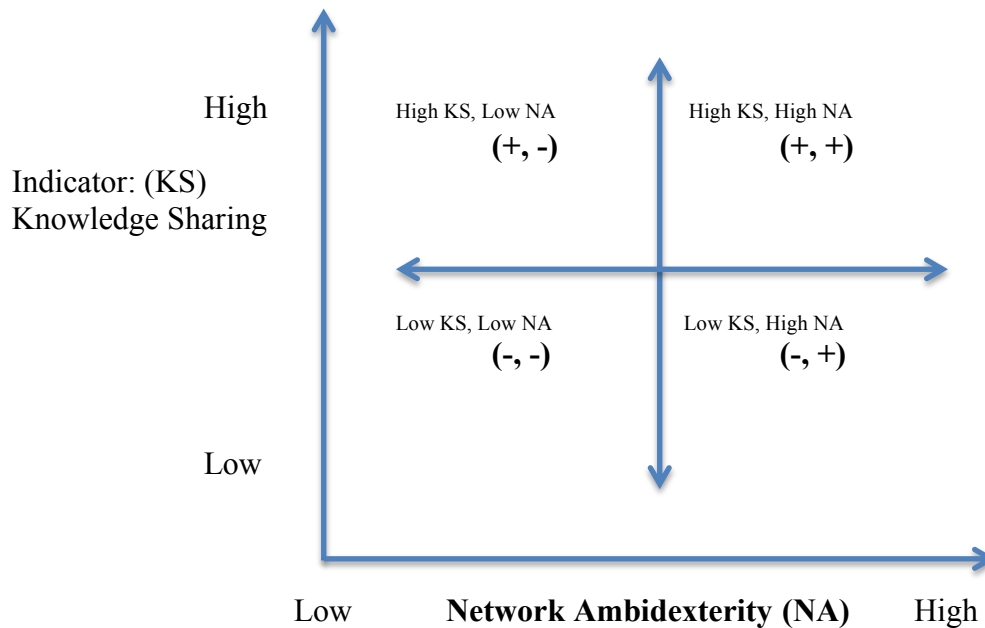
Social network analysis (SNA) has been successfully applied in numerous ways to understand inter-firm network coordination. Burt (1992) used SNA to study network boundaries; Adler and Kwon (2002) determined networks to be an important resource in building competitive advantage. Lin (1999a) considered the effects networks have on legitimizing occupational status and building professional reputation. These studies have been particularly relevant in understanding the positions of actors within organizational networks. Krackhardt (1994) described networks as:

a series of relations that span the entire organization, unimpeded by preordained formal structures and fluid enough to adapt to immediate technological demands. These relations can be multiple or complex, but one characteristic they share is they *emerge* in the organization they are not preplanned. (p. 218)

Network theory uses the term “actors” to mean any kind of social unit to include subunits within organizations, firms, individuals, and collective entities (Carley & Hill, 2001; Monge & Contractor, 2003). Here the term actors will be used primarily to describe the individuals that comprise an organizational network.

Over the previous year my colleague Dr. Lloyd Duman and I have experimented with tentative ideas of how to capture and operationalize an indicator tool for assessing real time resilience. Collaboratively, we developed a tentative model of a resilience grid that would help us begin mapping network indicators both vertically and horizontally within an organization. This would take into account the notion of networks clustering either in positive or negative ways, and it would bring to bear the idea that network resilience ambidexterity could be mapped through the positive or negative relationships exhibited in real time. The capacity of an organization to see the novelty of their networks in real-time would give them access to critically

important information (good and bad) influencing the system. Given the capacity to contextually reorganize networks on the basis of where the system is, highlights the relevance of exploring resilient network ambidexterity along the parallels of optimization and exploration. To this end, the purpose of this dissertation is to understand how networks support the ongoing development of strategies that lead to either autonomous or sequential optimization and exploration during periods of disruption. Figure 1.1 illustrates the potential for viewing resilient network ambidexterity through a multivariate scale perspective:



*Figure 1.1.* Resilience network ambidexterity grid.

### **Nature of This Study**

The literature on social network analysis has proposed various methods for quantifying or graphing network activity in organizations. For example, the network probability matrix (NPM) focuses on predictability of future networks based on previous relationship history. Another example is the simulation investigation for empirical network analysis (SIENA) that uses statistical data to track longitudinal network data and shifts in behavior between nodes and

networks (Snijders, Steglitch, Christian, & Schweinberger, 2007). The exponential random graph model (ERGM) uses variations in network structures and patterns to make predictions on how they will evolve (Goodreau, 2007). The previous methods of network quantification attempt to predict network behavior and do so successfully by monitoring links in social networks, and the conduits or bridges that harvest intergroup or intragroup social dynamics. By taking specific measurements over time of the density of a network, a vivid picture emerges on how they are clustering or forming around specific nodes. This view, however, provides little information about the social dynamics being exchanged that are significant to understanding what makes a network truly function the way it does.

Individuals and organizations are urged to provide models of the future that they want to realize. Once these models begin to emerge, more positive things can be built around them; this, in many ways, can be viewed as an organization's greatest task. Senge, Scharmer, Jaworski, and Flowers (2008) insist that it is possible for global change to happen, and for people to learn to access, individually and collectively, our deepest capacity to sense and shape the future.

Through my ongoing collaboration with Dr. Duman, we have developed a tentative framework to explore the indicators most prevalent in contributing to an organizational model we refer to as Resilience Thinking Leadership (RTL). Two overarching domains were determined to contribute to RTL: An adaptive capacity (AC) domain (this would be my primary focus) and Dr. Duman's focus would be on the adaptive governance (AG) domain. Adaptive capacity refers to the level of autonomy and interconnectedness individuals possess and enact during periods of organizational duress. We surmised that each domain contains indicators that modulate the level of RTL an organization can mobilize during disruptions. Nested within RTL

is resilient network ambidexterity. This serves as the linchpin through which the adaptive capacity domain is mobilized.

Several salient threads are consistent in the primary focus of this inquiry on resilience. First, social networks and their co-constructed values are embedded in organizations irrespective of horizontality or verticality of structure. Second, social ties and their adaptive capacity within organizational structures are viewed as vital elements to sustain and enrich resilience. Third, the conduits of cohesion, knowledge sharing, collaboration, and creativity are considered necessary features affecting organizational coordination and cooperation regardless of business type. Through this lens, resilient network ambidexterity can be viewed as a socially constructed process iteratively modulated by human interaction; consequently, RNA can extend the boundaries of organizational resilience that would otherwise remain static.

### **Attributes of Resilient Network Ambidexterity Research**

The ensuing sections initially, examine social-ecological perspectives and definitions of resilience that serve as a springboard for this inquiry. Next, crossing-paradigmatic boundaries from various streams of literature will facilitate bridging the structural, cognitive, and relational elements of social capital as a central feature of networks and help clarify the conceptual framework of resilient network ambidexterity. Finally, a discussion on how organizations can mobilize the most salient elements of resilient network ambidexterity is introduced, along with a brief discussion of the subsequent chapters of this dissertation.

**Resilience.** A fundamental characteristic of social-ecological resilience is the interplays within an adaptive cycle and its emphasis on “adaptive capacity, transformability, learning, and innovation” (Folke, 2006, p. 67). Given the complexity and speed of contemporary organizations shifting their contexts, a scalable method of harnessing and replicating the resilience-building

practices is of utmost significance to both organizations and leaders. This view gives organizations the flexibility to mobilize their feedback mechanisms and networks in ways that promote adaptive behaviors. These adaptive behaviors are nimble and yet sufficiently strategic to demonstrate resilience from multiple perspectives. Kogut and Zander (1996) posit that “organizations are best viewed as a social community specialized in creating efficient speed and efficiency in transferring knowledge” (p. 503). This perspective presumes that coping mechanisms exist in organizations that can be optimized in ways that sustain a certain level of efficiency. However, this lens may only provide temporary optimization for a specific type of disruption. If organizations instead look for variations in the feedback system, they will remain cognizant of the vastness of their own resilience. Rather than searching for the potential drivers complicating the system, the organizational mindset shifts to begin looking to see which human sensor networks are responsible for creating stability and pursuing novelty during periods of perceived duress. While these systems can be artificially induced to act in ways that produce predictable behaviors, ideally, probing the system should be done in ways that promotes unconstrained self-organizing (Marion & Uhl-Bien, 2002).

Boyatzis’s (2006) assertions capture the essence of the organizational mindset: “It is a complex system when the system description is simpler than the behavior it exhibits” (p. 608). An example of this often used in the complexity literature, is the pattern created by a flock of birds, operating under the auspices of simple rules in flight that prevent them from colliding, while maximizing speed and distance of travel. The relevance of applying the concepts of self-organization and emergence to social systems is not limited to any one organization or industry. These concepts also influence societies and economies almost daily. In Silicon Valley, for example, academic institutions, corporations, entrepreneurs, scientists, and venture capitalists



self-organize in novel ways to form strategic partnerships and establish cutting edge business platforms.

Knowing how to define complexity, despite its tendency to randomly shift, is an important feature of RNA. The keys to understanding RNA and its practices are to investigate at the various scales of the network: macro, meso, and micro). Macro-level interactions are analogous to those of an air traffic controller, directing the overarching vision of an organization. At the meso-level, mid-level managers consider the dynamic exchanges that encourage self-organization to produce results during periods of change. Micro-level interactions evolve by making meaning of the messages provided by the previous two levels. At the micro-level, connections are forged to centralize actions and disperse knowledge in efficient, novel ways.

With these key concepts of resilience serving as the foundation, the attempt here is to apply these ideas to social systems (networks within organizations). However, in order to fully operationalize these social constructs toward developing RNA in organizations, the elaboration and refinement of a scale is necessary. This instrument expands the idea of ambidexterity within the context of a social network. Considering contextually what kind of social phenomenon emerges during disruptions has the potential to uncover the level of RNA an organization may be able to produce.

**Crossings paradigms.** Following scholars who recommend that researchers cross paradigms (Schultz & Hatch, 1996; Willmott, 1993), interplay among the paradigms of complex adaptive systems, adaptive capacity, resilience, and social capital should be considered in the context of RNA. Some researchers suggest recombining different knowledge systems as a strategy for managing complex adaptive systems (Ludwig, Mangel, & Haddad, 2001; McLain & Lee, 1996). Their work suggests that relating the constructs of different paradigms and importing

them in ways that cascade knowledge across disciplines, can lead to new ways of addressing resilient network ambidexterity. To that end, this inquiry will bring to bear credible examples of the indicators—quantitative and qualitative—that support claims regarding the influence that resilient network ambidexterity has on organizations.

**Social capital.** Isolating the resources that either strengthen or weaken social capital has become a central concern to researchers of organizations looking to enhance networks (Walker & Salt, 2012). The distinct features of social capital and its purported benefits have created both agreement regarding social capital's positive influences and also divergence on how to operationalize it at various levels of the organization (A. R. Anderson & Miller, 2003). While the social conduits capable of enhancing organizational knowledge and growth have consistently shown to have positive effects on the dimensions of revenues and sales while mediating knowledge transfer (Mehra, Dixon, Brass, & Robertson, 2006). Nevertheless, the research community has only sparsely considered other relevant modulating effects, and the impacts networks may have on extending the positive conditions created by social capital (Andrews, 2010). The lack of an agreed upon universal definition of social capital may signal to both the ubiquity of its multidisciplinary appeal or the elusive nature of capturing its essence with a precise definition. With this in mind, many of the evolving definitions share similarities despite the reluctance of the research community to reach consensus on a singular definition of social capital. Woolcock and Narayan (2000) synthesized the parallels of the various definitions of social capital by concluding that the sociological literature has produced different, albeit, compatible definitions of social capital.

The most salient feature distinguishing scholars focused on social capital is the idea of whether they focus on the internal versus external manifestations brought about by the resources

obtained through social capital's effects. The internal effects are ostensibly characterized by the ties that bring together individuals together and has been referred to as *bonding forms* of social capital. The external focus, commonly referred to as *bridging social capital*, is concerned with the structural facets among various actors with implications on the collective (Gittel & Vidal, 1998; Kilduff & Brass, 2010; Putnam, 1993b).

Because RNA refers to processes that are internal to organizations, bonding (internal) forms of social capital will be emphasized in this research. Scholars diverge on the most salient features of bonding social capital. Some assert that formally established ties allow access to the people and the resource mobilization needed to build networks (Burt, 1992; Coleman, 1988; Granovetter, 1973). In contrast, other scholars define networks as the informal interactions occurring either by way of membership in civic organizations or unstructured through face-to-face interaction (Evans, 1996; Ostrom, 1994; Putnam, 1993a). Coleman (1988) defined the nuanced, subconscious nature of social capital by concluding:

If physical capital is wholly tangible, being embodied in observable material form, and human capital is less tangible, being embodied in the skills and knowledge acquired by an individual. Social capital is less tangible yet, for it exists in the relations among persons. (pp. 100–101)

The capacity organizations have to cope with disruptions brings to bear the idea of resilience as a tacit by-product of the network's social capacity to maintain its identity during periods of uncertainty. Boyatzis (2006) asserted that, "people around you may not let you see a change. Also, they may be victims themselves, as they adjust their perception on a daily basis" (p. 614). The meaning networks extract from organizational settings influences the rationale for how goals are prioritized and determines what corresponding information is shared during challenging periods. The diverse elements of social network interactions can be related to resilient network ambidexterity, specifically during critical periods of disruption. As such, a

more in-depth exploration of social capital can serve to potentially highlight the need for building resilient network ambidexterity through this specific lens.

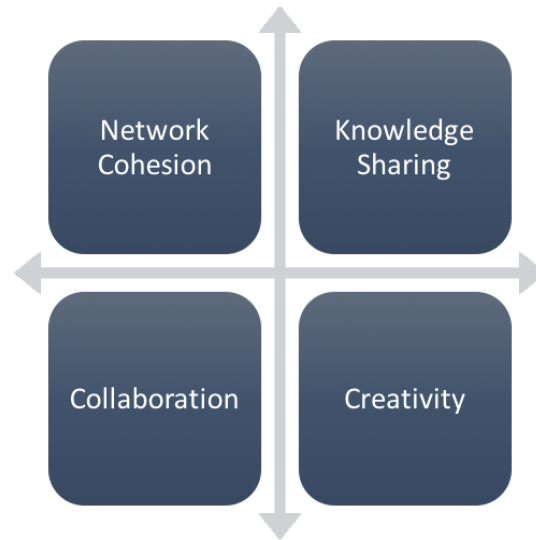
**Social networks.** At any given time, organizational processes will be in flux between beginning cycles of change and end states that are attempting to normalize behaviors and people. The challenge is in managing the types of disruptive change that have the propensity to send organizations beyond a state of emergence into chaos. With this in mind, as organizational change occurs, employees will naturally look to their networks to help them understand how their individual and collective roles may need to shift in the face of new challenges. Networks are of importance at this intersection since they are most expressive of the group's capacity for resilient network ambidexterity.

A common thread in the review of the literature on social capital focuses on the interactions that empower people in ways that build resilience. The general principle here is that enriched connections among people allow them to evolve and pave the way forward by adapting and expanding to the evolving context. This type of adaptive capacity is defined as the level of autonomy and creativity networks possess and enact during periods of organizational duress. By combining the adaptive capacity of social systems, with the interactions produced through organizational networks, the emergence of resilience network ambidexterity begins to take shape as an ongoing process for potential examination.

Understanding the value of the embedded social networks within organizations becomes particularly relevant in the representation of an RNA framework for two reasons. First, they link shared communication bonds to the ongoing adaptive practices necessary for resilience building before and during disruptions. Second, content-rich information shared by such networks effectively facilitates knowledge transfer between organizational members both horizontally and

vertically (Koka & Prescott, 2002). Knowledge transfer may initially occur in subtle, tacit ways; however, over time an emergent pattern is expressed within the organization's structure. This is particularly critical as the internal networks (people) carrying micro-level information attempt to articulate the goals of the organization to both the internal and the external environment.

**Mobilizing RNA.** Organizational ambidexterity denotes an organization's ability to deal with the tensions that exist between optimization and exploration (Duncan, 1976). These tensions surface as a consequence of the distinct sources of knowledge necessary to manage ambidexterity (March, 1991). Adler, Goldoftas, and Levine (1999) concluded that, by design, ambidextrous organizations create contradictory structures in order to both optimize and explore. Smith and Tushman (2005) argue that managing the contradictions of optimization and exploration involves two distinct cognitive processes, differentiation and integration. Differentiation clarifies variances in strategy and organizational architecture. Integration means identifying synergies between strategy and organizational architecture. A helpful understanding of what is occurring at the cognitive level of networks becomes essential as disparate objectives among members of an organization may be prioritized differently during intense periods of duress. Figure 1.2 attempts to capture the positive feedback relationships that are believed to be most instrumental to either sustain or enhance resilience network ambidexterity.



*Figure 1.2.* Positive indicators of network resilience ambidexterity.

Understanding the previous indicators becomes the acid test of how well potentially a network grapples with the concept of emergence as a consequence of disruptions. By developing and enhancing social networks and the ties that networks create, people and organizations “gain additional resources by accessing the stores of direct and indirect ties” (Aldrich, 2012, p. 54). Often, overreliance on organizational strategies that proved successful in the past leads to complacent thinking. After the system’s thresholds begin to fail, formulaic responses typically follow in vague attempts to fill fault lines instead of addressing the seismic shifts occurring beneath the surface. Given this reality, a question that I continue to explore is: what are the organizational indicators or behaviors that promote resilience network ambidexterity from an adaptive capacity perspective?

Appreciating the dynamic interplay between disruption and adaptability social systems exhibit during times of disruption brings to bear the opportunities that a resilient network ambidexterity scale might have on organizations. Smit and Wandel’s (2006) understanding that resilience is inherently an adaptive capacity suggests that resilience can be considered more than a process of recovery and stasis. In this sense, the capacity to dampen a disturbance only captures

one element of a multitude of self-organizing actions occurring across time and above and below spatial scales of the system in focus (Nystrom & Folke, 2001; Gunderson & Holling, 2002).

### **Definitions of Key Terms**

- *Adaptive Capacity*: Defined as the level of autonomy and creativity individuals possess and enact during periods of organizational duress. By combining the adaptive capacity of people with the interactions produced through social capital, the emergence of resilience begins to take shape as an ongoing process for potential optimization.
- *Anticipatory Awareness*: The act of suppressing critical organizational tipping points by actively monitoring the network activity flows, and probing for underlying fault lines.
- *Bonding Social Capital*: Ties and connections between individuals resulting in shared resources and reciprocal interactions (Lin, 1999b).
- *Bridging Social Capital*: Ties and connections between social circles that share resources embedded in the collectivity that would otherwise not exist independent of the group's structure. (Lin, 1999a).
- *Critical Tipping Point*: Intense periods of random organizational disturbance that require innovative solutions rather than lock step predetermined ones.
- *Disruption Management*: Combining the elements of optimization and exploration that lead to “organizational ambidexterity” (Tushman & O'Reilly, 1996).
- *Optimization*: The use and development of things already known (Levinthal & March, 1993).
- *Exploration*: The pursuit of new knowledge (Levinthal & March, 1993, pp. 104–105).

- *Human Sensor Network*: This network begins extending its boundaries as organizational contexts rapidly shift in ways that demonstrate their understanding of how the actions of one person in the network has consequences that affect others that can either enhance resilience or dampen it in ways that affect the whole system.
- *Organizational Ambidexterity*: Simultaneous optimization of existing competencies and exploration of new opportunities that leads to superior performance (Tushman & O'Reilly, 1996).
- *Social Capital*: "Resources embedded in social networks accessed and used by actors for actions" (Lin, 2000, p. 25).

### **Assumptions and Limitations**

Because of the hierarchical nature social structures often form, there is a human tendency to create insular mechanisms within social systems. Mobilizing RNA for personal gain and uneven distribution emphasizes the downside of social capital as occupants of high network status positions may optimize the resources they have multiplied (Levi, 1996; Portes, 2000). An assumption in this study is the notion that leadership is shared and emergent, rather than operationalized by one individual at the top of an organization. Hickman's (2010) statement highlights the importance of collective interactions: "[W]ithout citizen leadership and the values of community that it brings to the decision-making process, choices all too frequently reflect the expeditious consideration of business and political interests" (p. 122).

This inquiry assumes that the leader is not a context setter. Instead, the competitive environment is the catalyst. When combined with the threats inherent in complex systems, the organizational environment sets the context for the network challenges encountered daily. This rationale defies conventional schisms of top-down leadership. The intent here is not to



reconfigure a new form of leadership for organizational leaders. Rather, this research attempts to rationalize a pragmatically formulated sense of urgency for organizations. This shift does not suppress leadership in the formal sense. However, the leadership role is a limiting factor if the assumption remains that leaders are solely the central architects of the day-to-day organizational context.

### **Outline of Chapters**

This study is organized into four additional chapters. The content of each chapter is provided below.

Chapter II: Literature review—The aim of this chapter is to provide an overview of the state of the research on complex adaptive systems, resilience, social capital, social networks, and organizational ambidexterity in order to critically reflect on the theoretical and empirical themes. The vast interest in social capital as phenomena merely grazes the surface of the depth and breadth of human dimensions through which organizational development scholars have examined networks as a critical element of organizational life that can be mobilized.

Chapter III: Methodology—This chapter explored the adaptive practices and the capacity networks possess to harvest and diffuse knowledge across organizational boundaries. Scale development is of particular relevance to this idea, as it provides a means of prioritizing and identifying those indicators most salient in harvesting RNA. Following researchers who have attempted to operationalize and measure organizational resilience through factor analysis (Mallak, 1998; Somers, 2009), the goal is to take the existing contributions of the literature on complex adaptive systems, resilience, social capital, networks, and organizational ambidexterity and fuse these paradigms to develop a scale for understanding RNA.

Chapter IV: Findings—This chapter presents findings and interprets the results produced from the exploratory factor analysis and the narrative responses obtained from the subsequent scale refinement questions in the qualitative portion of this research. The intent is to converge the roads of the (Q)uantitative and (q)ualitative construct validity journey, to evaluate the specific indicators that are significant in producing significant levels of RNA. The chapter ends with a qualitative analysis that served as a refinement tool for examining RNA’s direct and indirect indicators capable of harvesting resilient network ambidexterity.

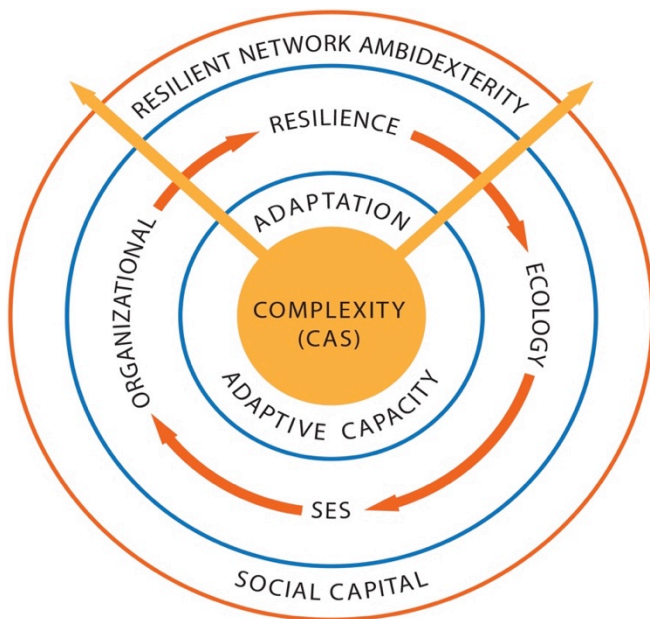
Chapter V: Discussion and implications for leading change—This closing section summarizes certain predictive resilience network ambidexterity indicators in the context of the modern-day organization. The summary provides support for ongoing inquiry and exploration into the substantive benefits some variables have over others in considering ambidexterity within organizations. In this final chapter, the refined scale will serve as a catalyst for generative thinking and robust dialogue among scholars, organizational development practitioners, and organizations. This chapter ends by presenting simple guidelines for the mobilization of RNA and discusses concepts instrumental to building ongoing adaptive capacity for leading and mobilizing networks through RNA during and after disruptions.

## Chapter II: A Review of the Literature

RNA is a network's ability to shift its organizational focus between periods of optimization and exploration, either sequentially or simultaneously, during periods of disruption. While numerous research efforts have considered the dimensions of social capital, resilience, and adaptive capacity to understand organizations and communities, very few have considered how social networks can facilitate RNA during times of disruption. This chapter fills a void in the organizational literature by integrating complexity, adaptive capacity, resilience, social capital, and organizational ambidexterity as a single construct. The primary goal of this chapter is to bridge these organizing constructs to emphasize their distinct contributions to the notion of resilience network ambidexterity (Gioia & Pitre, 1990). This strategy follows Schultz and Hatch's (1996) understanding of *interplay* between and among distinct constructs. "Interplay refers to simultaneous recognition of both contrasts and connections between" (p. 534). This focus on interplay supports the notion that construct boundaries are permeable and, thus, not relegated to either/or ways of linear thinking.

This literature review begins by defining the following five organizing constructs that inform the single construct of RNA: complex adaptive systems, adaptive capacity/adaptation, resilience, networks/social capital, and organizational ambidexterity. Figure 2.1 illustrates the core elements of complexity that set the context for the remaining organizing concepts that will be explored. Next, the literature on adaptive capacity is reviewed, followed by a review of resilience. Then the importance of social capital and how it is structured as a central phenomenon in networks is underscored. This area of research is afforded the largest concentration in this chapter. The final section of this chapter explores relevant research on the theory of organizational ambidexterity as a balanced process that orients networks to promote optimization

and exploration thinking (Andriopoulos & Lewis, 2009; Gibson & Birkinshaw, 2004). From this point the literature transitions from a conceptual framework towards building a case for an assessment tool.



*Figure 2.1.* Core elements of resilient network ambidexterity.

### **Complex Adaptive Systems**

Pascale, Milleman, and Gioja (2000) argue, “self-organization and emergent complexity are the twin engines in the evolution of all living things” (p. 146). These engines are driven by networks either expanding knowledge through their interactions or centralizing their interactions to upend potential disruptions in the organizations. A common thread that underscores the literature on complexity theory is emergent self-organization. As such, a variety of autonomous interactions occur between agents, and the byproducts of those interactions bring about unintended consequences. (Chiles, Meyer, & Hench, 2004). Typically, when organizations are faced with major disruptions leading to undesirable circumstances the causal effects are examined by a central control mechanism (leadership) primarily focused on a number of factors that caused the system to fail. The assumption of the approach is that a small set of subsystems

acted in unforeseen ways and are responsible for the unexpected occurrence. As such, organizations tend to view these types of anomalies as isolated incidences that can be prevented in the future by retooling a small number of subsystems that are deemed responsible for failure. However, this approach is usually defensive posturing. Its intent is to stave off criticism; however, in doing so, systemic problems are not acknowledged.

A number of organizational change and leadership scholars have studied organizations in attempts to understand creative emergence within organizations (Carley & Hill, 2001; Lichtenstein, 2000; Lichtenstein & Plowman, 2009; Plowman et al., 2007; Schneider & Somers, 2006; Uhl-Bien, 2006; Uhl-Bien, Marion, & McKelvey, 2007). A central feature of RNA is the acknowledgement that adaptation is a hallmark of coping with organizational disruptions. As such, subscribing to rigid processes undermines the emergent capacity that organizational networks inherently possess. Against this backdrop, leadership scholars have begun translating what is often observed in socio-ecological systems and applying the concepts of complex adaptive systems to the organizational landscape (Chiles et al. 2004; Lichtenstein, 2000; Marion 1999; Marion & Uhl-Bien, 2001; Meyer, Gaba, & Colwell, 2005; Plowman & Duchon, 2008; Stacey; 1992; Wheatley, 2005).

Complex adaptive systems provide a context for describing the system as an emergent process, rather than an output of a series of static interactions. Walker and Salt (2012) describe the nuances inherent in complex systems by maintaining:

In attempting to describe it, you're building and refining the stakeholders' own mental model of what it is, but this model will only ever be a rough approximation of what it actually is, and it'll never be complete. It becomes, rather a way of thinking about the system. (p. 38)

Systems are complex, self-organizing, and can only be partially controlled, which their behavior difficult to predict. However, creating a way of thinking that is malleable and open to

diverse feedback is possible. Interdependent processes as they relate to networks involve the intentional social interactions that take place at the organizational level to both initiate feedback and mobilize responses to deal with organizational disruptions. This involves considering networks in terms of their adaptability or adaptive capacity, creativity, autonomy, knowledge sharing, and their propensity to foster collaboration.

Complexity theory emphasizes the need for all levels of the system to accept their role in planning that was poorly executed or poorly designed; this moves the system away from defensiveness and toward creativity (P. Anderson, 1999; Chiles et al., 2004; McKelvey, 1999). As participants begin to self-organize, their adaptive capacity begins to expand, and information and knowledge is redistributed in meaningful ways. This open acknowledgement and sharing of responsibility can lead to new organizational capacity that was not possible during periods of organizational stability. Structural change in this sense involves participants improvising behaviors in order to adapt to shifting organizational contexts and allow creative emergence of new ideas.

Complexity leadership theory and complexity theory share two common characteristics. First, they both consider the interactions within the system to be a collective endeavor, involving many actors. Second, a central feature of these theories is the notion of emergent adaptability (Uhl-Bien & Marion, 2008). These overlaps position adaptability and social interactions as the hub through which knowledge and novelty is harvested in organizations (Cilliers, 1998; Marion, 1999). As such, systems are not considered in the more classical sense of systems theory that attempt to maintain organizational equilibrium and reach a stable state (Boulding, 1956). Instead, complexity theory accepts the permeability of a system's boundaries. "Complexity leadership theory is about setting up organizations to enable adaptive responses to challenges through

network-based problem solving” (Uhl-Bien et al., 2007, p. 304). Uhl-Bien et al. (2007) suggested that organizational dynamics are ostensibly interconnected by the networks that produce knowledge and mobilize creative action. Interpretations of systems thinking connect feedback in a manner that exposes patterns of underlying behavior. An assumption being made here regarding systems thinking and complexity to a large extent, is that human interaction is in fact the system. This locates social capital and networks as key concepts in the explanation of an organization’s behavior. While differences can be drawn among the structural, cognitive, and relational aspects of the system, these differences are included here as a means of articulating the interactions of how people get things accomplished in organizations. Pascale et al. (2000) add three major steps that complexity science represents beyond systems thinking:

1. Systems thinking can deal with nonlinear events but is seldom operationalized to do so. Instead, it is used in linear dynamics where effects are proportional to cause. In contrast, complexity is concerned with nonlinearity and takes into account small fluctuations with the potential to magnify.
2. Complexity science is not concerned with controlling future states. Instead nimble reactions to the unexpected guide the focus of mobilizing action and coping strategies as they emerge in real time.
3. The competitive landscape is viewed in terms of the elements operating within it as well as with the landscape itself is changing (pp. 105–106).

Systems thinking is a useful tool for understanding RNA as it takes into consideration the interdependence between relationships in systems and how they contribute to success.

Furthermore, the concept of loose coupling is also a key concept of systems thinking and has implications on how networks function (Perrow, 1999). Weick (1976) noted the advantages of using coupling imagery by asserting that it not only gives researchers a way of talking about complexity but may also be a good system for “localized adaptation” (p. 7) suggesting that responses can be mounted independently within a system without impacting the system in its entirety. These dynamic responses often emphasize setting the organizational foreground for the emergence of collective behaviors that do not follow conventional wisdom, may only seek to

clarify rather than solve problems, and are not bound by the preconceived notion that a perfect solution always exists. Hunt, Osborn, and Boal (2009) assert that leadership through complexity resides between order and disorder links the past, present, and future. In this vein, leadership becomes “co-evolutionary and operating at the edge of chaos” (p. 514). Dervitsiotis (2003) describes how a complex system experiences fluctuation between order and disorder. The space where these fluctuations take place is what he refers to as “the edge of chaos” (p. 255). This means that the system is self-organizing and iteratively displaying different attributes based on internal and external context. However, structurally certain elements of the original structure and identity of the system are preserved. This example of a dynamic system operating at the edge of chaos has applications to organizations as a metaphor for understanding that the distribution of network knowledge may initially appear incoherent, but over time networks maintain certain patterns of coherent synergy that increase resilience.

Cilliers (1998) discussed the nature of feedback within organizations as iterative and can be viewed along a positive-negative continuum. The “openness” of the system as it relates to network resilience facilitates information flow along a continuum of feedback necessary, to tolerate and respond to the level of organizational disruption being encountered. Cilliers also uses the term, *modulation versus control*. This is a befitting way to describe how organizational networks interact, as they are being synthesized here. A RNA perspective empowers networks to identify the level of disruption, realign processes, and mount a proper response. This in turn gives the network the flexibility to also select whether optimization and exploration is enacted. The characteristics capable of modulating a system require deeper exploration into the adaptive practices taking place in organizations. As such, adaptive capacity is examined in the following section.



## **Adaptive Capacity**

Adaptive capacity has been shown to have the potential to be enhanced through learning, engaging diverse stakeholders, collaborative problem-solving and building knowledge practices (Armitage, Berkes, & Doubleday, 2010; Folke, Hahn, Olsson, & Norberg, 2005). The resilience literature consistently includes adaptive capacity as a supporting element for producing favorable outcomes. “Adaptive capacity is a universally positive system property. A system simply cannot have too much of it and it is never described in negative terms” (Engle 2011, p. 652). Smit and Wandel (2006) define adaptation, as “manifestations of adaptive capacity” (p. 286). They see adaptive capacity as the system’s ability to change and deal with the systemic problems they are often exposed to. Carpenter, Walker, Anderies, & Abel (2001) argue that adaptive capacity and learning are similar terms in that they demonstrate how systems respond to disruptions. In terms of ecological resilience, Gunderson (2000) views adaptive capacity as a system’s capacity for robustness to periods of change. Norris, Stevens, Pfefferbaum, Wyche, and Pfefferbaum (2008) offer: “Robustness is defined as the ability to withstand stress without suffering degradation” (p. 134). Dalziell and McManus (2004) argue that adaptive capacity reflects the system’s ability to respond to external disruptions in a manner that preserves the internal mechanisms of a system to maintain it and achieve its purpose. Other ecology scholars see adaptive capacity as a byproduct of the drivers that influence systems to adapt (Adger, 2000; Blaikie, Cannon, Davis, & Wisner, 1994; Fiksel, 2006; Walker et al., 2004; Wilbanks & Kates, 1999). An organizational view of adaptive capacity focuses on the coping mechanisms brought about by future disruptions (Staber & Sydow, 2002). Figure 2.2 illustrates the adaptive capacity domain and the interplay between RNA and its potential indicators.

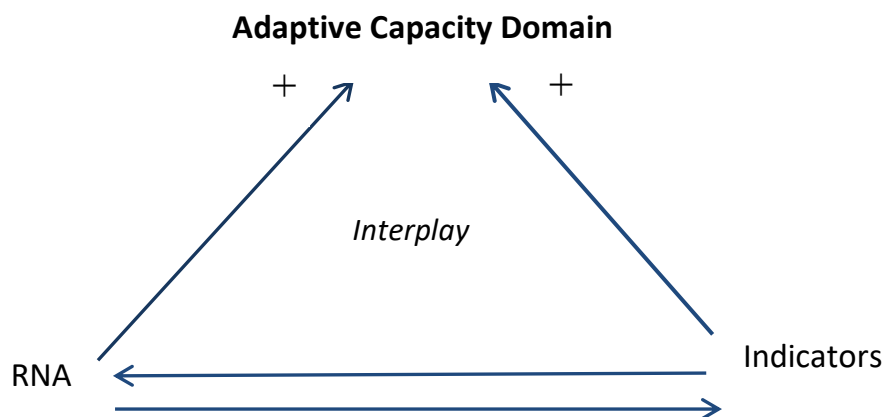


Figure 2.2. Adaptive capacity domain.

Organizational scholars have described adaptive capacity as a critical factor for both organizational and leadership success, concluding that it has the potential to harvest a myriad of alternatives to resolve unforeseen disruptions (Chakravarthy, 1982; Parsons, 1964; Staber & Sydow, 2002). Additionally, the literature defines adaptive capacity as a property of a system to transform and transition during periods of disruption (Folke, 2006). Predominantly, the definitions of adaptive capacity are similar in that they regard adaptive capacity as a lever for building resilience (Fiksel, 2006; Gunderson, 2000; Norris et al., 2008). The literature on adaptive capacity overlaps with complimentary terms and processes, including robustness, stability dynamics, adaptability, and resilience. As such, here the terms adaptive capacity and adaptability will be used interchangeably.

Numerous definitions exist for adaptation in the ecology literature. However, what they share is the notion that an adjustment in behavior or response, either at the individual or systemic level, is a characteristic that occurs either prior to, or following periods of perceived vulnerability (Fankhauser, Smith, & Tol, 1999; Smit, Burton, Klein, & Wandel, 2000). Here, parallels can be drawn between the adjustments in ecology to the adjustments made in organizations, specifically regarding the knowledge that is being either enhanced or adjusted to meet the day-to-day

demands of the organization. Engle (2011) argues that few efforts have been made to evaluate adaptive capacity across vulnerability and resilience frameworks and even fewer assessment tools are available for understanding the dynamics of adaptive capacity.

The previous assertions build confidence for the inclusion of adaptive capacity as an organizing construct for the development of a RNA scale. The network's function in this self-organizing environment is clarifying the feedback being produced both internally and externally to produce stabilizing action during unstable organizational periods. These actions have a two-pronged effect on networks. First by increasing the capacity of the system to foster emergent order and second, it dramatically increases its capacity to increase its goals (Prigogine, 1968; Swenson, 1989). The result is generative on two levels: first, social capital is produced to collectively address vulnerability, and, second, networks are reconfigured in ways that support emergence and unconstrained adaptive capacity.

In the context of human systems, specifically communities, scholars have focused on adaptive strategies as they relate to a system's vulnerability (Smit & Wandel, 2006). The term vulnerability as described here refers to the level of susceptibility a system has to disruptions (Adger, 2006). Looking to understand the linkages that exist between resilience, adaptive capacity and vulnerability Gallopín (2006) argues that adaptive capacity and resilience are subsets of vulnerability. Vulnerability in this sense is interpreted as a concept that signals the system to maintain the networks' structure to produce novelty and mount a proper response during periods of organizational duress.

Consistent with Engle (2011), Cutter et al. (2008) view adaptive capacity and vulnerability as a nested feature of resilience where overlaps exist between resilience and each of these elements. These studies link vulnerability to adaptive capacity and ultimately to resilience

as a process (Norris et al., 2008). Adger (2006) considered the effects of social vulnerability, by focusing on the underlying factors that make people susceptible. From a risk assessment perspective (Brooks, Adger, & Kelly, 2005) correlated the level of risk as a potential driver of future vulnerability and increasing the probability of hazards. While Cutter et al. (2008) examined vulnerability in terms of the many roles civil society elements such as politics, culture, and institutions have on affecting or sustaining it.

Adding another dimension to the concept of adaptive capacity, Carpenter et al. (2001) identify learning as a characteristic of the systems behavior when faced with perturbations. Eakin and Luers (2006) argue that a “hybridization” of approaches in the vulnerability research has created new insights into the causal linkages of vulnerability and innovation into ways of measuring it (p. 367). Conversely, Cutter et al. (2008) argue that the relationships between vulnerability, resilience and adaptive capacity are still not well articulated (p. 600). However, despite these variances scholars agree that there are interdependent relationships between vulnerability and resilience frameworks (Eakin & Luers, 2006; Jansen, van den Bosch, & Volberda, 2005; Nelson, Adger, & Brown, 2007; Vogel, Moser, Kasperson, & Dabelko, 2007). Gallopín (2006) for example, linked elements of adaptive capacity and vulnerability to describe the capacity of a system to respond to environmental threats or changes. From a natural disaster and community hazard perspective various approaches have emerged for measuring a society’s vulnerability to either social or environmental change. Cutter et al. (2008) developed a tool to assess social vulnerability because of technology or natural hazards known as the Social Vulnerability Index (SoVI). Cardona (2006) developed the Prevalent Vulnerability Index (PVI) specifically focused on the indicators or social vulnerability. Others include Vincent’s (2004) Index of Social Vulnerability to Climate Change for Africa and Adger, Brooks, Bentham,

Agnew, and Eriksen's (2005) Predictive Indicator of Vulnerability. While other scales have been created to determine vulnerability of natural environments (Kaly, Pratt, & Mitchell, 2004).

These insights have also led to diverse views on how to define vulnerability based on the contextual lens vulnerability is examined through. Some scholars have argued that vulnerability is not measurable as it is difficult to observe and identify (Hinkel, 2011; Luers, Lobell, Sklar, Addams, & Matson, 2003). Just as with many of the previous organizing constructs, the term "vulnerability" has multiple definitions, and with little consensus on an agreed upon definition (Manyena, 2006). Here, the definition from Blaikie et al. (1994) of vulnerability as an anticipatory mechanism to cope and recover from disruptions aligns best with an RNA perspective.

Alexander (2013) offers this cautionary advice when considering vulnerability in the context of resilience, "One person's resilience may be another's vulnerability, and one would not want the concept to be used as a means of reinforcing unethical practices or hegemonies" (p. 2714). The previous scales have generally come out of the natural disaster literature and focus on individual or social vulnerability through the specific lens of natural disruptions as a byproduct of natural disasters. Vulnerability in the RNA sense has consequences on how social capital is produced. Vulnerability in this context is defined as the extent to which the network is sensitized to the level of adaptive capacity it possesses or lacks to cope with organizational disruptions. This also crosscuts the cognitive dimensions of social capital as vulnerability can be viewed as an antecedent for social coordination.

## **Resilience**

Folke (2006) noted that the resilience approach "emphasizes non-linear dynamics, thresholds, uncertainty, and surprise, how periods of gradual change interplay with periods of

rapid change, and how such dynamics interact across temporal and spatial scales” (p. 253). A large resilience literature exists across many disciplines. Holling (1973) brought the term resilience to prominence; he used it to describe ecologies, noting that systems have two properties—stability and resilience. He went on to conclude that systems do not center on equilibrium, but rather operate close to a hypothetical threshold that when crossed would shift the system into a state of disorder. “But there is another property, termed resilience, that is a measure of persistence of systems and their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables” (Holling, 1973, p. 4).

Building on Holling’s seminal conception of systems not centering on a focal point, Gallopín (2006) acknowledged that multiple stability states might be possible given the inherent properties of a constantly changing system. Pickett, Cadenasso, and Grove (2004) examined the contradictory definitions of resilience in the literature that are separated by the paradigms of equilibrium and non-equilibrium. From a stability and equilibrium perspective, resilience is defined as the ability to return to a stable state of balance after a disruption. Conversely, a non-equilibrium view of resilience emphasizes the dynamic evolutionary potential that exists within systems. Brand and Jax (2007) argue, “the original descriptive and ecological meaning of resilience is diluted as the term is used ambiguously and in a very wide extension” (p. 1). This section attempts to taper the interpretations of resilience by narrowing its focus within the context of adaptability. Engle (2011) posits: “to understand the interlocking mechanisms within and across systems the resilience paradigm scholars need to study human and environmental systems and their interactions together” (p. 649).

As a point of entry into the field of resilience as a multidisciplinary field, an investigation into the range of cross-disciplinary definitions will be useful in linking the paradigms that justify

the need for an RNA scale. The definition of resilience by Adger et al. (2005) aligns best with RNA as “the capacity of a social ecological system to absorb recurrent disturbances, to retain essential structures, processes, and feedbacks” (p. 1036). Table 2.1 emphasizes the diverse literature on the topic of resilience—seen from disciplines of ecology science, ecology, social ecological systems (SES), social science, ecosystems, and organizational studies—and the ongoing need for a more unified definition of this paradigm.

Resilience scholars have grappled with how to formulate strategies for a system that is dynamic without presupposing that it can be in some manner reduced to prediction and thus stabilization (Folke et al., 2010). Turner (1976) considered how foresight played a role in pre-and post-disaster preparation resilience. He argued that organizations experience an “incubation period” marked by a proliferation of tacit events that conflict with what is generally accepted. However, these events are not scrutinized and therefore not circumvented.

Timmerman’s (1981) seminal work is cited as among the first to incorporate resilience theory into the social sciences. He argued that the advent of technology and science created rigidities that made society more vulnerable to hazards. Resilience scholars have also been concerned with managing resilience and have associated it with enhancing and sustaining desirable outcomes in rapidly changing environments where the future is highly ambiguous (Adger et al., 2005; Walker et al., 2004).

Table 2.1

*Definitions of Resilience Across Multidisciplinary Perspectives*

Author	Definition of Resilience	Perspective
Holling (1973)	“Measure of the persistence of systems and their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables” (p. 4)	Ecology Science
Walker et al. (2004)	The ability to maintain the functionality of a system when it is perturbed or the ability to maintain the elements required renewing or reorganizing if a disturbance alters the structure or function of a system. Comprised of three characteristics: 1. Self-organizing 2. Capable of absorbing disturbances 3. Capacity for learning and adaptation	Ecology Science
Walker and Salt (2006)	“Capacity of a system to experience shocks while retaining essentially the same function, structure, feedbacks, and identity” (p. 2).	Ecology
Carpenter et al. (2001)	The magnitude of disturbance that a system can tolerate before it transitions into a different state that is controlled by a different set of processes	SES
Adger (2000)	“The ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change.” (p. 347)	Social Science
Folke et al. (2002)	The underlying capacity of an ecosystem to maintain desired ecosystems services in the face of a fluctuating environment and human use.	Ecosystems
Hamel and Välikanagas (2003)	The capacity for continuous reconstruction	Organizational
McDonald (2006)	Reflects properties of being able to adapt to the requirements of the environment and the ability to manage the environments variability	Organizational
Berkes and Ross (2013)	“Resilience is a system, and the social-ecological system, as an integrated and interdependent unit, may itself be considered a complex adaptive system” (p. 4)	SES



Enhancing resilience can be equated to taking zinc pre-emptively to avoid catching a cold. Knowing that a tipping point exists, an individual mounts a response to enhance the amount of immunity “stocks” that would otherwise lead to a debilitating physical state. Mäler, Li, and Destouni (2007) argue that resilience in a system should be considered valued stock based on its contributions to the system’s wellbeing. Through the lens of adaptive management, Gunderson (2000) maintains, “the resilience of the ecological system provides ‘insurance’ within which managers can affordably fail and learn while applying policies and practices” (p. 44). From an economic lens, Quiggin (2011) hypothesized that operationalizing strategies for success, without re-conceptualizing new theories during times of crisis, leads to the inadvertent recycling of undesirable consequences. Quiggin emphasizes the need for new approaches to uncertainty where realism trumps rigor, equity is valued over efficiency, and humility overcomes hubris. The challenge here is in striking the proper balance between these characterizations. Walker and Salt (2012) argue that systems with efficiency driven, mechanistic, top-down control exhibit less adaptive capacity and lower levels of resilience. Traditional top-down organizations would have a difficult time pitching equity over efficiency, as hierarchical organizations are generally run according to leadership principles that rationalize process predictability, production stability, and generally meet change with linear responses.

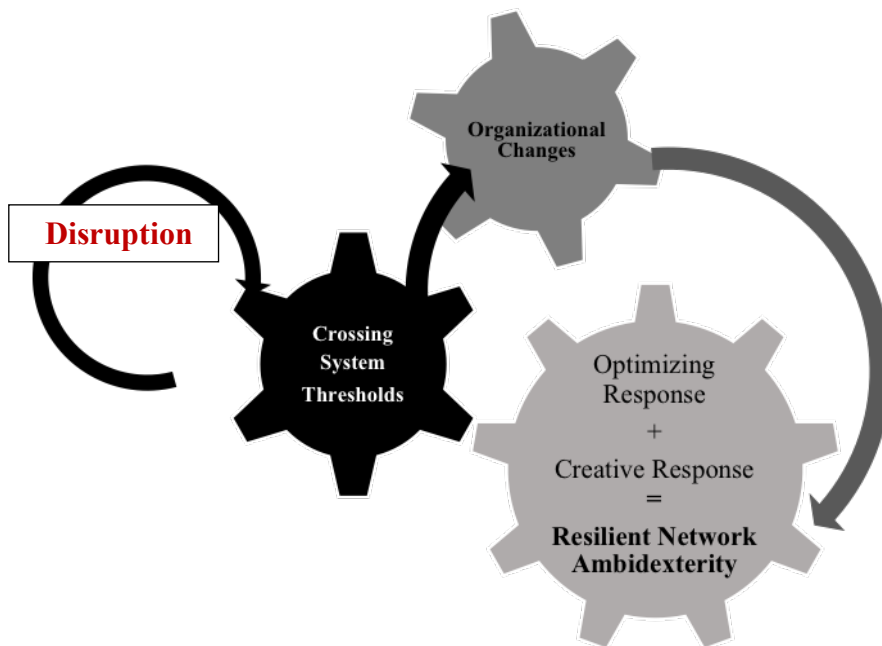
Given the dubious distinctions and divergence on how to conceptualize resilience, Bhamra, Dani, and Burnard (2011) posit that “it is essential to understand whether resilience is: a measure, a feature, a philosophy or a capability?” (p. 5389). Carpenter et al. (2001) see resilience as a metaphor and the by-product of social interactions inherent in dynamic systems. This extended the concept of resilience by introducing the notion of adaptive cycles. Based on the

idea that dynamic systems do not gravitate towards states of equilibrium, they posited that resilient systems have three characteristics:

1. The amount of change that a system can undergo while retaining the same controls on structure and function.;
2. The degree to which the system is capable of organizing itself, without disorganization or force from external factors;
3. The degree to which a system develops the capacity to learn and adapt in response to disturbances.

Resilience emphasizes the value of understanding and crossing what Walker and Salt (2012) refer to as “thresholds” (p. 6). These thresholds are described in the following section; they are also referred to as *critical tipping points* and exist in self-organizing systems whether describing ecosystems or human systems.

Because critical tipping points are not easily recognizable, it is imperative to understand them, locate them in the system, and determine why the system is where it is in the life cycle. Most important, is the imperative of mounting a proper response for how to deal with such critical tipping points once the structure changes and emergent behaviors take place. The consequences of understanding critical tipping points lies in the fact that once certain organizational limitations have been reached all the variables in the system begin to also exhibit changes (Kauffman, 1993; Walker & Salt, 2006). Figure 2.3 illustrates the movement between thresholds that systems navigate towards creating RNA.



*Figure 2.3.* Threshold crossing toward building network resilience ambidexterity.

Cutter et al. (2008) posits that transitioning from conceptual framework to assessment in the context of resilience is challenging because it spans through social, physical, institutional and economic dimensions (p. 603). Understanding network resilience in the context of complexity begins with recognizing the collective potential for novelty human systems inherently possess. Tierney and Bruneau (2007) focused on organizational resilience and measured the extent disruptions affect leadership training, organizational structure, and capacity. A key feature of resilient social ecological systems is reciprocal feedback (Gunderson & Holling, 2002; Berkes et al., 2003; Chapin et al., 2004). Feedback is a consistent feature in the resilience literature, as is the characteristic of learning as the system adjusts to disruption and seeks momentary stability (Adger et al., 2005; Klein, Nicholls, & Thomalla, 2003; Folke, 2006). Here networks can be asserted as a critical element to the demonstration of adaptation, knowledge sharing, and improvisation (Cutter, 2008; Folke, 2006).

The scales included here, generally focus on the question, resilience to what? —and are predominantly found in the ecology literature. Schipper and Langston (2015) cite that a limitation across resilience scales is that they often remain ambiguous as to whether the indicators examined refer to individual or group resilience, or whether individual resilience is dependent on group resilience. Additionally, the context of each scale, coupled with the way the definition of resilience is mobilized, creates divergence on the distinct indicators of resilience.

### **Networks and Social Capital**

The aim of this section is to provide an overview of the state of research on social capital and to critically reflect on the theoretical and empirical themes that are important to operationalize social capital in the context of network resilient ambidexterity. The overarching definitions, consistent within the scholarly research, can be summarized as primarily focused on social relation investment, which yields expected returns internally or externally within the boundaries of the organization to produce benefits (Bourdieu, 1989, 1990; Burt, 1992; Coleman, 1988; Lin, 2000; Portes, 2000; Putnam, 1993b). Fine and Green (2000) argued that the constructs of social theory are being re-launched from a social capital lens. By analyzing theoretical concepts of social capital and conceptual frameworks of network theory, the heuristic potential of social capital as a critical element in resilience network ambidexterity becomes clear.

The palette of varied definitions in the literature examined creates scholarly divergence on how to resolve the existing gaps regarding the sources of social capital (Lin, 1999a). Baron and Hannan (1994) noted that social capital research has been marked by a “plethora of capitals” (p. 1122). To this end, many of the empirical findings in this section employ Bourdieu’s (1990) frame of reference that defines social capital as: “The aggregate of the actual or potential resources, which are linked to possession of a durable network of more or less institutionalized

relationships of mutual acquaintance and recognition—or in other words, to membership in a group, which provides each of its members with the backing of the collectively owned capital, a “credential”, which entitles them to credit, in the various senses of the word” (p. 248). Bourdieu posits that the metamorphosis of capital could shift from its primordial physical, monetary manifestations to the material realm underlying our beliefs. In either case, value may be attained. He argues that social capital is convertible in that, like monetary capital, it can be utilized for different purposes. For example, the benefits of an individual social position in a network can be positively converted to benefits in the marketplace or prove advantageous in bridging other seemingly more important social groups. Adler and Kwon (2002) view social capital not in terms of reproducibility, but rather as Coleman (1988) called it, a “complement to other forms of capital” (p. 21). Additionally, Lazerson (1995) proposed that the value social capital could have positive economic effects through the reduction of transactions costs.

A common argument, which emerges in the social capital literature, is about determining the level where social capital activities and practices take place within networks. Burt (1992) and Coleman (1988) contend that social capital resides in the relations created with other actors and not at the individual level. Conversely, Bourdieu (1990) views power as a central feature in social relations. Schwartz (1997) supports Bourdieu’s view asserting: “In modern, differentiated societies, access to sources of income in the labor market depends upon cultural capital in the form of educational credentials and social capital in the form of network forms of power” (p. 73). Here, Coleman’s (1988) ideas about social capital are embraced in that social capital is understood to be a necessary outcome in establishing the network’s identity. In this sense, the attributes associated with the social capital established by the network can be viewed as an antecedent for their propensity to be ambidextrous.

Social capital is a central concept of network theory; in many ways, they are inextricably linked. Searching to locate social capital within a network, Burt (1992) put forth his structural hole (SH) theory defining it as, “an element of social structure simple in concept, powerful in describing empirical data, with integrating implications for diverse lines of social science theory” (p. 3). Woolcock and Narayan (2000) synthesized the parallels of the various definitions of social capital by concluding the sociological literature has produced different, albeit compatible, definitions of social capital. The most salient feature distinguishing the theoretical camps focused on social capital is whether they focus on the internal or external manifestations brought about by the resources obtained through its effects. The internal focus is ostensibly characterized by the ties that bind individuals and has been referred to as *bonding forms* of social capital. The external focus, commonly referred to as *bridging social capital*, is concerned with the structural facets among various actors with implications on the collective (Burt, 1992; Gittel & Vidal, 1998; Granovetter, 1983, 1985; Oh, Kilduff, & Brass, 1999; Putnam, 1993a, 1993b). A large swath of the network theory literature focuses on the bridging (external) dynamics of social capital and their implications on structural elements of an organization. In this study however, the focus will remain on the internal assessment of networks to produce outcomes manifested through social capital in its various forms.

Social network analysis (SNA) has its roots in the social sciences and has been used as a tool for studying individuals and their relations to a network. Specifically, SNA seeks explanations for the social behavior of the entire network rather than focusing on the behaviors of a single actor within it. In the organizational development literature, social network theory has been used to understand creativity (Obstfeld, 2005). Krackhardt and Porter (1985) used SNA to reveal promotion potential within a network, while Burt (1992) used SNA to examine innovation

within networks. Salancik's (1995) view of the interactions occurring within networks is of relevance in understanding how to interpret them in the context of ambidexterity:

When one interaction occurs, the networks of dependencies that shadow it are likely to produce mutual adjustments to the interaction patterns between and within organizations. And in managing some of these relationships, organizations find themselves creating new relationships when they can split off some activities through divisions of labor to better manage “the new and the old” (p. 347). What Salancik refers to as managing the new and the old is essentially a function of RNA. In this instance however, the terms shift to understanding the parallels of optimization (old) and exploration (new).

The basic rationale for the incorporation of social capital in this chapter is to emphasize the relevance of what is at the heart of any network, which are the social resources embedded within it. “There is a danger in network analysis of not seeing the trees for the forest. Interactions, the building blocks of networks are easily taken as givens” (Salancik, 1995, p. 346). Building on this metaphor, social capital can be viewed as the trees within a larger forest ecosystem, referred to here as networks. Thus, considering social capital as it is being examined in this chapter is to connect the internal structure (networks) to outcomes (ambidexterity). How networks interact and build knowledge should be a central concern for organizations and leaders. In general, social capital is an outcome of these interactions. This perspective ensures that the forest (networks) remains linked to the trees (social capital).

**Network theorizing.** Two of the most prominent social network theories are Granovetter's (1973) *strength of weak tie theory* (SWT) and Burt's (1992) *structural hole theory*. Both theories rationalize similar ideas of how networks function. Burt views social networks as a set of ties centralized around a common node (individual), thus forming what he refers to as an

*ego-network*. The information brokered by people within this network produces access to information, novelty, and resources others do not. Those not connected form the metaphorical hole, while the brokers of information act as links that bridge the holes, consequently enhancing the overall social capital of the network (Burt, 1992, p. 339). Burt (1992) extends Granovetter's (1973) work on SWT by asserting that, "regardless of the relation between structurally equivalent people, they lead to the same sources of information, and are therefore redundant" (p. 19).

Granovetter (1973) also makes distinctions between strong and weak ties; the strength of the ties is the antecedent for whether they can act as a bridge to other network resources. Burt (1992) prefers the use of "redundant" versus "non-redundant" contacts to describe the types of benefits each may or may not be capable of providing (p. 18). According to Burt non-redundant ties produce novel information through the enactment of social bridging created by those in positions to broker them. In either case, whether considering the strength of the network ties as bridging or bonding mechanisms within networks, or the non-redundant ties' capacity to produce novel information as described in Burt's theory, both are concerned with the production of social capital within a network.

**Network view of social capital.** Coleman (1988) asserted:

Social capital is defined by its function. It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of social structures, and they facilitate certain actions of actors—within the structure. (p. 98)

Embedded in these structures are resources that can facilitate responses, otherwise ignored without the presence of social capital. Unlike physical capital, however, which is considered a tangible resource, social capital is tacitly expressed and based in part on the social relationships, which provides access to resources in quantity and quality through reciprocity and trust (Portes, 2000). Several authors have drawn distinctions between three meta elements of



social capital; structural, cognitive, and relational (Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998). Each dimension has implications on RNA (Figure 2.4).

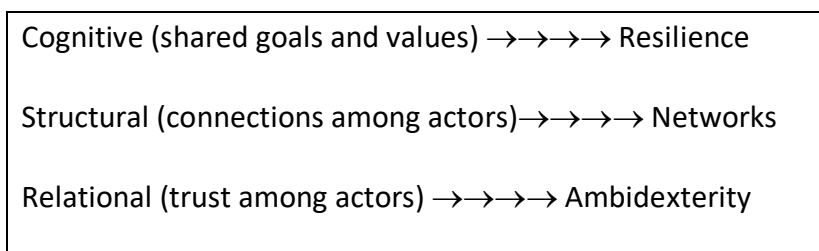


Figure 2.4. Meta element implications for Resilient Network Ambidexterity.

These variances imply that social capital is a layered social process, which encompasses the individual norms (behaviors) and structural features derived from networks to conceptualize and thus operationalize it at various levels of an organization. These characteristics are relevant to RNA. The previous dimensions of social capital create the mobilizing feature of this framework. While each of these meta-elements can be explored independently, exploring them collectively produces the greatest return for organizations. A brief explanation of the three meta elements described above will facilitate understanding their differences.

*Structural social capital* as the name implies, refers to the structural networks' ability to adhere to the rules and procedural elements, which are reflected in the quality of social interactions and patterns of behavior (Hitt & Duane, 2002). McFadyen and Canella (2004) argue that the position of actors within the social structure gives them access to unique information and resources and is an important aspect of the network. The cognitive element includes the shared values, beliefs, and norms that predispose actors towards the accrued elements of reciprocity, collective action, and shared vision, as emphasized in Putnam's (1993b) work on community organizations.

*Network resilience ambidexterity* extends the boundaries of the interactions described previously. This reinforces what Andrews (2010) asserts as being "constituted by the broader

organizational mission and values that form the context by which exchanges of knowledge and collective action take place” (p. 587). As such, social capital is considered an antecedent of RNA, where networks legitimize and strengthen their collective knowledge to produce stability and value. Table 2.2 illustrates the nuanced similarities and varied perspectives of social capital as emphasized in the network literature:

Table 2.2

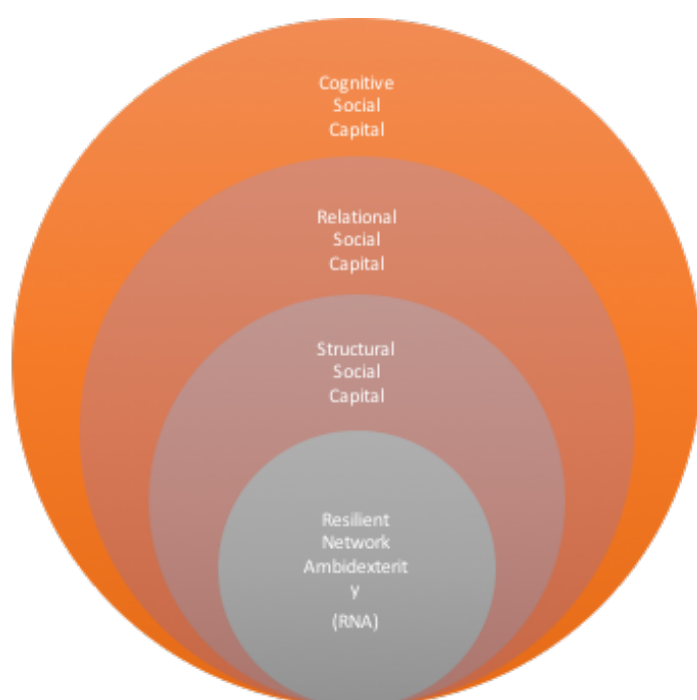
*Nuanced Perspectives of Social Capital in Network Analysis Literature*

<b>Authors</b>	<b>Level of Network Analysis</b>	<b>Primary Focus</b>	<b>Interplay</b>
Kim, Oh, and Swaminathan (2006)	Network dyad, triad and global	Organizational Intergroup Intragroup	Exploration/Optimization Multilevel analysis of the structural tendencies of organizational networks.
Oh, Labianca, and Chung (2006)	Social capital multilevel analysis	Organizational Intergroup Intragroup	Optimization Links social capital to group/team effectiveness.
Labianca and Brass (2006)	Social networks and its underpinnings	Organizational Intergroup	Optimization /Exploration Negative effects of social capital on productivity.
Madhavan, Koak, and Presscott (1998)	Pattern changes in interfirm networks.	Organizational Internal/External	Optimization/Exploration Links external change to internal network patterns of change (mapping principles).
Dhanaraj & Parkhe (2006)	Innovation and networks	Organizational Internal /External	Optimization/Exploration Introduce concept of orchestration as a framework for network cohesion.

**Nesting the dimensions of social capital in RNA.** Three approaches were evident in the review of empirical research on social capital as they pertain to networks. First, behavioral variables such as norms, values and trust were measured by way of surveys and interviews. Second, the relationships between social capital and an alleged single indicator such as trust, reciprocity, network ties, and ethical leadership were the locus of inquiry. Lastly, multiple indicators were espoused to support social capital network strength and mobilization claims (Burt, 1997a, 2000). These variances have impacts on the epistemological significance of social capital and the research being conducted. Paxton (1999) asserted that, “the lack of an obvious link between theory and measurement has, in some cases, led to the use of questionable indicators of social capital” (p. 90). While the dimensions and sources of social capital remain ostensibly unresolved, this review revealed relationships between both social norms and networks as critical features in the positive demonstration of social capital at both the individual and the network level.

Despite social capital's lack of interchangeability, the units of analysis in the studies reviewed include three critical components. The first element is understanding the available resources and how they are distributed; the second element points to how those resources are embedded through social networks; and the third element focuses on how purposeful action leads to the mobilization of multilevel resource distribution (Lin, 1999b). As mentioned previously, the multidimensionality of social capital consistently surfaces as a common theme in this review. Woolcock (1998) developed a multilevel model that drew distinctions between bridging and bonding social capital. These two distinctions were commonly emphasized in the literature and congruent with more robust methods of operationalizing networks. Nahaphiet and Goshal's (1998) dimensions of social capital, structural, relational, and cognitive, were typically

associated in the literature with either one or both forms of bridging and bonding network social capital. By linking these two commonly used sources of social capital (bridging and bonding) to the dimensions of networks (structural, relational and cognitive) a clearer picture begins to surface in the research regarding the potential indicators that best unfetter social capital's benefits within networks. The ensuing sections briefly explore the structural, relational, and cognitive dimensions of social capital. Figure 2.4 illustrates how the dimensions of social capital are nested within RNA.



*Figure 2.5.* Nested dimensions of social capital in RNA.

**Structural dimension of social capital.** Seeking stricter methodological rules, Lin (2000) attempts to resolve epistemic divergence in social capital theory by using network analysis as the backdrop to understand social capital. As such, social capital is the foundation for RNA. Lin's proposition circles back to the notion of embeddedness put forth by Burt (1992), describing the resources necessary for collaborative action. Kirkby-Geddes, King, and Bravington's (2013) study reveals how the physical environment plays a critical role in

developing social capital within networks, supporting Szrester and Woolcock's (2004) argument that social capital is subject to equal constraints of both the physical and the psychosocial environment.

Delving deeper into the distinct modulators impacting networks and thus organizational behavior, Carmeli, Ben-Hador, Waldman, and Rupp (2009) looked to determine which social and structural drivers affect the way relationships are not only created, but also sustained. The results of this analysis confirm that bonding social capital mediates the relationship between a leader's relational behavior (LRB) and employee vigor. Interestingly, the study also showed that vigor mediates the connection between bonding social capital and employee job performance. Uzzi (1999) found that trust developed between partners in alliances change the types of information that is exchanged. This perspective is thematically consistent in the review of social capital, specifically when applied to the research on its structural dimensions and presumes that the information exchanged between people, based on reciprocity and trust, can produce social capital practices, which can be isolated at the individual level and mobilized when needed at the network level.

**Relational dimension of social capital.** One of the more comprehensive studies in this review is Pastorizia and Ariño's (2013) study confirming that ethical leadership at the supervisory level matters in the creation of the structural, relational, and cognitive dimensions of internal social capital. The frequency and amount of information exchange (structural dimension) was positively associated with employees' degree of identification with the goals of the organization (cognitive dimension); this interdependence suggests that exploring any dimension of social capital in isolation from the others ignores their interdependence within networks.

Trust is a common indicator in the measurement of social capital. However, differences in the research methodologies are apparent in the way trust is considered to affect social capital creation. Coleman (1988) sees trust as the source by which social capital is developed. Conversely, Narayan and Cassidy (2001) and Putnam (1993a) view trust as a dimension or construct of social capital. Tansley and Newell's (2007) research findings support the notion that trust could be viewed as an antecedent instrumental in achieving other outcomes. In the case of Tansley and Newell's research, the outcome was enhanced performance. Adam and Rončević (2003) conclude:

Any attempt to solve two basic problems—first the problem of sources and consequences, and second, the problem of whether social capital is a dependent, independent or intermediary variable—in a straightforward positivist manner is fundamentally doomed to failure as such attempts fail to recognize the complexity of social phenomena and processes. (p. 166)

Regardless of the positionality of the researcher whether positivist, utilitarian, or post-positivist, in all cases where trust was included as an indicator of social capital it correlates as valuable in developing social networks.

**Cognitive dimension of social capital.** The review of the literature has consistently supported the proposition that social capital exists at various levels of the organization, through different contexts and distinct theoretical worldviews. The interdependence that all the elements of social capital ostensibly demonstrate, builds a strong case for examining the dynamics of their interactions and how they contribute to resilience network ambidexterity. For example, the cognitive shared goals and values of a group are, in all likelihood, circulated best when there is a connection among actors in the network (structural dimension). Trust (relational dimension) among actors in the network is likely necessary for the recombination of either of the previous dimensions. Kaspersen (2000) examined the role social capital in its various forms has on the organization and concluded: “The existence and maintenance of different networks on the basis

of generalized reciprocity, trust, and readiness to co-operate are a precondition for the transfer and dissemination of knowledge and innovations” (p. 45). This emphasis on integration of social capital elements assumes that the antecedents of social coordination should be present to even begin considering a proper conceptualization and definition of the term, network. To this end, the modulating mechanism is context, and defining networks becomes less relevant than understanding the network behavioral dynamics for empirical inquiry. Andrews (2010) supports this view of cognitive social capital as “being constituted by the broader organizational mission and values that form the context by which exchanges of knowledge and collective action take place” (p. 587).

M. Li’s (2013) review of methodological fit in the social capital and social network research examined how network scholars choose methodological techniques through a comprehensive survey of the methods selected in the social network and social capital body of research. Li’s study looked at the determination of boundary specification strategies employed among researchers, the chosen sampling techniques, and the collection of data in the context of networks and social capital. The list below highlights examples in the research where the cognitive dimensions of social capital were explored while adapting a congruent definition of social capital (primarily a network view).

- The antecedents and consequences of social capital contribute positively to those seeking employment (Granovetter, 1973; Lin, Ensel, & Vaughn, 1981).
- Correlations are drawn between social capital and upward career mobility (Burt, 1992; Gabbay & Zuckerman, 1998).

- Correlations have been established between higher rates of CEO, executive, compensation and social capital (Belliveau, O'Reilly, & Wade, 1996; Burt, 1997a, 1997b).
- Increased social capital reduces employee turnover rates (Krackhardt & Hanson, 1993).
- Social capital encourages innovation through greater exchanges of resources (Gabbay & Zuckerman, 1998; Hansen, 1999).
- Social capital spurs intellectual capital (Nahapiet & Ghoshal, 1998).
- Social capital positively affects supply chain management relations (Baker, 1990; Uzzi, 1999).

Table 2.3 synthesizes a cross section of the literature on social capital through the various domains discussed previously.



Table 2.3

*Synthesis of Research Domains in the Social Capital Research*

Source	Method	Sample/ Participants	Social Capital Themes & Orientation	Synopsis
Hawley, St.Romain, Rempel, Orr, and Molgaard, (2011)	Quantitative Correlational Study	Participants (148) from first six cohorts of KPHLI (Kansas Public Health Leadership Institute) drawn from public health and allied health agencies.	Cognitive Dimension	Study evaluated 35 of 38 social capital indicators from previous research triangulating various qualities associated with social capital, and items related to bonding, bridging and linking social capital pre-and post KPHLI Social Capital and Leadership Training Survey demonstrated significant increases following training. Important outcome is understanding that competency-based trainings associated with social capital can be quantified. Suggests that it is plausible to purposefully generate social capital.
Carmeli et al. (2009)	Quantitative Correlational Study	Employees (290) and managers (15) at community centers belonging to the Israeli Association of Community Centers (IACC). Had 209 surveys collected on site with a 72.0% response rate over a seven-month period.	Bonding Social Capital Structural Dimension	Examined role leaders play in building bonding social capital, thereby nurturing employee vigor, which is positively correlated to enhanced employee job performance. Confirmed that bonding social capital mediates relationship between leader's relational behavior and employee vigor. Study also illustrates that vigor mediates the connection between bonding social capital and employee job performance. Results indicated that displaying relational behaviors at leadership level cultivates positive relationships between team members (bonding social capital.) Study highlights importance of relational leadership as a vehicle for spurring motivation (vigor).

*(table continues)*

Tansley and Newell (2007)	Qualitative Grounded Theory Case study	Formal interviews (45) conducted with project leaders, team members and consultants plus ~ 40 informal interviews.	Relational Dimension Bonding social capital	Research showed importance of trust as antecedent of building social capital. Project leaders capable of enacting relational leadership practices developed “companion trust” across functional areas of organization. Study also correlated leader’s competence levels and trust. Socially, construct of competence instrumental in achieving trust, thus spurring social interactions, that enhanced performance and success in challenging times.
Acquaah (2007)	Quantitative study Multiple Regression Analysis	Data from senior executives—chief executive officers or managing directors and deputies, and heads of the finance/accounting function—from 200 large- and medium-sized manufacturing and service firms operating in Ghana.	Structural Dimension Bridging/External SC	Examined the effects between organizational performance, competitive strategy and social capital. Created four models using multiple regression analyses to test relationships between control variables and effects. Study attempted to provide evidence of contingent value of SC. Showed that SC developed from social networks and external links with other managers, community leader, and politicians, significant predictor of enhanced organizational performance.
Gupta, Huang, and Yayla (2011)	Quantitative Path Analysis Study	Data were collected from 146 senior business students (divided into 36 teams with three to five individuals per team) at a large metropolitan university in the Midwestern United States.	Bonding SC Cognitive Dimensions	Looked at relationship of social capital and performance in teams. Derived factor scores for cohesion, trust, shared vision, the second-order social capital, and Collective Transformational Leadership (CTL) calculated using weighted average of measurement items based on contributions to the construct. Results demonstrated collective leadership is contingent on amount of enacted team social capital. Context shown to have moderating effect on SC. However, counterintuitively, CTL had little effect on team performance. This team level inquiry highlighted resources embedded in SC as multidimensional construct capable of enhancing team-bonding SC.

*(table continues)*

Burt (1997a)	Quantitative Correlational Value-added model study	284 managers were interviewed and asked to cite network relations within and beyond (beyond what?). Random sampling of 3,000 managers from heterogeneous backgrounds and locations throughout same firm were interviewed.	Bonding and Bridging SC	Identified work relations and structural holes as distinct constructs and attempted to link both to outcomes by measuring the strength of relations in terms of intimacy and activity. Intimacy measured by emotional closeness; activity by frequency of contact with new versus old acquaintances. Affirmed social capital was strongly evidenced through combined personal and corporate relationships. Further, correlations between early promotions and network constraint were found to be strong. However, perceived value of employees' strongest contacts had no direct association with early promotion.
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### **Putting it All Together: Resilient Network Ambidexterity**

The emphasis on organizational ambidexterity has gained considerable notice by organizational researchers since Tushman and O'Reilly (1996) argued that organizations should be ambidextrous and optimize and explore simultaneously. Empirical studies on the subject have generally associated the correlation of organizational ambidexterity with improved performance (Gibson & Birkinshaw, 2004; He & Wong, 2004; Kyriakopoulos & Moorman, 2004; Smith & Tushman, 2005). Nested in the idea of network resilience thinking is the notion of organizational ambidexterity. Katila and Chen (2008) put forth an integrative strategic framework emphasizing the need to move beyond balancing optimization and exploration. They proposed that shifting between these two parallels should be based on the environment.

The proliferation of interest on the subject of optimization and exploration has taken many epistemological twists and turns. Earlier conceptualizations considered structural alignment and change as a key feature of the ambidextrous firm (Duncan, 1976; Tushman & O'Reilly, 1996).

The context of the organization has implications on the outcomes of an ambidexterity strategic lens. As such, the internal functions of the network play a key role in the deployment of an ambidextrous strategy. Organizational context and the collective intelligence of networks prove to be important in two ways. First, organizational context provides powerful information that is exchanged and acted upon among network actors. Second, knowledge creation at the network level is primarily a function of the autonomy organizations provide for cross-pollinating new ideas. Table 2.4 illustrates the intersections of research in social ecological systems, which link knowledge to the organizing constructs previously described in this review.

Table 2.4

*Intersections of Knowledge Research*

Source	Knowledge	Primary Focus	Interplay
Olsson, Folke, and Berkes (2004)	Roles knowledge plays in adaptive co-management of SES.	Internal /External Institutions, Society	Optimization/Exploration
Peterson and Luthans (2003)	Building on existing knowledge to develop SES indicators.	Internal	Optimization
Gadgil, Olsson, Berkes, and Folke (2003)	Ecosystem assessment for alliance building and informal knowledge network creation.	Internal/External	Optimization/Exploration Social Capital
Berkes (2009)	Knowledge as a catalyst for long-term alliance building involving indigenous communities.	Internal/External	Social Capital
Donovan and Puri (2004)	Knowledge as a shared asset for managing ecological resources	Internal/External	Social Capital Optimization/Exploration

**Ambidextrous networks.** Optimization and exploration as a field of study began with Holland's (1992) work on complex adaptive systems. These models first indicated how adaptive systems prioritized one continuum over the other, thus creating a state of disequilibrium. March (1991) applied these concepts to organizations and found complex adaptive systems in this context to exhibit similar patterns of behavior. As one aspect of the system became flooded with creativity, the knowledge already harvested within the system would be underutilized. Subsequently, the stability of the system becomes increasingly vulnerable as simultaneous integration of optimization and exploration is substituted with competing dynamics between them operating in isolation. Since then, large swaths of organizational literature have focused on

the distinct features and subsequent outputs associated with optimization and exploration (Duncan, 1976; Lawrence & Lorsch, 1967; Levinthal & March, 1993; March, 1991; March & Simon, 1967; Mintzberg & Mchugh, 1985). Levinthal and March (1993) succinctly captured the differences between these two polarities: “Exploration is the pursuit of knowledge of things that might come to be known. Exploitation is the use and development of things already known” (p. 105). An organization’s ability to balance optimization and exploration has been cited as a critical element of organizational success (He & Wong, 2004; Katila & Ahuja, 2002; Laursen & Salter, 2006; Tushman & O’Reilly, 1996).

Tushman and O’Reilly (1996) contributed to organizational theory by asserting that a proper mix of optimization and exploration impacts organizational success at the structural level. However, integrating the appropriate mix of these activities remains a challenge for organizations. Abernathy (1978) and Porter (1985) contested whether the simultaneous mobilizing of optimization and exploration was even realistic for organizations. Tushman and Anderson (1986) extended the idea of sequential optimization and exploration by exploring the technologies and the patterns of change in various industries. Their findings suggest that periods of optimization are sustained in organizations and periods of exploration are highlighted by momentary disruptions that lead to short bursts of innovation. Figure 2.5 illustrates the interplay among the paradigms described in this chapter.

Vermeulen and Barkema (2002) addressed optimization and exploration from an organizational learning perspective and emphasized how imperative balancing both is to organizational success. From a stability and change perspective Volberda, Baden-Fuller and van den Bosch (2001) argued that to some degree optimization and exploration combined are important features of organizational viability.

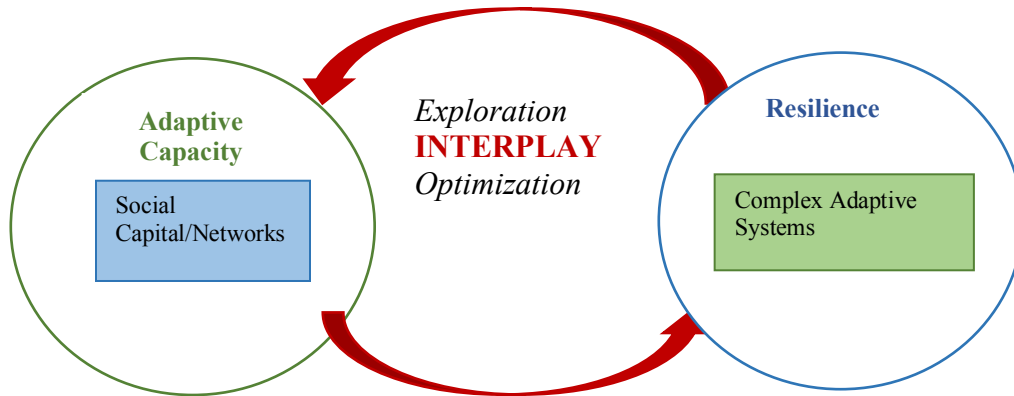


Figure 2.6. Paradigmatic interplay of RNA.

### Exploring the Tensions Between Optimization and Exploration

The previous discussions have in common the acknowledgment that strategically, organizations should understand and recognize the significance of articulating and implementing these two systemic features based on the context they face. Conversely, competing interpretations exist on the implementation of these two distinct strategic polarities and when they are best enacted within organizations. Two schools of thought further divide the literature. The first way of thinking about these strategic elements honors the combined elements of optimization and exploration as a feature in complex adaptive systems that are symbiotically alternating between these two states at the same time. The second strand of empirical literature argues for the discontinuation of one continuum in exchange for the other. Raisch, Birkinshaw, Probst and Tushman (2009) argued that there are four “central tensions” (p. 685) that need to be resolved in the ambidexterity literature.

- *Differentiation and Integration*: Differentiation refers to the separation of optimization and exploration among organizational units. Integration refers to the mechanisms that facilitate organizations mobilizing both simultaneously.

- *Individual or organizational*: refers to the question of whether ambidexterity manifests itself at the structural level of the organization or the cognitive individual level.
- *Static versus dynamic*: Refers to the tendency to build ambidexterity theory on the assumption that ambidexterity can be mobilized simultaneously by viewing organizational behavior as static. This does not consider the dynamic of organizations and requires a combined view of ambidexterity as both dynamic and static
- *Internal versus external*: Refers to the research on ambidexterity primarily addresses internal functions of optimization and exploration. Exploration of the internal and external interplays in the preservation of organizational ambidexterity is underexplored in the literature. (p. 686).

As Raisch et al. (2009) previously noted, these are relevant in understanding the critical question of how ambidexterity is achieved. And through what channel or lever is it best demonstrated in organizations? The intersection of the previous questions gives way to the concept of RNA. A common theme emanating from the empirical research on ambidexterity and optimization/exploration is the absence of a scale that formally seeks to identify the indicators of how networks achieve ambidexterity. This gap reflects the importance of optimization and exploration as a critical organizing construct. Furthermore, given the extent to which organizational ambidexterity, in whatever forms it is mobilized, is positively associated with organizational performance; it can by extension be categorized as a central feature of network resilience.

Geerts, Blindenbach-Driessen, and Gemmel's (2010) study of 532 service and manufacturing firms considered the internal/external differences in ambidexterity. Their findings



showed that ambidexterity had a positive effect on their growth. In other studies, on the antecedents of ambidexterity, the uncertainty of the environment has been a catalyst for ambidexterity (Jansen, Vera, & Crossan, 2009; Sidhu, Volberda, & Commandeur, 2004). Andriopoulos and Lewis (2009) examined the tensions that exist between optimization and exploration and the challenges in managing them. They conducted a case study on multiple firms in the new product design industry and uncovered three nested paradoxes of innovation: strategic intent, customer orientation and personal drivers (pp. 701–702). Through their study, they concluded that to produce “virtuous cycles of ambidexterity” (p. 696) requires managing all three nested tensions at multiple levels within the organization. This study placed the locus of control for the development of ambidexterity on the middle manager’s capacity for implementing strategies that link organizational capabilities with individual processes. The questions of whether to apply a sequential optimization/exploration strategy, or mobilize ambidexterity simultaneously, continue to be a source of contention in the literature.

By extension, the notion of ambidexterity at the individual or organizational level has received the attention of numerous scholars. For example, Gibson and Birkinshaw (2004) position ambidexterity at the individual level. Through this lens, individuals divide their time between optimization and exploration. They referred to this individual balance of “alignment and adaptability across an entire business unit as “contextual ambidexterity” (p. 209). Disputing the practicality of contextual ambidexterity, Kauppilla (2010) argues that Gibson and Birkinshaw assume that knowledge stores exist within the organization and are readily available for use. In a study of design firms, Andriopoulos and Lewis (2009) combined the elements of structural ambidexterity and contextual ambidexterity sequentially. Their findings provided strong evidence that alternating between the two strategies was most successful in these types of

creative organizations. The combinations and re-formulations of the multilayered and cross-disciplinary views on organizational ambidexterity have inspired scholars to extend the boundaries of organizations, individuals, and strategic creativity. It appears that ambidexterity as a theory has undergone a myriad of ambidextrous applications. While ambiguity regarding the best way to mobilize aspects of ambidexterity in organizations remains uncertain, in general, the studies of organizational ambidexterity appear to positively associate firm performance despite the way it is mobilized. Table 2.5 illustrates the impacts of organizational ambidexterity across several contexts.

Table 2.5

*Cross section of Literature on Organizational Ambidexterity*

Author(s)	Ambidexterity Sample Focus	Findings
He and Wong (2004)	Organizational—Sales	Positive correlation between firm performance and ambidextrous strategy
Andriopolous and Lewis (2009)	Innovation—New Product Development	Uncovered nested paradoxes associated with ambidexterity
Katila and Ahuja (2002)	Innovation	Ambidexterity positively associated with firm level innovation
Venkatraman, Lee, and Iyer (2005)	Organizational—Sales	Positive correlation between firm performance in sales and ambidextrous strategy
Rothaermel and Alexandre (2009)	Innovation—141 U.S. Manufacturing Firms	Combined internal/external focus of ambidexterity correlates positively to increased innovation and knowledge
Schulze (2009)	Firm level performance	Positively associated with subjective ratings of performance
Groysberg and Lee (2009)	Individual—1,053 banking analysts, across 78 distinct banks	Combined activities of exploration and optimization reflected success is lower in exploration versus optimizing roles in individuals
Caspin-Wagner, Ellis, and Tishler (2012)	Organizational—Sales	Positive correlation between firm performance in sales and ambidextrous strategy

### **Studies Combining Organizational Ambidexterity, Networks, and Social Capital**

The impact social capital has on network ambidexterity during periods of disruption has not been given sufficient emphasis in the organizational development literature. In line with the previous theoretical frameworks, social interactions are pivotal to learning (Adler & Kwon, 2002). Despite the valuable contributions of each of the organizing constructs explored previously toward understanding organizational performance in various contexts, very few have fused them. Atuahene-Gima and Murray (2007) confirmed the previous void in the literature on networks by acknowledging that, “few studies have examined how social capital dimensions (structure, relational and cognitive) affect learning” (p. 2). Their study attempted to fill this gap by investigating how the relationships brought about by social capital in its various dimensions are significant to optimization and exploration. The results supported the need for a balanced approach between these two continua. They investigated how the effects were measured through learning processes in new product development in technology firms in China. Furthermore, this study attempted to address whether organizational learning is best articulated through a balanced approach of optimization and exploration (March, 1991). This is one of the few studies found in the organizational ambidexterity literature that explores the dynamics of exploration and optimization through social capital. However, its focus was on managerial ties in optimizing and exploring learning in new product development, specifically, in new ventures in China.

While these perspectives broaden the view on social capital and its impacts on ambidexterity, the study is based primarily on a hierarchical view of organizational ambidexterity. As such, Atuahene-Gima and Murray (2007) use power as a positively related indicator of organizational ambidexterity. This centralizes social capital in the context of a central figure in organizations, rather than the network. In this case, those with greater technical

acumen and top management by virtue of power influence groups toward ambidextrous mindsets. Furthermore, the study focused specifically on technology firms that are generally primed by market competition towards exploration. Given this context, optimization was found to associate positively with trust and exploration was not. This suggests that mobilizing organizational ambidexterity through network indicators may require specifying how each indicator is defined.

C. Li's (2013) study investigated the governance mechanisms that encourage a senior team manager's cognitive practices to impact organizational resilience. The work established how social-capital has a link between top management teams and organizational ambidexterity. The results demonstrated that higher levels of social capital at the executive level have a positive effect on top management team diversity and it also positively related to ambidexterity. The governance mechanisms supported by senior executives also played a role in facilitating practices such as information sharing and effective communication among team members. Finally, social capital as a resource embedded at the top level was found to be a valuable mechanism for top management teams to mitigate contradictions in strategy and remain nimble when faced with paradoxes in their respective firms. As in Atuahene-Gima and Murray (2007), again here the locus of interest is on leaders as a central lever for the replication of organizational ambidexterity in various manufacturing firms. However, their study design was cross functional and spanned across 113 technology firms, they were all concentrated in China.

Both C. Li's (2013) and Atuahene-Gima and Murray's (2007) studies were conducted in China thus presumptively limiting generalizability of their findings. Furthermore, the cognitive elements of social capital are isolated to managers and top-level executives with little emphasis on the larger network. In general, the social capital and network literature tends to view the

cognitive dimensions of networks as a collective output of social capital. This circles back to interpretations of whether social capital is considered a process or an outcome. M. Li (2013) tends to understand social capital as a process that can bring about shared vision through the connections established at the top level of a hierarchy. The three indicators M. Li identified were trust, connectedness, and shared vision. When viewed exclusively through the centrality of top executives, the key feature of the collective resources shared in constructing social capital at the network level was overlooked. While recognizing it as a personal good, M. Li sees social capital is primarily a collective good that is best articulated through collective, rather than individual action. Table 2.6 synthesizes the previous studies on organizational ambidexterity as they relate to social capital.

Table 2.6

*Synthesis of Studies in Organizational Ambidexterity and Social Capital*

Authors	Method	Sample / Participants	Themes	Summary
Atuahene-Gima and Murray (2007)	Quantitative factor analysis	450 new technology firms in China	Exploration and Optimization Social Capital	Structural dimensions of social capital affect optimization and exploration differently in managerial settings Cognitive effects of social capital have a positive effect on learning. Trust in managers positively affects learning and optimization.
M. Li (2013)	Quantitative correlational study	113 Chinese manufacturing firm's CEOs and managers participated.	Organizational Ambidexterity Social Capital	Results showed higher levels of social capital at executive level have positive effect on TMT diversity; also, positively related to ambidexterity. Governance mechanisms supported by senior executives also played role in facilitating practices such as information sharing, and effective communication among team members. Social capital as resource embedded at top level, found to be valuable mechanism for TMTs to mitigate contradictions in strategy and remain nimble when faced with paradoxes in their respective firms.

## Summary of Chapter II

The mechanisms that link social capital to network ambidexterity have yet to be fully explored in the organizational development literature. From the previous studies, tentative indicators of network ambidexterity can be identified through the common themes shared among them. The confirmation of specific indicators as they pertain to organizational networks and organizational ambidexterity is largely missing in the literature on social capital and organizational development. This leaves ample space for the creation of a network resilience ambidexterity scale.

The dubious distinctions regarding the nature of social capital embroil it in conflicting ideas regarding whether it is a process or an outcome. Here social capital is considered an outcome that is derived from the potential networks have to produce ambidexterity. In this study, the following indicators are examined through this lens, based on the extant literature on social capital examined in this study:

- Knowledge Sharing—the process of imbuing the organization with information and opportunities for optimization and exploration strategies;
- Collaboration—the process of connecting tasks to performance, regardless of where they are situated in the network (micro level, meso level, macro level);
- Creativity—network functions are spurred by ongoing novelty regardless of where they are in the optimization/exploration continuum;
- Network cohesion—characterized by shared values and vision both internally and externally within the network structure.

A scale that identifies the indicators of organizational ambidexterity in organizations through their established networks remains to be seen. The combination of the constructs fused

in this chapter is particularly relevant in the representation of an RNA scale for two reasons. First, they link shared learning to the strategic exchanges necessary for alliance building during organizational disruptions. Second, optimization and exploration, and content rich information, facilitate knowledge transfers between organizational members both horizontally and vertically (Koka & Prescott, 2002). Initially, knowledge building may occur in subtle, tacit ways; however, over time an emergent pattern of underlying resilience becomes evident within the structural, cognitive and relational elements of the network.

### **Chapter III: Methodology and Study Design**

Organizations often view optimization and exploration, “as being associated with inconsistent organizational architectures and processes” (Smith & Tushman 2005, p. 522). While organizational scholars have consistently argued that organizations should build capacity by acknowledging these contradictions (Adler et al., 1999; Cameron & Quinn, 1998; March, 1991; Poole & Van de Ven, 1989), empirical research on social network indicators that modulate optimization and exploration remains on the periphery of organizational inquiry. Organizations by their very nature optimize and explore. The notion of organizational ambidexterity is not limited to a specific type of organization. A factor consistent in organizations (whatever the size) is that they inevitably face contradictions. It is at this intersection that Smith and Tushman (2005) argue, “effectively managing contradictions is rooted in paradoxical cognition managerial frames and processes that recognize and embrace contradiction” (p. 523). The potential to make meaning of the ostensible contradictions within organizations creates the foreground for the purpose of this research.

#### **Research Purpose and Goals**

March (1991) argued that organizational adaptation is centralized around the activities of optimization and exploration. This study aimed to bring to bear a helpful tool for gauging the social indicators in organizations most critical to develop and maintain resilient network ambidexterity. I developed a quantitative process for identifying and validating the indicators of RNA through the development of a scale, with a sufficient participant sample size to establish construct validity (DeVellis, 2015). Furthermore, a blueprint for converting the results from the (Q)uantitative study through exploratory factor analysis was utilized to advance the justification



for a unifying, (q)ualitative investigation. Stake (1995) draws distinctions between qualitative and quantitative inquiry by defining the type of knowledge the researcher is aiming to uncover:

Perhaps surprisingly, the distinction is not directly related to the difference between quantitative data, but a difference in searching for causes versus searching for happenings. Quantitative researchers have pressed for explanation and control; qualitative researchers have pressed for explaining the complex interrelationships among all that exists. (p. 37)

This study attempted to make meaning of the micro-level interactions of networks, the ostensibly overlooked, diffused social practices that surface emergently and impact multilevel ambidextrous strategies in organizations. This considered Thurstone's (1947) common factor model, which hypothesizes that an indicator in a set of observed measures can be linearly associated with several others and one unique factor. Based on the review of literature previously conducted, I surmised that four indicators positively correlate with my primary construct of interest, RNA. These initially included knowledge sharing, creativity, collaboration, and network cohesion.

An indicator is a quantitative or qualitative measure derived from observed facts that simplify and communicate the reality of a complex situation (Freudenberg, 2003). Indicators reveal the relative position of the phenomena being measured and when evaluated over time, can illustrate the magnitude of change (a little or a lot) as well as direction of change (up or down; increasing or decreasing).

Since Exploratory Factor Analysis (EFA) is cited as the preferred methodological foundation for scale development and construct validation, it was used in this study as a descriptive technique to determine if the identified indicators are reasonable in measuring the latent capacity of RNA (Brown, 2014; Floyd & Widaman, 1995; Preacher & MacCallum, 2003).

The goals for this study were as follows:

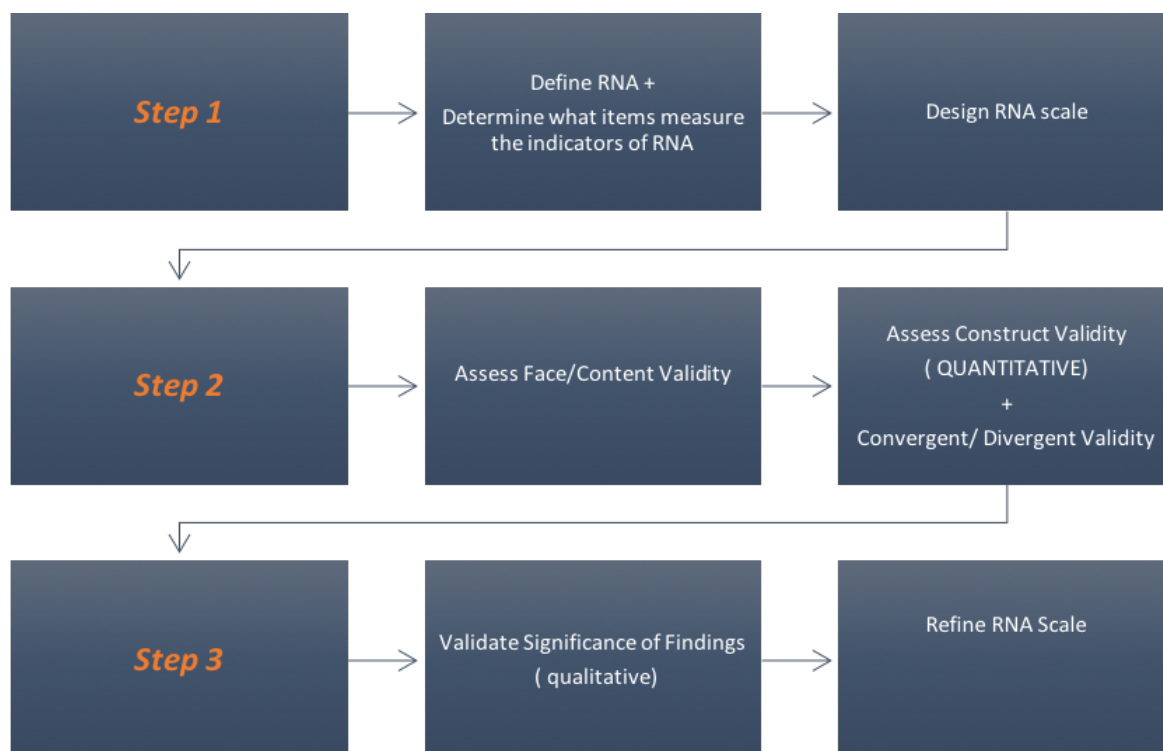
- To develop an RNA scale and its items;
- To determine the indicators of RNA in organizations;
- To determine if the indicators determined support/explain RNA;
- To assess the degree that the indicators contribute to RNA;
- To determine the relationships between and among the indicators.

### **Constructing the Scale**

For this research, EFA was used as it is considered the most appropriate analytical tool for the development of a RNA scale. While the emphasis of the research was predominately quantitative (QUAN), a qualitative (qual) component was also incorporated. Creswell (2014) argues that a core assumption of mixed methods research “is that in the combination of qualitative and quantitative approaches provides a more complete understanding of a research problem than either approach alone” (p. 4). These insights responded directly to the nature of this research, which was framed around a problem rather than a research question.

The problem explored in this research was understanding the characteristics of networks that promote resilience through what are often viewed as divergent strategies (optimization/exploration) during periods of organizational disruption. The research process was divided into three steps. Step 1 involved developing the scale items and examining the scale and assessing them for face and content validity. Step 2 entailed collecting participant data and using statistical analysis on the obtained data from participants to assess the construct validity and reliability of the indicators. Step 3 involved presenting the revised scale to organizational leaders and their teams for additional feedback and refinement. Utilizing an EFA process, items were iteratively dropped that did not correlate strongly with the assessed construct of interest.

Loevinger's (1957) theory of psychological test construction informed the development of this scale. Three specific components of construct validity were cited in Loevinger's (1957) work: substantive, structural and external. Each of these types of validity was used toward the final development of the RNA scale. Figure 3.1 illustrates the three-stage research design process that I followed.



*Figure 3.1.* The three-step research design process.

**Step 1. Item development process.** A critical first step in scale development is to establish a clear theoretical context of the construct of interest (Clark & Watson, 1995). Moreover, Abell, Springer, and Kamata (2009) considered the careful attention required from different lines of evidence in examining construct validity, stating: “To the extent that these tests are well anticipated by scale developers, the relevant analyses will build toward conclusions supporting or refuting the accuracy of the measure” (p. 130).

A thorough literature review was initially conducted searching for gaps in the literature to determine how other scholars approached measurement of network ambidexterity. Furthermore, the literature review included broader paradigms to extend the boundaries of the construct of interest (Clark & Watson, 1995). While the broad swath of literature examined cast an initial wide net, thinking along abstract levels of the construct of interest helped crystalize the theoretical model's development.

The rationale advanced by Abell et al. (2009) was of significant value in making this decision to conduct an exploratory factor analysis; they argue:

The type of factor analysis is referred to as exploratory, because (a) the model formation (i.e., the number of latent variables) are explored, rather than specified by the intention or theory in the test/scale construction process and (b) factor structure is explored by modeling each item as a function of all common factors, rather than as a function of only a subset of the factors, to see which factor has a strong relationship with the item and which factor does not. (pp. 133–134)

This methodological approach was of importance to the development of this scale for two reasons. First, it would uncover scale items that would not correlate strongly to the proposed indicator and second, construct validity evidence would be further supported through the unpredictable way test items can reveal an unexpected factor. Another specification in the scale development process was the consideration of how many factors/indicators I would include in my analysis. Edmundson and McManus (2007) suggest that, “methodological fit is created through an iterative learning process that requires a mindset in which feedback, rethinking and revising are embraced as valued activities” (p. 156). The overarching goal of this research was to examine the survey so that it served its intended purpose prior to it being administered. Abell, et al. (2009) cite two reasons why EFA is useful in scale construction: “[F]irst, it may identify test items that are not correlated to an intended common factor. Second it may uncover an

unexpected factor structure of test items” (p. 34). Figure 3.2 illustrates the multidimensional model used in this research.



*Figure 3.2.* Multidimensional model for survey item specification.

In developing an item pool for this scale, Clark and Watson (1995) argue, “the fundamental goal at this stage is to sample systematically all content that is potentially relevant to the target construct” (p. 5). Generating the scale items required iteratively weaving in and out of the literature and the item development process in a process that is representative of a funnel’s shape. The initial entry point in the item development process began broadly with a large group of items that were reduced as they were found to be less applicable to the primary construct of interest—RNA. Abell et al. (2009) argue that when developing a large item pool, “either way the goal is to achieve an item pool that is larger than ultimately desired but small enough to be reasonable for administration in large-sample validation” (p. 43). This also meant reaching a level of theoretical saturation where the myriad ways of expressing a construct have been exhausted.

Following this process, four tentative indicators emerged: knowledge sharing, collaboration, network cohesion, and creativity. This process considered the implications cited by Clark and Watson (1995) regarding initial item pool generation: “[Items] should be broader and more comprehensive than one’s own theoretical view of the target construct and should include content that will be ultimately shown to be tangential or even unrelated to the core construct” (p. 311). Items were based on the notion that while they were understood to be independent, collectively they related broadly to resilient network ambidexterity. Ultimately, 10 to 15 items were created for each of the tentative indicators representing the construct of interest for a total of 52 initial items.

An important concern in deciding what to measure for scale developers is in defining terms that can be considered outcomes, characteristics, or processes (Abell et al., 2009, p. 16). I understood that, theoretically, that the features of RNA stemming from the interplay among the paradigms of complex adaptive systems, were adaptive capacity, resilience, and social networks. The constructs measured were defined as the following:

- Knowledge sharing: the process of imbuing the organization with information and knowledge for optimization and exploration strategies;
- Collaboration: the process of connecting tasks to performance regardless of where they are situated in the network (micro level, meso level, macro level);
- Creativity: the process behaviors spurred by ongoing novelty, regardless of where they occur along the parallel continuum of optimization and exploration;
- Network cohesion: the process characterized by shared values and vision within the internal boundaries of the network structure.

Upon closer examination, it became clear that knowledge sharing, and collaboration were overlapping notions of the same process I was attempting to measure. Isolating the resources of knowledge sharing, independent of collaboration, and vice versa, brought the realization that they are both inextricably linked. As such, I removed collaboration as an independent indicator and kept knowledge sharing as a theoretical indicator with sufficient explanatory power to define the process of connecting tasks to performance and imbuing the organization with meaningful information. Table 3.1 offers insights into the revised definitions of each of the RNA indicators, along with a brief explanation of what each is intended to measure in an organization.

Table 3.1

*RNA Indicator Quantifications*

Theoretical Resilience Network Ambidexterity Indicators	What it measures:	Of What:
Creativity: Capacity of the organization to facilitate independent think and foster novelty through interactions.	The level of centralized or decentralized novelty that exists in an organization.	An organization
Knowledge sharing: Capacity of the organization to share information across organizational business units for learning and ongoing viability.	The level to which the organization shares useful information and opportunities among individuals for the purposes of short- and long-term viability.	An organization
Network Cohesion: Organizational emphasis on fostering shared commitment to values and mission.	The degree to which the organization encourages members to share values and mission.	An organization

**Step 2. Validity assessments.** This study followed Clark and Watson's (1995) logic regarding scale development in that rather than proving reliability, the aim was to maximize validity. After I generated the initial item pool, the items were examined for face and content validity to ensure that the measures created for the construct of interest could be operationalized. Hardesty and Bearden (2004) use the dartboard as an analogy to make distinctions between content and face and content validity. In order to establish content validity, the darts should land randomly on the dartboard. Should the darts be grouped on one side or the other of the dartboard, content validity cannot be established as the items may only partially represent the construct of interest. Similarly, in assessing face validity the items must at a minimum hit the dartboard (p. 99).

In this study, face validity (hitting the dartboard) was first assessed by my partner in research (Dr. Lloyd Duman) and by the members of my dissertation committee. Each item was evaluated based on the strength of the content to uniquely express what it was intended to measure (i.e., knowledge sharing, network cohesion, and creativity). Next, I solicited feedback from my methodologist, Dr. Donna Chrobot-Mason, Director for the Center for Organizational Leadership at the University of Cincinnati.

Based on Dr. Chrobot-Mason's feedback, four major revisions were made. First, in response to feedback that items were too broad, some items were reconstructed to better reflect the original definition. Second, I modified the survey to clarify the focus on the study. Third, the items were initially found to shift between individual-level and organizational-level responses. Based on this feedback, all survey items were revised to reflect a holistic view of the organization. Finally, redundant and double-barrel questions were identified and revised for clarity and conciseness.



**Content validity.** Content validity assessments were initially established through the solicitation of various experts that included both scholars and practitioners in various fields related to organizational ambidexterity and network resilience. Hardesty and Bearden (2004) offer this cautionary advice to researchers: “This validity assessment is necessary since inferences are made based on the final scale items and, therefore, they must be deemed face valid if we are to have confidence in any inferences made using the final scale” (p. 99).

This process facilitated the pruning of the initial item pool from 52 to 40 items. For the 40 items, a six-point Likert partitioned scale was used. Each item had six possible options for a response: 1 = *strongly disagree*, 2 = *disagree*, 3 = *somewhat disagree*, 4 = *somewhat agree*, 5 = *agree*, and 6 = *strongly agree*. I chose six partitions as appropriate to the sensitivity of the scale based on the recommendation from Abell et al. (2009) that “imposition of the numbers helps defend interpretations claiming that if respondents perceive the distance between two and three as equal to the distance between three and four, they will make the same associations regarding the text labels” (p. 49). Table 3.2 illustrates the types of validity assessed in this study:

Table 3.2

*Types of Validity Assessed*

Type of validity	Plan to assess validity	Goals
<i>Face validity</i> : The degree to which the assessment appears to measure what it claims to measure (DeVellis, 2015).	The scale will be presented to my dissertation committee and PhD colleagues	To ensure the connection between the scale and the construct of interest remain aligned.
<i>Content validity</i> : Refers to the adequacy with which a measure assesses the domain of interest. (Hinkin, 1995).	Solicit content experts and practitioner insights, through a brief survey on how well the construct of interest is represented in the scale items	To ensure the scale content conforms to what it intends to measure.
<i>Construct Validity</i> : Concerned with the relationship of the measure to the underlying attributes it is attempting to assess (Hinkin, 1995).	The extent to which the scale measures the construct of interest	Correlate the results from the scale to determine whether the relationships between items show statistical significance.

**Construct validity.** Considering the relevance of clear conceptualizations of the construct of interest in scale development, Clark and Watson (1995) argue that “the most precise and efficient measures are those with established construct validity; they are manifestations of construct in an articulated theory that is well supported by empirical data” (p. 310). Due to the basic exploratory nature of this study, a simplified statistical approach that would allow for the investigation of various paradigms potentially influencing the dimensions of a theoretical model was necessary. Worthington and Whittaker (2006) describe exploratory factor analysis as a “dynamic process of examination and revision, followed by more examination and revision, ultimately leading to a tentative rather than a definitive outcome” (p. 808). Williams, Onsman and Brown’s (2010) objectives for exploratory factor analysis were followed in this study to,

reduce the number of variables, examine the relationship between variables, assess the unidimensionality of a theoretical construct, evaluate the construct validity of a scale, development of parsimonious (simple) analysis and interpretation, address

multicollinearity (two or more variables that are correlated), and to develop theoretical constructs, and used to prove or disprove theories. (p. 2)

In considering an appropriate sample size, this study followed Clark and Watson's (1995) recommendation of assessing a minimum of 300 respondents. Abell et al. (2009) also recommended following a range of five to 10 respondents per scale item when conducting exploratory factor analysis (p. 64). All indicators were measured using a conventional multi-item Likert scale and higher scores were interpreted as indicators of greater amounts of the construct of interest. Statistical data was then analyzed in Statistical Program for Social Sciences (SPSS). Items were grouped based on the tentative indicators identified in the literature review. With the understanding that all forms of validity are interrelated, convergent and discriminant validity assessments were conducted. Convergent validity ensures that variables that are expected to correlate do so, while discriminant validity assesses the degree variables that should not correlate, do not (Abell et al., 2009). This final step verified the expected relationships between the new scale results and the construct of interest being examined. Simms (2008) contends that discrepancies between results and theoretical assumptions suggest that, "(i) the measure does not adequately measure the target construct, (ii) the theory requires modification, or (iii) some combination of both" (p. 428).

**Step 3. Refining the content of the RNA scale.** Creswell (2014) reasoned that, "the knowledge that develops through a post positivist lens is based on careful observation and measurement of the objective reality that exists "out there" in the world" (p. 7). In order to refine the RNA scale, organizational practitioners and leaders were asked to review the scale after it had been run through the statistical analysis. This corroborates Eisenhardt's (1989) rationale for combining multiple data collection methods: "The triangulation made possible by multiple data collection methods provides stronger substantiation of constructs and hypotheses" (pp. 537–538).

To this end, a critical feature of this study was to capture participant narratives that focused specifically on individual perceptions of how the RNA scale could be used in their respective organizations. Edmonson and McManus (2007) suggest that “methodological fit is created through an iterative learning process that requires a mindset in which feedback, rethinking and revising are embraced as valued activities” (p. 1156). The feedback received from the feedback of the participants (further detailed in Chapter IV) clarified how to potentially mobilize resilient network ambidexterity. In this phase of data collection, I reached out to members of my LinkedIn network and invited them to respond to the results of my new scale and to share them with their teams if possible. Participant selection took into consideration the respondent’s ability to potentially mobilize strategies within their organizations. Participants were asked to consider three specific content areas of the RNA scale:

- Do you consider the scale to be a useful tool for strategy development?
- Are optimization and exploration terms you would use to describe Resilient Network Ambidexterity?
- How could this scale be improved?

After reviewing the insights gleaned from participants, I followed-up with either one-on-one phone conferences to clarify their responses, or transcribing their insights as they were written.

## **Ethics**

All the steps in this research were given proper ethical consideration. Prior to conducting the study, I requested and received approval through the Antioch University Institutional Review Board (IRB). Participants were not pressured into taking part in the study and were not forced or coerced into signing any consent forms. Furthermore, participants had the option of terminating

their engagement in the study any time during the data collection process. The informed consent provided to potential participants are included in Appendix I. Furthermore, this study respected any gender, race, religious, and cultural concerns throughout the research design (Creswell, 2014). Data were collected using Survey Monkey and Mechanical Turk. The data was secured by use of a secure log in and password.

### **Limitations of Research Design**

This research made tentative claims about the indicators that best represent a construct of interest. Despite the rigor involved in synthesizing the literature and analyzing the data, frameworks are imperfect tools, and this should be known at the onset of the process of developing them (Britt, 2014). Beyond the subjective claims and objective interpretations being made in this research design, limitations can be derived from the lack of absolute agreement of the ways certain terms are defined in this study. Developing a representative model that is both complex and is representative of a diverse pool of respondents proved to be a limiting factor in this research design.

### **Summary**

The RNA scale provides critical information on how to mobilize social network resources to produce ambidextrous organizations. Testing the indicators of RNA through exploratory factor analysis based on a minimum of 300 respondents formed the basis for establishing construct validity in its various forms. These results coupled with a final qualitative step to further refine the scale are detailed in the ensuing chapter.

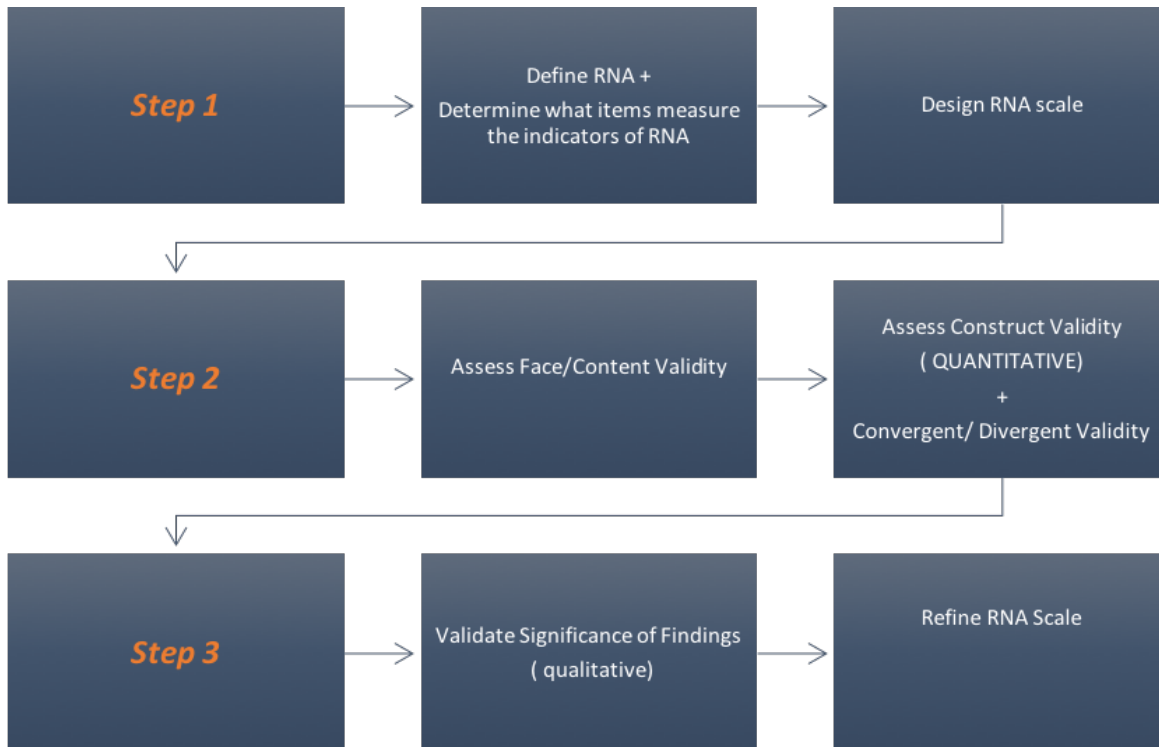
## Chapter IV. Results of the Study

The problem I sought to explore through this research became linking the creative tensions of optimization and exploration in ways that enhance organizational performance. More specifically, the question that emerged was: what organizational factors promote resilient network ambidexterity? The rationale for developing a resilient network ambidexterity (RNA) scale was primarily to provide a means of understanding the dynamic interplay occurring at the intersection of two complementary paradoxes.

Within the context of traditional management and organizational theory, inconsistencies with prevailing theories are typically dismissed. These incompatible theses are defined as paradoxes. Poole and Van de Ven (1989) contend that these incompatibilities have great potential in promoting development of new, valuable insights. In this study I defined RNA as a network's ability to shift its organizational focus between periods of optimization and exploration, either sequentially or simultaneously, during periods of disruption. The goals for this study were as follows:

- To develop an RNA scale and its items;
- To determine the indicators of RNA in organizations;
- To determine if the indicators determined support/explain RNA;
- To assess the degree that the indicators contribute to RNA;
- To determine the relationships between and among the indicators

This chapter describes the detailed outcomes of the three-step scale development process as shown in Figure 4.1.



*Figure 4.1.* Three step scale development process.

### **Scale Development**

The overarching goal of the RNA survey was to create a useful scale to advance the understanding of network ambidexterity in organizations during times of disruption. The initial instrument consisted of 49 items, divided into three distinct sections, intended to assess the construct of interest (RNA) and based on the definitions provided in Table 4.1

Table 4.1

*Definitions of Theoretical Indicators Measured*

RNA Indicator	What it Measures	Level
Creativity (Capacity of the organization to facilitate independent thinking and foster novelty through interactions.)	The level of centralized or decentralized novelty that exists in an organization.	Organizational
Knowledge sharing (Capacity of the organization to share information across organizational business units for learning and ongoing viability)	The level to which the organization shares useful information and opportunities among individuals for the purposes of short- and long-term viability.	Organizational
Network Cohesion (Organizational emphasis on fostering shared commitment to values and mission)	The degree to which the organization supports shared values and mission.	Organizational

**Participant demographics.** Participant recruitment and data collection were obtained using Mechanical Turk. Amazon’s Mechanical Turk is a website that facilitates online research through an integrated system of participant compensation. This decision was based on research from Buhrmester, Kwang, and Gosling’s (2011) investigation into the merits of conducting research in the social sciences using Mechanical Turk, who concluded: “Most important, we found that the quality of the data met or exceeded the psychometric standards associated with published research” (p. 5). At the end of the data collection period, data were downloaded to a Microsoft Excel spreadsheet. Of the 384 total responses received, 344 surveys were considered complete. A survey was considered complete, when all questions were answered. The analysis was undertaken after removing incomplete responses,  $N = 344$ . The initial instrument included five demographic items: gender, age, education level, annual income, and race/ethnicity.

Of the 344 responses included in the analysis, 39% identified as female, 61% identified as male, and 0.3% preferred not to say. The age of respondents ranged from 18 to 75, with most



(81%) of the respondents between 25 and 44. Approximately half (45%) of survey respondents indicated they were managers, middle managers, or supervisors in their organizations. Most respondents (73%) indicated their education level as being Bachelor's degree or higher. Most (72%) indicated they were working in an organization that is constantly innovating. Almost half (48%) were employed with an organization with between 25 to 500 employees. Table 4.2 provides a detailed summary of the participant demographic data.

Table 4.2

*Demographics of Survey Participants*

CHARACTERISTIC	N	%
<u>Gender</u>		
Male	210	61.0
Female	133	38.7
Prefer not to say	1	0.3
<u>Age</u>		
18–24	23	6.7
25–34	201	58.4
35–44	78	22.7
45–54	28	8.1
55–64	9	2.6
65–74	5	1.5
75 +		
<u>Ethnicity</u>		
American Indian/Alaskan Native	14	4.1
Asian/Pacific Islander	133	38.7
Black or African American	24	7.0
Hispanic	14	4.1
White/Caucasian	151	43.9
Other	8	2.3
No Answer		

*(table continues)*

Education

Completed Some High School	21	6.1
Completed Some College	38	11.0
Associates Degree	33	9.6
Bachelor's Degree	171	49.7
Master's Degree	77	22.4
PhD, Ed, MD	3	0.9
Other	1	0.3

Role in organization

Employee/Professional	165	48.0
Middle Manager/Supervisor	93	27.0
Manager	65	18.9
Director	8	2.3
Associate/Assistant VP	2	0.6
Senior VP	2	0.6
President	3	0.9
	-	-
Other	6	1.7

Yearly Income

\$20,000–\$35,000	128	37.2
\$50,001–\$75,000	66	19.2
\$75,001–\$100,000	45	13.1
\$100,001–\$150,000	16	4.7
More Than \$150,000	6	1.7

Employed at an organization with. . .

2–4 Employees	17	4.9
5–24 Employees	53	15.4
25–99 Employees	75	21.8
100–500 Employees	89	25.9
501–1000 Employees	54	15.7
1,001–5000 Employees	53	15.4
I do not work for an organization	3	0.9

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Note: N = 344

**Survey instrument validity.** Abell et al. (2009) offer instructive advice in the development of rapid assessment instruments by cautioning the researcher that “no matter how elegant and thorough its conceptual foundation, if a scale cannot be read and understood by its intended audience, it is useless” (p. 36). With this in mind, the actions described in the following sections were undertaken to develop an initial RNA scale possessing internal validity. Items were created considering the descriptive themes found to be most salient in the literature that connect networks to ambidexterity and resilience. The first section asked participants to select from a series of 18 disruption scenarios that they had experienced in their organizations, and a specific disruption selected by the participant served as the context for answering the remainder of the survey. Each subsequent section asked participants to indicate their level of agreement using a Likert scale with responses ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). After numerous iterations of survey refinement, the final survey consisted of a total of 27 items.

**Face validity.** The importance of face validity is underlined by its straightforward meaning—does the scale measure what it is intended to measure (DeVellis, 2015). In order to assess the relevance of each of the items in my survey, I initially solicited feedback from my methodologist, Dr. Donna Chrobot-Mason, Director for the Center for Organizational Leadership at the University of Cincinnati. She offered the following suggestions:

Ensure you are developing items that will load together when you do a factor analysis. In other words, the items in each subscale should not be redundant but need to pertain specifically to the construct of interest.

Keep it as behavioral as possible. So, you are moving from the theoretical domain to the behavioral domain or from latent to manifest. What types of behaviors are you looking for that would tell you that an organization is effectively managing disruptions?  
(D. Chrobot-Mason, personal communication, March 6, 2017)

Based on Dr. Chrobot-Mason’s feedback and further feedback I received from several scholars and practitioners adept at survey construction, I made several major revisions. First, the

items were generally considered too broad to have relevance to the construct of interest. Based on this feedback, I refined the alignment of each item to address the intent of my inquiry. Second, since I was advised that the survey's focus was not articulated clearly at its beginning, I modified the survey, ensuring that I clearly defined the factors I sought to measure. Third, the items were initially found to shift between individual- and organizational-level responses. Based on this feedback, all survey items were revised to reflect a holistic view of the organization. Finally, redundancy and double-barrel questions were identified and revised for clarity and conciseness.

**Content validity.** With respect to survey items, Abell et al. (2009) describe content validity as the degree to which the “content of the items conforms to the definitional boundaries of its domains” (p. 45). To assess content validity, I obtained feedback from seven scholar practitioners, executives working in various fields involving innovation and technology, and other experts in the field, ( $N = 7$ ). The questions posed in my correspondence were:

- Do the survey questions make sense in the context of what I am seeking to discover?
- Are the questions intuitive and do they stay on task thematically?
- Do the phrases used in the survey items create a holistic picture of the construct of interest?

Below are several responses that I collected from the feedback to these questions:

- A CEO in a nanotechnology firm: “Context—consider the ambivalence of the context, resilient network ambidexterity looks very different in education than it does in say, pharmaceutical companies” (Anonymous, personal communication, April 2, 2017).
- A scholar practitioner:  
  
Understand your audience—Practitioners see the playing field very differently than executives, and consultants see the world through rosy assumptions about the models

they are looking to validate. In other words, consider that something like ‘creativity’ and the actions surrounding it are inconclusive to those that perceive themselves to lack creativity in a formal sense. (Anonymous, personal communication, April 8, 2017)

- A supply chain executive:

Based on the definitions, items appear to be capturing the indicators being explored. Have you considered grouping the questions based on theme? I felt like I bounced around a lot and had to look back to make sure that I answered based on what you’re looking for. (Anonymous, personal communication, April 8, 2017)

- A scholar: “Consider the fact that multiple disruptions may occur simultaneously. Each disruption may shift behaviors, and, depending on the scenario selected in the survey, the participant’s behaviors will likely also change” (Anonymous, personal communication, April 2, 2017)

This was also some feedback from colleagues in the Antioch doctoral program:

- “Would your questions change if organizational ambidexterity was viewed along a continuum? How relevant is a disruption to the construct of interest? In other words, let’s assume no disruption takes place, but the organization exhibits ambidexterity, wouldn’t they be considered resilient?” (Anonymous, personal communication, April 12, 2017)
- “Your introduction is very academic sounding and your voice seems too formal. Two items regarding work rotations made me question their relevance.” (Anonymous, personal communication, April 15, 2017)
- “These items make sense and are intuitive for participants. But the prompts are a little confusing to me. Are you referring to me in the context of the organization? Or the organizational context?” (Anonymous, personal communication, April 15, 2017)

After discussing these responses with my methodologist, I revised the survey to meet the following criteria:

- Establish parsimony—I looked back to the literature to establish the least number of items that could measure the indicators believed most representative of RNA.
- Clarify frame of reference—I consistently refined the scale to focus on the organization rather than on teams, subunits, or individuals.
- Eliminate redundancy—I revised the survey and consulted with colleagues in the Antioch PhD program to eliminate questions that ostensibly addressed the same thing.
- Categorize items—I grouped survey items based on the tentative indicators they expressed. While disagreement exists as to the efficacy of clustering in this context, Abell et al. (2009) support grouping of survey items by topic, which they contend eliminates participant confusion.

The iterative process through which content validity was established entailed measuring each factor to establish its relationship to RNA, and for what purpose each factor was measuring RNA. This process produced a revised survey consisting of three sections and 26 items. The revised instrument is shown below.

### **RNA Scale**

The RNA scale consisted of three subscales and 26 items. The creativity consisted of nine items. The Knowledge sharing subscale consisted of 10 items. The Network Cohesion subscale consisted of seven items. The following shows the content of elements of the creativity subscales:

**Section 1. Creativity.** Creativity is defined as the level of novelty that exists in an organization. Thinking about (the disruption's name chosen above) in your organization, to what

degree would you evaluate the following statements about the creativity that was exchanged during the disruption. The scale ranges from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*). The statements for which scaling was sought for creativity were:

1. My organization encouraged us to stay innovative during the disruption.
2. My organization encouraged us to fine-tune what we were already very good at during the disruption.
3. People in my organization were encouraged to experiment with new ideas during the disruption.
4. My organization asked us to seek out new ways to stay relevant in the market we operate in.
5. My organization established restrictive rules for dealing with the disruption. (reverse score).
6. People in my organization frequently made minor adjustments to innovation processes during the disruption.
7. My organization challenged us to think beyond our existing capabilities.
8. My organization takes the time needed to come up with many ideas.
9. My organization explores each challenge from many angles.

**Section 2. Knowledge sharing.** Knowledge sharing is defined as the extent to which the organization effectively disseminates information and opportunities. Thinking about (the disruption's name chosen above) in your organization, to what degree would you evaluate the following statements about the information and knowledge that was exchanged during the disruption. The scale ranges from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*). The statements for which scaling was sought for knowledge sharing were:

1. My organization enabled us to create knowledge networks to boost information sharing during the disruption.
2. My organization cultivated a learning environment.
3. People in my organization shared information regardless of the department it pertained to.
4. People in my organization relied on one others shared knowledge to solve the problem.
5. My organization inspired us to think strategically during the disruption.
6. People in my organization shared ideas across business units.
7. The employees in my organization learned from one another.
8. My organization sought out the expertise of others when working on a problem that could not be easily resolved.
9. My organization encouraged some form of job rotation among employees in different departments.
10. My organization replicates best practices across organizational boundaries.

**Section 3. Network cohesion.** Network cohesion is characterized by people in the organization sharing values and organizational mission. Thinking about (the disruption's name chosen above) in your organization, reflect on the degree to which your organization promoted network cohesion. The scale ranges from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*). The statements for which scaling was sought for network cohesion were:

1. People in my organization were encouraged to build networks across organizational boundaries during the disruption to support the mission.



2. My organization encouraged building extensive in-house networks that could be used to solicit help.
3. My organization made it comfortable to talk to anyone in my organization, regardless of his/her title.
4. People in my organization shared organizational values.
5. There was a lot of competition between departments in my organization during the disruption (reverse score).
6. People in my organization spent time together socially while working through the disruption.
7. My organization's social network was supportive during the disruption.

**Construct validity.** Construct validity is broadly defined as “the extent to which an operationalization measures the concept it is supposed to measure” (Bagozzi, Yi, & Phillips, 1991, p. 422). In this case, an EFA was performed on the results of the survey instrument. This statistical approach was chosen as it, “allows the researcher to explore the main dimensions to generate a theory, or model from a relatively large set of latent constructs often represented by a set of items” (Williams et al., 2010, p. 3).

**Potential threats to construct validity.** Threats to construct validity include the presence of bias and unfairness. Researchers should remain cognizant of incorporating preconceptions or prejudices into their assessment tools, and communicating expectations through them, either consciously or unconsciously (Ragin, 1994). A famous instance of communicating the researcher's hypothesis was the Hawthorne effect, also called the observer effect, in which factory workers adjusted their behavior in response to being observed rather than as a response to increases in lighting as hypothesized (McCarney et al., 2007). A related threat,

entails the researcher somehow communicating the desired result, prompting participants to respond accordingly. Two other possible threats are defining a predicted outcome too narrowly, and the presence of confounding variables (MacKenzie, 2003).

As the primary researcher, I remained aware of the possibility of conscious or unconscious biases to the best of my ability and guarded against allowing these to influence the design and administration of the survey instrument. Clark and Watson (1995) posited: “The most precise and efficient measures are those with established construct validity; they are manifestations of constructs in articulated theory that is well supported by empirical data” (p. 310). Given the potential threats to construct validity in objective scale development, it is further discussed in the ensuing sections.

**Assessing for construct validity.** Factor analysis has been one of the primary means of determining that a survey elicits the information that it is intended to produce. DeVellis (2015) states that “factor analysis can help an investigator in determining how many latent variables underlie a set of items” (p. 155). Moreover, “factor analysis also can provide a means of explaining variation among relatively many original variables,” (p. 155) such as the items comprising this research’s survey instrument, “using relatively few newly created variables, (i.e. factors)” (p. 155). In particular, EFA allows any variable, in this case items on the survey instrument, to be associated with any factor, whereas CFA is restricted, both as to the number of factors and the assignment of variables to factors.

Suhr (2003) explains the difference in purpose between EFA and CFA: “Traditionally factor analysis has been used to explore the possible underlying structure of a set of interrelated variables without imposing a preconceived structure on the outcome, allowing identification of the number of constructs and the underlying factor structure” (p. 2). On the other hand, CFA is a

statistical technique used to verify the factor structure of a set of variables and “to test the hypothesis that a relationship between observed variables and their underlying latent construct(s) exists” (p. 1). I chose to undertake exploratory factor analysis as the principle point of entry in developing an RNA scale as it best aligned with my primary research goal of examining the relationships between theoretical factors and evaluating the construct validity of a revised RNA instrument.

**Descriptive statistics.** Descriptive statistics were calculated for each survey item and included the following: number of responses, minimums, maximums, means, standard deviations, and skewness and kurtosis measures (see Appendix D). The skewness and kurtosis measures were used to test for the structure and symmetry of the distributions of each item’s responses, and how close to a normal distribution the probabilistic patterns of these responses were (Abell et al., 2009). Skewness refers to the amount of asymmetry in a distribution’s structure. The normal distribution is symmetric and therefore has a skewness of zero. A negative skewness measure indicates a negatively or left-skewed distribution, and a positive score indicates a positively or right-skewed distribution. In negatively-skewed distributions, the distribution’s mean is less than its mode, whereas in positively-skewed distributions, the mean is greater than the mode. Distributions with no skewness (e.g., the normal distribution) have means equal to their modes. In general, skewness measures in the range -1 to 1 are preferred for psychometric work with values in the range -2 to 2 acceptable (SPSS, n.d.). As shown in Appendix A, among the survey questions comprising the final version of the RNA scale, the response distributions of all items fell within the -2 to 2 range.

Kurtosis measures the amount of probability in the tails of a distribution and is indicative of how probable outliers are. Hair, Black, Babin, and Anderson (2010) state: “Negative kurtosis

values indicate a platykurtic (flatter) distribution, whereas positive values denote a leptokurtic (peaked) distribution” (p. 71). Therefore, distributions having -1 to 1 are preferred for psychometric uses, but those with -2 to 2 are also acceptable (SPSS, n.d.). For the survey items, all excess kurtosis measures fell within the range -2 to 2 (Appendix D).

**Bivariate correlations.** Bivariate correlations (See Appendix E) measure the direction and strength of the interdependence between two continuous variables (DeVellis, 2015). I ran bivariate correlations on the items within the three sections of the initial RNA survey. The items, for the most part, were well correlated with the other items in their sections. However, responses to scale statements such as C5<sup>1</sup> within the Creativity section (“*My organization established restrictive rules for dealing with the disruption*”) and NC5 in the Network Cohesion section (“*There was a lot of competition between departments in my organization during the disruption*”), exhibited correlations below 0.3. Likewise, KS9 (“*My organization encouraged some form of job rotation among employees in different departments*”) in the Knowledge Sharing section also exhibited some correlations less than 0.3. However, I felt the presence of these questions were necessary to properly cover the sections. Consequently, after assessing the correlations in each of the sections, I retained all the items for factor analysis.

**Factor analysis.** In developing a scale to measure the indicators for mobilizing RNA, exploratory factor analysis was used. As its name implies, factor analysis attempts to identify a relatively small number of underlying factors, or constructs, within a larger group of items, such as the survey item responses in this research. Abell et al. (2009) cite two advantages to using EFA in developing scales: “First, it may identify test items that are strongly correlated to an intended common factor. Second, it may uncover an unexpected factor structure of test items”

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<sup>1</sup> The codes for items measured in the scale are listed in Appendix A.

(p. 134). In either case, for a researcher, there are various decisions within the analysis that ultimately improve the accuracy and the final solution of the factor analysis (Fabrigar, Wegener, MacCallum, & Strahan, 1999). I followed a cyclical process, continually comparing the various solutions achieved until a meaningful scale emerged. This process included the following EFA sequence:

1. Performed an initial extraction via Principal Component Analysis (PCA);
2. Performed the Kaiser-Meyer-Olkin test of sampling adequacy;
3. Performed Bartlett's Test of Sphericity;
4. Performed a scree plot analysis assessing eigenvalues;
5. Performed a factor rotation using oblique rotation (Direct Oblimin) to determine item to factor relationships and assess component correlations;
6. Performed Chronbach's Alpha reliability analysis to assess inter-item correlations within factors.

Factor analysis was performed on the data in SPSS through six iterations. Below are the results of the final iteration. The Principal Component Analysis (PCA) consisted of assessing the KMO, Bartlett's Test of Sphericity (BTS), and the Eigenvalues of the extracted factors. The Kaiser-Meyer-Olkin (KMO) is the measure of sampling adequacy and goodness of fit. According to Kaiser (1974) a  $KMO > .5$  is acceptable and values below  $.5$  should motivate the researcher to rethink the analysis or collect additional data. In addition,  $.5 \leq$  to  $> .7$  is considered mediocre,  $.7 \leq$  to  $> .8$  good,  $.8 \leq$  to  $> .9$  excellent, and, as in this case,  $KMO \geq .9$  superb. A  $KMO = .925$  indicates a relatively compact pattern of correlations within factors and indicates distinct and reliable factors (Hutchenson & Sofroniou, 1999). The final iteration of the RNA scale yielded a KMO of  $.925$ .

Bartlett's Test of Sphericity (BTS) was performed as a means of assessing the correlations that exist with other variables and with the variables themselves (Zaiontz, 2017). Neill (2017) recommends that extracted factors can explain between 50 to 100% of the total variance. In this case, the final iteration of the factor analysis indicated a two-factor solution that accounted for 61% of the total variance.

DeVellis (2015) described the rationale for using a rotation process: "The purpose of factor rotation is to find a particular orientation for the reference axes that helps us understand items in their simplest terms" (p. 80). A Direct Oblimin with an oblique rotation process was conducted, because I surmised that, to some degree, my factors and items to be correlated. DeVellis (2015) recommends using an oblique rotation method for factors that are thought to be correlated. As can be seen, two factors met the selection criteria with factor loadings greater than 0.5. The first factor was consisted of items from the knowledge-sharing and network-cohesion sections and emphasized a willingness to extend learning and collaboration across organizational boundaries. The second factor, on the other hand, consisted entirely of items drawn from the creativity section and seemed to emphasize innovation, experimentation, and continuous improvement, all elements contributing to creativity. Table 4.3 lists the items loading on to the factors as a consequence of the factor rotation conducted.

Table 4.3

*Component Factor Analysis Loadings*

<b>Item</b>	<b>Component</b>	
	<b>1</b>	<b>2</b>
KS1	.775	
KS2	.590	
KS3	.648	
KS6	.625	
NC1	.895	
NC2	.859	
NC6	.782	
NC7	.636	
C1		.689
C2		.792
C3		.785
C4		.803
C7		.742

*Note:* Extraction Method: Principal Component Analysis. Rotation method: Oblimin with Kaiser Normalization. Rotation converged in 6 iterations.

Because the factors were correlated, loadings tended to be strong. The correlation coefficient of the factors was .680. Table 4.4 provides the factor correlation matrix.

Table 4.4

*Two-Factor Component Correlation Matrix*

<b>Component</b>	<b>Component</b>	
	<b>1</b>	<b>2</b>
<b>1</b>	1	.680
<b>2</b>	.680	1

Lastly, I completed reliability assessments of the items within each factor. The inter-item correlation matrices for the items comprising each of the factors were assessed, and the Cronbach's Alphas were calculated. Cronbach's alpha is used to assess internal consistency

among a group of items, such as survey items as in this case (Cronbach, 1951). The Cronbach's Alpha for Factor 1 was .900. Cronbach's Alpha for Factor 2 was .852. Based on the previous findings, both factors were relabeled to be more expressive of the construct of interest—RNA. As such Factor 1 was renamed *Optimizing Organizational Boundaries*, and factor 2 was renamed *Exploring Novelty*. Tables 4.5 and 4.6 respectively, illustrate the inter-item correlations of Factor 1 and Factor 2.

Table 4.5

*Factor 1 Inter-Item Correlation*

	KS1	KS2	KS3	KS6	NC1	NC2	NC6	NC7
KS1	1							
KS2	.613	1						
KS3	.478	.504	1					
KS6	.527	.594	.635	1				
NC1	.667	.536	.445	.497	1			
NC2	.578	.539	.484	.480	.665	1		
NC6	.508	.506	.435	.393	.503	.578	1	
NC7	.486	.564	.469	.563	.520	.460	.582	1

Table 4.6

*Factor 2 Inter-item Correlation*

	C1	C2	C3	C4	C7
C1	1				
C2	.540	1			
C3	.631	.512	1		
C4	.545	.477	.641	1	
C7	.521	.421	.531	.569	1



### **Partial Confirmatory Factor Analysis**

Additionally, a partial confirmatory factor analysis (PCFA) was performed. Gignac (2009) states: “A PCFA may be considered to lie between conventional exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) on the spectrum of evaluating the plausibility of a model” (p. 40). He goes on to argue that PCFA provides “information as to whether the explanatively derived factor model solution is associated with a reasonable chance of being confirmed via CFA” (p. 40). Based on these recommendations, the supplementation of a PCFA would ensure my findings yielded a satisfactory model fit for CFA in the future.

A goodness-of-fit test was performed using the Maximum Likelihood Method of extraction and included the implied model chi square. Bartlett’s Test of Sphericity gave the null model chi square, in this case providing evidence for the independence of the factors being explored. Abell et al. (2009) recommend using chi-square ratios in relation to degrees of freedom and further assert: “A small value indicates a good fit. A value less than 2 or 3 is considered acceptable, although there is no commonly accepted standard for this quantity” (p. 59). Gignac (2009) suggests the values of three indices as supportive evidence for pursuing a CFA based on an initial EFA: the Normed Fit Index (NFI), the Comparative Fit Index (CFI), and the Tucker-Lewis index (TLI). Gignac states: “Larger incremental close-fit index values are indicative of a progressively better fitting model, with values approximating .950 or larger indicative of an acceptable level of model fit” (p. 41). Moreover, with respect to the root means square error of approximation (RMSEA), and absolute close-fit index, Gignac (2009) states: “Smaller absolute close-fit index values are indicative of a progressively better fitting model, with values approximating .08 to .06 or less indicative of an acceptable level of model fit” (p. 41). The values obtained for the RNA survey instrument are given in Table 4.7.

Table 4.7

*Partial Confirmatory Factor Analysis Indices*

Index	Value
NFI	.941
CFI	.958
TLI	.922
RMSEA	.082

As can be seen, the NFI, CFI, and TLI show values approximating .95. Moreover, at .082, the RMSEA falls very close to the .08 to .06 range Gignac (2009) specifies. Thus, the EFA produced within this analysis shows promise for conducting a CFA in the future; and confirm the promise of the survey instrument in evaluating the latent variables identified by Factors 1 and 2.

Tables 4.8 and 4.9 list the revised RNA survey and the composition of each renamed factor.

Table 4.8

*Revised RNA Survey Composition of Factor 1—Optimizing Organizational Boundaries*

Code	Statement
KS1	<i>My organization enabled us to create knowledge networks to boost information sharing during the disruption</i>
KS2	<i>My organization encouraged us to create a learning environment</i>
KS3	<i>People in my organization shared info regardless of the department it pertained to</i>
KS6	<i>People in my organization shared ideas across business units</i>
NC1	<i>People in my organization were encouraged to build networks across org. boundaries during the disruption to support the mission</i>
NC2	<i>My organization encouraged extensive in-house networks to solicit help</i>
NC6	<i>People in my organization spent time together socially while working through the disruption</i>
NC7	<i>My organization's SN was supportive during the disruption</i>

Table 4.9

*Composition of Factor 2–Exploring Novelty*

Code	Statement
C1	<i>My organization encouraged us to stay innovative during the disruption</i>
C2	<i>My organization encouraged us to fine-tune what we were already very good at during the disruption</i>
C3	<i>People in my organization were encouraged to experiment with new ideas during the disruption</i>
C4	<i>My organization asked us to seek out new ways to stay relevant in the market we operate in</i>
C7	<i>My organization challenged us to think beyond our existing capabilities</i>

**Process Summary Phase One**

The process I followed in conducting the exploratory factor analysis can be described as a four-step process. In the first step, I ensured that I had adequate data to conduct the factor analysis in the first place; this meant ensuring the sample size was adequate for factor analysis. Tabachnick and Fidell (2007) argue that at least 300 cases are needed for factor analysis. I collected 344 responses. MacCallum, Widaman, Zhang, and Hong's (1999) research on the role of sample size and its effects on factor analysis, argued that, while rules of thumb for sample size may be largely contested in the literature, "a sample size of 200 or 400 was adequate under most conditions" (p. 95). Correlation matrices were calculated to begin assessing the relationships between factors. Both KMO measurements and Bartlett's test of Sphericity were conducted prior to extracting any factors, as these measures are expressive of the suitability of the data for factor analysis (Yong & Pearce, 2013). The second step was to simplify the scale by determining the criteria for eliminating factors; scree plots and Eigen values were used to make these determinations (Cattell, 1966; Kaiser, 1960; Yong & Pearce, 2013). Iteratively, factors were extracted while retaining the items with the highest loadings. The third step, a Direct Oblimin

rotation method was employed on the unrotated factors. Yong and Pearce (2013) assert that Direct Oblimin offer researchers a simplified structure that loads on as few factors as possible. Lastly, the remaining two factors were labelled in accordance to their new meanings (DeVellis, 2015). This final step led me to reconfigure my factor naming based on an inductive process of assessing the construct of interest—RNA. To this end, a four-factor model was theorized: Knowledge Sharing, Network Cohesion, Collaboration, and Creativity. From this analysis, the data suggest that organizational disruptions require effective coping mechanisms that are inherently driven by two factors that are centralized around adaptive capacity. The first was named as *optimizing organizational boundaries*, and the second I relabeled as, *exploring novelty*. These newly labeled factors became the basis for Phase 2 of this study.

### **Interpretation and Refinement Phase**

For this phase of this analysis, participants received notifications via LinkedIn and email soliciting their participation in assessing and sharing their thoughts regarding the revised RNA scale. A total of 89 participants were asked for their input (See Appendix I for invitation letter). Initially, participants were simply asked to respond to my email and agree to the informed consent if they were interested in giving me feedback on my dissertation topic. Of the 89 participants I contacted, approximately half were either upper level executives, founders of a company or entrepreneurs working across different fields of technology and innovation. The second group of participants encompassed a broad assortment of occupations and held diverse roles within their organizations. The respondents could answer either all the questions or choose at least one that they could answer. I received 12 responses based on the following prompts ( $N = 12$ ):

- Do you consider the scale to be a useful tool for strategy development?

- Are optimization and exploration terms you would use to describe organizational ambidexterity?
- How does your organization explore and optimize?
- Do you think of optimization and exploration as two distinct functions? Or the same thing on opposite sides of a continuum?
- How could this scale be improved?

After receiving participant's responses, they were categorized into two broad categories of feedback. The first category of responses focused on scale refinement from participants. The second broad category focused more generally on how the respondents interpreted the scale within their specific organizational context. After separating participant responses into two broad categories, a more systematic approach through a process of thematic analysis was completed. Thematic analysis is a search for themes that are revealed to be important in describing the phenomenon being explored (Daly, Kellehear, & Gliksman, 1997). According to Boyatzis (2006) themes are defined as "a pattern in the information that at a minimum describes and organizes the possible observations and at a maximum interprets aspects of the phenomenon" (p. 61).

The ensuing sections explore two broad themes identified in this analysis. The first theme involves participant's feedback on scale refinement, the second broad theme highlights the various ways participants interpret the RNA scale in the context of their specific organizations. Lastly, a more comprehensive investigation was conducted through the reflective process of thematic analysis.

## Broad Analysis of Participant Narrative Responses

To understand the response of participants to the development of the RNA scale, I spoke with them about the refinement and interpretation of the scale. In the following subsections, their perspectives emerge in relation to questions raised.

**Participant feedback on RNA scale refinement.** Participants acknowledged the links between optimization and exploration as an important feedback tool for creating strategy. For example, in response to the question—“Do you consider the scale to be a useful tool for strategy development?”—an entrepreneur working in the field of quantum materials for electronic LED displays offered the following comment:

I can understand the value of measuring exploration and optimization. Going to my leadership team and saying we need to explore more starts a conversation, but that conversation will soon shift to a series of questions: Explore what? Optimize where? So, the scale sends the signal that these two functions may not be balanced. Is that what you're after? I guess the question is: “How do you ‘do’ RNA?”

Another respondent considered the scale from an employee's perspective in answering the question: “Do you consider the scale to be a useful tool for strategy development?”

My company wants me to find innovative ways to deliver our services to companies more effectively and with less bureaucracy than they already have. It's not rocket science, but they make it seem like it is, because my organization is constantly looking to predict the consumer's behavior. If I were to receive a survey like this, my first thought is to think that they're looking to get more creative than they need to be about what I do. I would perceive this to be a way to find out how to tell me how to do my job better. The disruption scenarios made me wonder if our company was being disrupted.

The following statement came from a telephone conversation I had with a participant when I asked, “How could this scale be improved?”

Some of the questions worked in the context of the disruption scenario I chose, but had I chosen a different scenario maybe not so much. I also, think that you should consider that sharing organizational values, means different things to different people. For example, I share trust with my organization as a personal value. However, I can't really answer that for other people in my organization. Question four under network cohesion asks to evaluate shared organizational values. Other than that, I found the questions to be specific to your topic.

Asked—“do you consider the scale to be a useful tool for strategy development?”—a respondent commented from a teacher’s perspective:

Getting a school district to think along these strategic lines would be a stretch. Too much bureaucracy is in place that constrains how much we can really explore as teachers. I feel like I can be creative, but within the boundaries. The principle of our school would love to act on a survey like this and implement strategies that work for us and our kids specifically. I think many of my counterparts would be excited to know that we are being included in the bigger conversation. Perhaps there could there be a survey for teachers and one for administrators?

One respondent considered the strategy question—“How does your organization explore and optimize?”—in the context of a SWOT (Strengths, Weaknesses, Opportunities and Threats).

We operate across three continents and one man’s opportunity is considered another’s threats. If we tell our people in China that we are under optimizing they would see that assessment as a threat—the fact that we can put it in the “opportunity” column in California, does not mean we can do the same with our Chinese counterparts. We like to think of exploration in terms of R&D and that is a big budget line item in this organization. If the scale revealed that we are not exploring enough, I would quite frankly question the instrument, because we do so much R&D. I would be hard pressed to go back and report that R& D is a weakness in our strategic planning session.

**Participant interpretations of the RNA scale.** In response to the question, “How does your organization explore and optimize?” a respondent shared these insights on what he considered an exemplary model of ambidexterity from a military perspective.

In the military, we standardize as much as humanly possible. This takes the guess work out of mundane tasks, like marching and cadence for example. Every soldier qualifies with a weapon on targets that are the same distance apart. It doesn’t matter if you’ve been in the military a day or 10 years. This is sort of an example of optimizing. But the military takes it a step further, some units are in constant optimizing mode, getting better and better at what they already do, like shifting between light and mechanized infantry. It’s all infantry but the units are optimizing the warfighting plan. In turn you have specialized units that do a lot of improvising with everything from how they get to a designated remote target location to how they move in clandestine ways. These are your Rangers, Deltas, Snipers, SF, et cetera.

A respondent working in consumer merchandising industry focused on the emphasis of RNA as a continuum in answering my query, “Do you think of optimization and exploration as two distinct functions? Or the same thing on opposite sides of a continuum?”

I see the terms as operating along a continuum. Moving from improving processes (in my case merchandise) to exploring new products and goods for the consumer to want to buy. The disruptions come, when we try and predict consumer behavior and while big data has for the most part solved this piece of the merchandising puzzle, the product fails miserably. This pushes us to explore, to ask internal and external questions. But also, to recognize that failure in this business is imminent. We generally explore only after we optimize. Consumer trends shift constantly, but not exponentially, unless things are bad economically. For my team the key is to know what areas of consumer behavior to explore, but only to act on them when the time is just right. In the meantime, we are all about optimizing the consumer experience.

Another respondent requested clarification of the definitions I used to create the scale and upon sharing the definitions of exploration and optimization. This person gave the following feedback in response to the question: “Do you consider the scale to be a useful tool for strategy development?”

Thanks for clarifying the definitions for me. I could see two ways this instrument could be beneficial. Our business unit teams are divided into pairs or triads it just depends, some work on innovation while others work on design improvements, like ergonomics. Success is measured based on our collaboration. We get into this thing where my team (innovation) likes to think we are the best innovation team in our company but compare our design improvement team to others that we consider stronger. Does this make sense? If we are considering new strategies, then based on your instrument results we could take each team that’s optimizing more than exploring and vice versa, then recombine them in ways that makes them more balanced on both sides. The people in my organization are resilient in the sense that we can fill in for each other. One of my colleagues went on paternity PTO and another employee could step in and kept the innovation team functioning.

I also think some people are more inclined to want to work a certain way. Everyone in my company took a personality test that assigns colors to who you are. I’m “orange” for example, and I welcome change. Working in innovation is a good fit for me. But that’s not always the case, if you have a bunch of “greens” that are all about efficiency working in innovation, creativity will suffer. Consider this, what if the instrument could also tell a company who is an optimizer and who is an explorer? Innovation strategies could look very different if companies considered this

Another respondent’s perspective focused on what her company does specifically well in the context of ambidexterity as a continuum in response to being asked, “how does your organization explore and optimize?”

I appreciate this perspective. The first thing I think about is how your survey relates to us as a small software company. If we need to optimize a part of our business, we’re going



to focus on process. If we are thinking of exploration, then we're thinking about the next best thing: a product. Have you thought about different surveys for multiple scales of a business? The tech lifecycle is always being disrupted. I think a software engineer thinks about ambidexterity as two sides of the same coin. In other words, they go hand in hand.

Another respondent thought of ambidexterity as a function of process improvement. I considered his perspective to address ambidexterity along a continuum. Essentially, he described process improvement as one process and innovation as a separate and distinct process. Process improvement, in the following narrative is a meso-level function carried out by workers and orchestrated by management. On the other side of the continuum, he said that innovation is a process for the scientists working in the organization to explore autonomously. I asked: "Are optimization and exploration terms you would use to describe organizational ambidexterity?" He answered:

We consider process improvement an ongoing thing where I work. I think you have to put limits around this or things are in an ongoing state of change. I've seen this happen in my workplace, we kept "improving" certain things, but we were only changing them. It took a new leadership team to really put an end to process improvement for the sake of process improvement. Now we are more precise about what needs improvement. Regarding exploring, we use the term innovation. Some of our competitors can pay 25 PhDs to just work on the R & D of nanotechnology, we don't have that luxury. We use nanotechnology in innovative ways and that's our niche. I spend time with our folks in the field that sell our technology and that's part of R&D, to understand our place in the market. I think we do innovation better than process improvement, because we have to.

A respondent focused specifically on optimization, how they define it in a healthcare insurance setting, and how their organizational mission is one that solely considers optimization as a measure of success. My question was: "How does your organization explore and optimize?" The response was:

Our platform is designed for users to optimize their organizational healthcare packages. So, optimization is a term we use constantly in our company. Specifically, we think of it as a client's due diligence to always look for better ways to make sure their employees are getting what they need out of their healthcare plans. We offer optimizer incentives to clients that retool their organizational healthcare needs at least twice a year. It may not seem like all that frequently, but this type of company only accounts for about three

percent of our total users and we have over 100,000 users on our platform, sometimes more.

I guess you could say we are in the “optimizing” business. If we can get a client to optimize, then we can explore, and often this bodes well for us, because sometimes that means adding benefits that are more valuable to them and more important to our bottom line. Let’s face it, that bottom line is usually more expensive plans. I think if we could show a client how they are not optimizing and exploring the focus of their healthcare benefits that would help them make decisions on how to navigate their plans. The benefit of a tool like this could be manipulated based on what area a company wants to energize. In our case, asking clients questions about whether they feel like they are optimizing their employees plans to serve them better.

A seasoned restaurateur offered the following remarks on the importance of exploration in the context of his restaurants and how it impacts his leadership style when asked: “Are optimization and exploration terms you would use to describe organizational ambidexterity?”

Eddie, I take no issue with the terms you use in the survey. Albeit, they mean different things to people even when they understand them in the manner you do. Sometimes people tell me that I run my restaurant like a meritocracy. And I say NO! I run it like a laboratory, the best experiments get the most recognition. I want the chefs to always be experimenting, it’s not unusual for us to give praise to the chef that has come up with the most provocative and tasty dishes in a year—the kind that when they are not on the menu I hear back about how many customers kept coming back and asking for it. I would want to know if we are not optimizing enough, or if we are exploring too much. My staff would say—we experiment too much, I say so does Google and look at them!

### **Refined Thematic Analysis**

A content analysis consists of a systematic data reduction procedure of open (emergent) coding of text (Strauss & Corbin, 1990). Open coding entails the initial breakdown of raw text into conceptual categories. These categories are discrete and detail a phenomenon, which, in this study, were the three RNA theoretical indicators (e.g., Creativity, Knowledge Sharing, and Network Cohesion) these were found to be embedded within the two-factor solution as themes (e.g., optimizing organization boundaries and exploring novelty). The eight items of Factor 1 (Table 4.8) and five items of Factor 2 (Table 4.9) were considered as possible themes during the open (emergent) coding process. Crabtree and Miller (1999) describe the process of connecting codes as a process of discovery in both the patterns of and themes in the data. Initially, I

developed a matrix of text that corresponded to the major categories and subcategories of participant responses to create an initial coding structure (Miles, Huberman, & Saldana, 2014).

Specifically, a construct matrix was developed in order to facilitate coding the qualitative content. Miles et al. (2014) assert that a construct matrix contains “data that highlight the variable properties and or dimensions of one key construct of interest from a study” (p. 171). The key constructs in this study were optimizing organizational boundaries and exploring novelty. The dimensions of interest became more salient through the integration of real case comments that illuminate “the way a variable plays out in different contexts” (Miles et al., 2014, p. 172).

Using the quantitative findings to guide the qualitative coding was guided by the process of triangulation with the intent to find common, consensual meaning within the RNA constructs. Triangulation is considered a powerful technique that facilitates validation of data through cross verification from two or more sources (Bogdan & Biklen, 2007; Erlandson, Harris, Skipper, & Allen, 1993; Lincoln & Guba, 1985; Silverman, 1993). Several iterations of evaluating participant feedback were performed prior to developing the explanatory construct matrix. This iterative process of scrutinizing themes took into account Crabtree and Miller’s (1999) advice for confirming qualitative findings whereby researchers albeit, unintentionally begin “seeing” data they expect to find.

I divided the themes between the two factors of optimizing organizational boundaries and exploring novelty; subsequently, two themes emerged and were categorized as follows:

- Optimizing Organizational Boundaries theme: As processes for improvement;
- Exploring Novelty theme: To solve problems creatively.

Results from the construct matrix are shown in Table 4.10:

Table 4.10

*RNA Thematic Construct Matrix*

Factor	Theme	Source of Quote
<i>Optimizing Organizational Boundaries</i>	Process as production Improvement	Respondent after clarification of definitions
	Process as Continuum	Small software company respondent
	Process as Continuum	Author's paraphrase of respondent
	Process as Improvement	Respondent Nanotechnology
<i>Exploring Novelty</i>	Solving Problems Creatively	Employee's Perspective
	Solving Problems Creatively	Restaurateur
	Specialization to Solve Problems Creatively	Military Perspective
	Failure as impetus for Solving Problems Creatively	Consumer Merchandising Industry Respondent
	Solving Problems	Military Perspective
	Solving Problems Creatively	Teacher's perspective
	Collaboration guiding innovation and solving problems	Respondent after clarification of definitions

**Thematic Analysis Summary**

**RNA as process.** An emergent theme that surfaced in conducting this thematic analysis is in the aspect of how participants understand RNA as a process; specifically, as a process for improvement. Asking participants to consider RNA as a tool for strategy development, led them to consider the construct itself in relation to its practical use within their organizations. Before

conducting this analysis, I believed that RNA could be used primarily as a tool for strategy development. The instrument could be used as an initial “pulse check” for an organization to determine the levels of optimization and exploration available in their strategic coffers. From this perspective, the scale would help organizations identify the factors necessary to develop sector-specific RNA strategies during disruptions. While this remains plausible, my preliminary thoughts did not take into account that during ambiguous periods an adaptive performance stance is taken. This stance places organizational actors squarely between strategic processes and uncertainty, searching beyond an organization’s strategic intent to the processes that expedite dealing with the disturbances being currently faced. Consequently, the extent RNA as a process, can broker the distribution of feedback and knowledge across organizational boundaries shifts the activities from proactive ideas to intentional actions. Ernst and Chrobot-Mason (2011) define *weaving* as an important feature of collective action, asserting:

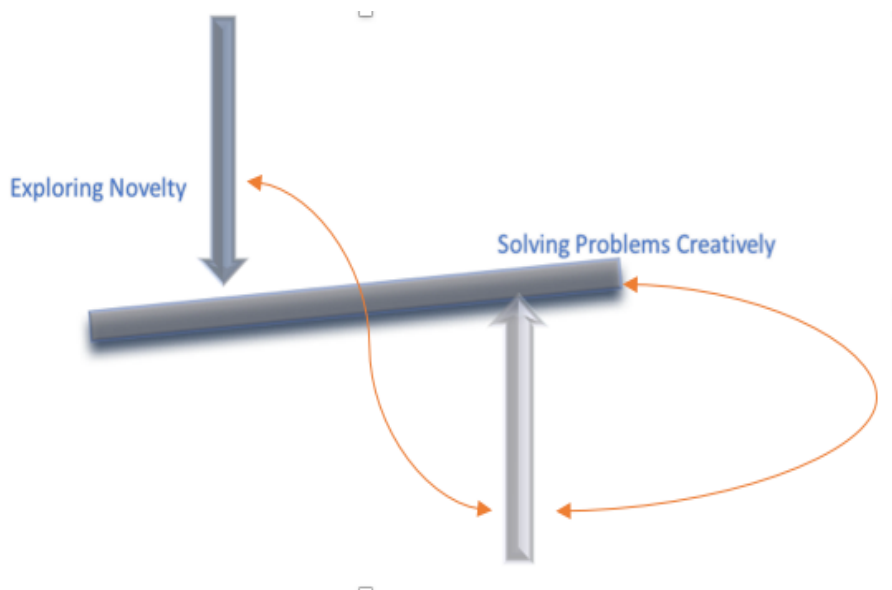
When this practice is in place, the groups involved not only enhance their own effectiveness but also can co-create a single overall direction, work together to realign collective resources as business requirements change and exploit diverse perspectives to enhance the effectiveness of the larger organization. (p. 87)

Viewing RNA as a process for understanding the elasticity organizations possess to stretch the boundaries of collaboration through feedback is an unintended, albeit, pleasant discovery of this analysis.

**Solving problems creatively.** This analysis indicated that participants formalize novelty in organizations through two distinct mechanisms. The first mechanism appears to be feedback, the second mechanism was in the context of adaptive performance. In terms of proximity, the closer participants were engaged in the actual process of exploring novelty to solve problems the more likely they were to pursue adaptive conceptions of creativity. This perspective provides sufficient latitude for leaders to think and act creatively during perceived episodes of

organizational difficulty. Conversely, participants that were distanced from directly engaging organizational problems viewed the construct of creativity only in relation to the feedback they received from the organization. This suggests that while Exploring Novelty and Solving Problems Creatively may be related, they should be treated as distinct aspects of adaptive capacity within organizations. Solving Problems Creatively, in this sense, represents a hierarchical process that forces performers to adapt to changing work environments based on the downstream knowledge they receive; this shifts the amount of autonomy an employee garners to directly impact organizational novelty.

On the other hand, Exploring Novelty suggests that the organizational landscape empowers people across organizational boundaries to express creativity autonomously as a way of solving problems. While the frame of reference is one that is ostensibly shared, the point of entry is different based on the distribution of power in the organization. Assuming the organization is seeking coordinated novelty to a common problem, results will vary depending on the rigidity of the top-down bureaucracy underlying the organization's activities. These distinctions are important as interdependencies are central features of alignment in ambidextrous organizations (Tushman & O'Reilly, 1996). Partitioning exploring novelty and exploring creative solutions is useful for organizations to recognize as these contrasts are flashpoints of divergence in thinking, specifically, when the presumption is that during periods of disruptions convergence of thinking is desirable to overcome organizational challenges. Figure 4.2 illustrates the process flow distinctions between exploring novelty and solving problems creatively.



*Figure 4.2.* Distinctions between exploring novelty and solving problems creatively in organizations.

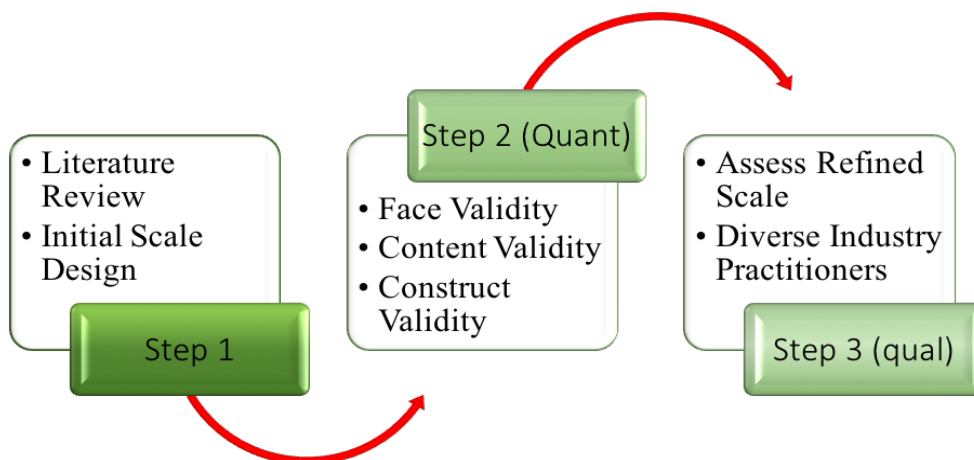
#### **Closing Summary of Chapter IV**

This analysis brought to bear the connections between resilience at the organizational level and how it impacts notions of ambidexterity at the social level. While the scale's refinement was a central feature in the responses gathered, there appears to be a gap in how it can be mobilized for specific levels of an organization. As such, a critical imperative that this research continues to explore is in re-casting RNA in more concise ways that will unify the factors found to be most prominent in “doing RNA” within organizations. This requires exploring different RNA taxonomies, specifically, as they pertain to organizational ambidexterity and its varying contexts. The next chapter revisits the RNA model based on the results of this research, considers the implications it may have on organizations and practitioners to affect and lead change, and provides ideas for mobilizing the RNA scale across organizational boundaries.

## Chapter V: Discussion and Recommendations

### Summary of Key Findings

This study culminated in the development of a resilient network ambidexterity scale. Scale development efforts followed a systematic three step process. Step 1 of the scale design involved a comprehensive literature review to determine how to define RNA. Step 2 involved face and content validity assessments that included editing and generating items based on respondent's judgments of the appropriateness of the scale items. Following this procedure, a final determination was made on which items would be retained for further analysis. Step 3 included the assessment and refinement of the truncated scale based on the diverse feedback and input of industry practitioners. Figure 5.1 illustrates the three-step methodological process that was followed:



*Figure 5.1.* Summary of validity process.

Exploratory factor analysis was utilized to assess construct validity based on the responses of 344 participants. Survey participants responded to a three-section survey that consisted of 26 items. The survey required them to select a specific disruption that best articulated the context for their responses. Using factor analysis, items were selected based on



the principles Simms (2008) describes as “homogeneous scales that only measure one thing” (p. 421). Inter-item correlations were reduced to two factors that best explained the latent dimensions of RNA (Preacher & MacCallum, 2003). Based on these findings, two factors were renamed: (a) Optimizing Organizational Boundaries, and (b) Exploring Novelty. As a means of supporting the EFA results, a PCFA was also conducted. This followed Gignac’s (2009) advice regarding the value a researcher may gain by supplementing an EFA with a PCFA should they wish to confirm in the future the derived exploratory factors. Gignac (2009) asserts: “The primary utility of a PCFA is that a researcher conducting a conventional EFA would be able to obtain more convincing information as to whether considering a CFA of the model in the future is justifiable” (p. 40). The PCFA concluded the construct validity portion of this inquiry and revealed a satisfactory result for pursuing a CFA in the future.

Following factor analysis, feedback on the revised scale was solicited from 12 organizational leaders and practitioners in a wide variety of professions. The following questions were delivered to participants soliciting their feedback on the revised RNA scale:

- Do you consider the scale to be a useful tool for strategy development?
- Are optimization and exploration terms you would use to describe ambidexterity?
- How does your organization explore and optimize?
- Do you think of optimization and exploration as two distinct functions? Or the same thing on opposite sides of a continuum?
- How could this scale be improved?

This feedback served as a secondary means of interpreting the revised scale for content validity. Furthermore, the participant’s narratives provided important information between my understanding of the theoretical construct of RNA and its congruence with how professionals

across disciplines understand it. Organizational practitioners' responses highlighted the difficulties of defining the terms used in the RNA scale across organizational contexts.

Participants also pointed out the different meanings the instrument might have for individuals working directly on project teams compared to those in leadership positions; however, the scale overall was judged to be a relatively good measure of RNA.

### **Revisiting RNA**

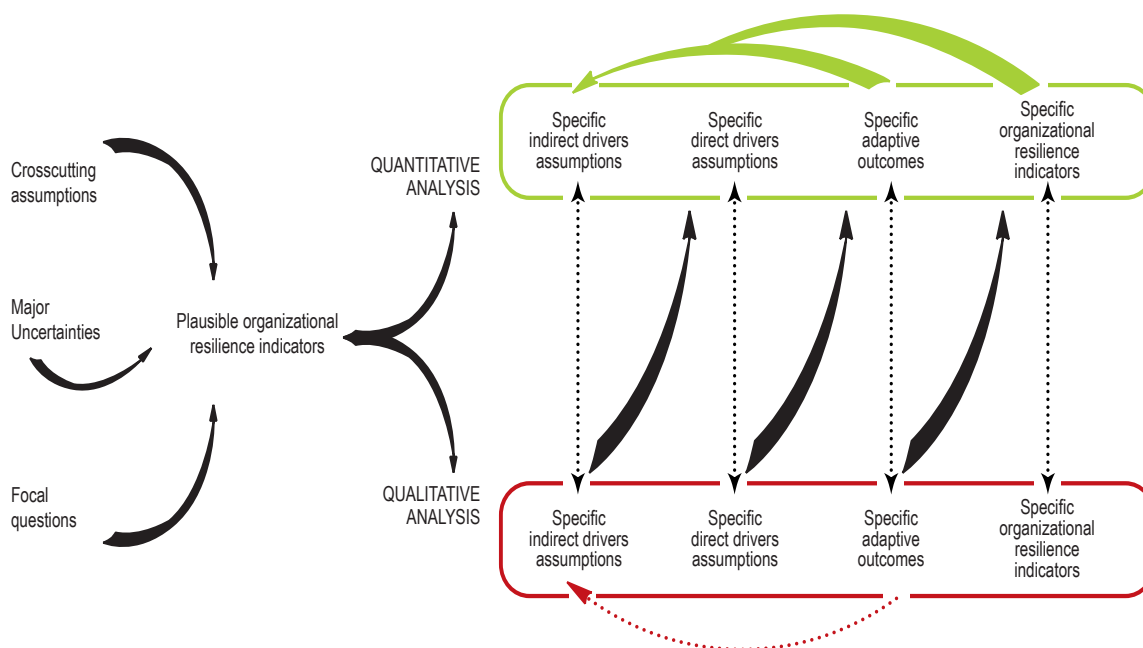
This research provided the backdrop for understanding the latent construct of RNA as it pertains to organizational resilience. In theory, it is plausible to determine the factors that endow an organization with RNA during periods of uncertainty. Increasingly, organizations find they must be adaptive and nimble in today's volatile and quickly changing business environment. Globalization requires multifaceted organizations and employees with multiple skills in order to remain effective. The notion that unpredictable organizational occurrences can be managed with predictive processes that lead to predictable outcomes is no longer tenable.

An ambidextrous organizational taxonomy focuses less on prediction and more on exploration and optimization. This shifts the leadership paradigm from desired ends to creative means. Ernst and Chrobot-Mason (2011) describe the role leadership plays in boundary spanning: "A boundary spanning leader then helps groups work across, around and through boundaries to engage in productive work with other groups whether inside or outside the organization" (p. 84). From an optimization perspective, knowing the assumptions organizations rely on during periods of duress, and how they extend organizational boundaries, is critical. From an exploration perspective, understanding what focal questions are being confronted in the pursuit of creativity during episodic turbulence and, at what level they are mobilized, is similarly

important. As such, mobilizing RNA at the organizational level begins with asking two questions regarding the organization's propensity to be ambidextrous:

- What are our assumptions that optimize organizational boundaries during disruptions?
- What are the focal questions that mobilize exploration during disruptions?

Each of these questions can be answered through two specific lenses. From a quantitative perspective, the RNA scale clarifies the boundaries of knowledge sharing by questioning how well knowledge is truly dispersed across the organization during a disruption. From a qualitative perspective, the scale examines issues that either stifle novelty or enables collective effort that fosters egalitarianism and collective participation. Figure 5.2 illustrates how organizational leaders can utilize the quantitative and qualitative levels of organizational inquiry.



*Figure 5.2.* Quantitative and qualitative inquiry path for leaders exploring organizational ambidexterity.

## **Mobilizing RNA**

The basic premise of organizational ambidexterity is that organizations should consider both exploration and optimization (Raisch & Birkinshaw, 2008). Long-term viability requires organizations to adapt to a quickly changing organizational landscape while optimizing existing knowledge and exploring novelty. Operating in a complex, highly dynamic environment often forces organizations to view optimization and exploration as mutually exclusive functions. The ability to implement these functions simultaneously or sequentially creates the central problem of how to structurally realign organizations to confront the current environment. Jansen et al. (2005) assert that pursuing optimization and exploration requires managing the contradictory processes of decentralizing decision making, while formalizing information sharing. As problems have become more complex—and the organizations and institutions with a stake in those problems have become more numerous and varied—it has become increasingly unlikely that problems can be solved without input and involvement from a wide variety of stakeholders. Recognizing the potential to build adaptive capacity in an organization is a fairly easy proposition to accept. However, the notion of combining functions that, at least on the surface, appear contradictory might seem counterintuitive.

Differences on how to build adaptive capacity will inevitably surface in organizations. Prioritizing which aspects are most important varies from person to person. The organization's role, in the current environment, is to clarify concerns and engage those involved in consensus building. Furthermore, finding solutions that reflect the interests of all while overcoming differences requires sustained effort. According to Chrislip and Larson (1994), several features must be present or intentionally built into the collaborative process from the beginning in order for it to succeed. These include: broad-based engagement, clearly stated need, and strong

leadership of the process. Increasingly, leadership requires the capacity to keep stakeholders engaged through periods of frustration, enforcing norms and agreed upon rules, and moderating sensitive issues.

### **Guidelines for Mobilizing RNA**

Beyond merely understanding RNA as a possible adaptive capacity building tool for organizations it is equally important to know how to operationalize it. As with many complex tasks, implementation guidelines can be useful. The ensuing section outlines a set of simple guidelines for understanding how to “do” RNA.

**First simple guideline: Embrace complexity.** Organizations must be able to map the constellation of existing organizational networks and their capacity for nimble reconfiguration and collaboration. Taking an example from nature, bees’ nest selection is a highly complex endeavor that unfolds in a set of simple rules to achieve optimal results. Coordinated action emerges from the individual activities of hundreds of individual bees. No single bee visits all the potential nesting sites to make direct comparisons, nor does the queen weigh the options and make the final call. Instead, all of the bees collectively follow the rules that allow them to gather disparate pieces of information, process them as a group, evaluate options, and make decisions. By establishing a set of rules, they collectively make better decisions than any single bee could make on her own (Sull & Eisenhardt, 2015). Kuhn (1977) posited:

Scientific development depends in part on a process of non-incremental or revolutionary change. . . . The usual prelude to changes of this sort is . . . awareness of anomaly, of an occurrence or set of occurrences that does not fit existing ways of ordering phenomena. (p. xvii)

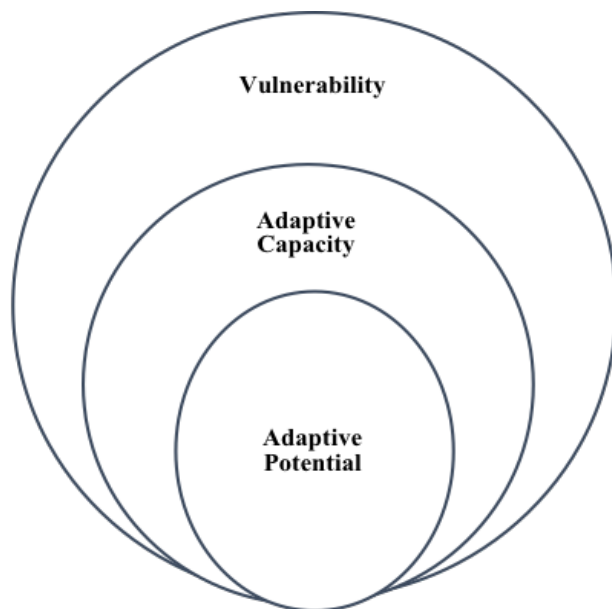
Gioia and Pitre’s (1990) conceptions on the advantages of using multiple paradigms build on Kuhn’s perspective: “Comparing and contrasting diverse paradigms is difficult when confined with one paradigm; looking for a meta level, however, can allow simultaneous consideration of

multiple paradigms and their transition zones” (p. 595). This contrasts with long-held views of organizations as predictable and capable of achieving equilibrium through rule-bound control mechanisms, as critiqued by Capra (1996), Stacey (1992), and Wheatley (2006).

The challenge for organizations is recognizing when they are in complicated situations versus complex ones. For example, complicated situations could surface as a consequence of organizational supply chain constraints and may be resolved by simply rotating suppliers to meet consumer demands in a more expedient manner. Conversely, complex events may require reconfiguring supply chain logistics and overhauling the corresponding technologies in their entirety. Along this continuum, the relevance of subsystems and key actors influencing and driving the current system are most relevant. Knowing how to define complexity, despite its tendency to randomly shift, is in essence a resilience network ambidexterity practice. The framework developed here enables leaders to have the foresight to consider networks holistically before enacting responses to disruptions that preserve the status quo.

**Second simple guideline: Embrace adaptive practices and vulnerability.** The term *adaptive* as it relates to RNA, crosscuts two definitions in the literature. From a complexity leadership theory perspective, it is understood to be a “generative dynamic” (Uhl-Bien, Marion, & Mckelevy, 2007, p. 299), underlying emergent activities in ways that produce novelty. From a social ecological systems perspective, adaptive capacity, in the context of resilient networks, best aligns with Pelling’s (2003) definition, which sees adaptability in terms of its relationship between vulnerability and adaptive potential. Kauffman (1993) used the term “fitness landscapes” (p. xvi) to assess and measure a systems adaptive value based on its varying configurations. Pascale et al. (2000) describe fitness as “the competitiveness of an enterprise” (p. 12). Essentially, the fitness of a system refers to what extent certain organizational adaptive

behaviors can be measured based on the strength of their capacity to do one of two things: transform disruptions into creativity and knowledge; or dampen the system's potential for adaptability. The intersections of adaptive capacity at the network level coupled with feedback during times of disruption provide a valuable tool for organizations facing the inevitable prospect of a disruption. RNA posits that in the medial space between vulnerability and adaptive potential is where the network's adaptive capacity and potential for novelty resides. Figure 5.3 attempts to capture the previously described dynamic.



*Figure 5.3* Nesting adaptive capacity in vulnerability.

Embracing vulnerability in the RNA sense has consequences for how knowledge is produced and dispersed in organizations. In this context, the organization remains sensitized to the dynamic interactions that incite action or complacency. Furthermore, organizations must bear in mind that social coordination is complex and susceptible to periods of vulnerability.

**Third simple guideline: Structurally design for knowledge sharing networks.** Shared context is what frames the diffusion of knowledge and innovation despite divergences in opinions and experiences (Tagliaventi & Mattarelli, 2006). Knowledge networks provide the

vital links through which resilient network ambidexterity can be distilled. By developing and enhancing knowledge and creativity, organizations can add resources from the stores of direct and indirect connections (Aldrich, 2012). Szreter and Woolcock (2004) use two metaphors to describe the interrelatedness of social capital and social networks: wires and electricity. They see Putnam's (1993b) view of social capital as the "wires' through which information and resources run" (as cited in Aldrich, 2012, p. 29); thus, networks and relationships serve as the structural foundation. On the other hand, Szreter and Woolcock see Lin's (1993a) understanding of social capital "as the electricity running through those wires; that is, the information and resources are passed back and forth" (as cited in Aldrich, 2012, p. 30). Thus, networks are the conduits that pass information and resources. Seen either way, RNA is assessed as the extent to which network connections exchange and produce knowledge.

Organizational ambidexterity signifies an organization's ability to manage the tensions between optimization and exploration. Pfeffer and Sutton (2000) referred to this as, "closing the knowing-doing gap" (p. 139). Other scholars explored this through the lens of knowledge sharing and organizational learning (Argote, 1999; Dixon, 2000; Garvin, 2000; Hansen, 1999). Winter and Szulanski (2001) argue that organizational strategies of knowledge replication share two distinct characteristics: "Broad scope of knowledge transfer—Modifies context of organization and may alter its identity; Dynamic capabilities accumulating in the 'center' or focal organization" (p. 732)

The fast food chain McDonald's, among other companies, has been cited as an example of the two previously defined characteristics. From a broad knowledge transfer perspective, the organization maximizes production through automation and standardizes processes across organizational boundaries (Love, 1995). From the centrality of organizational dynamics,

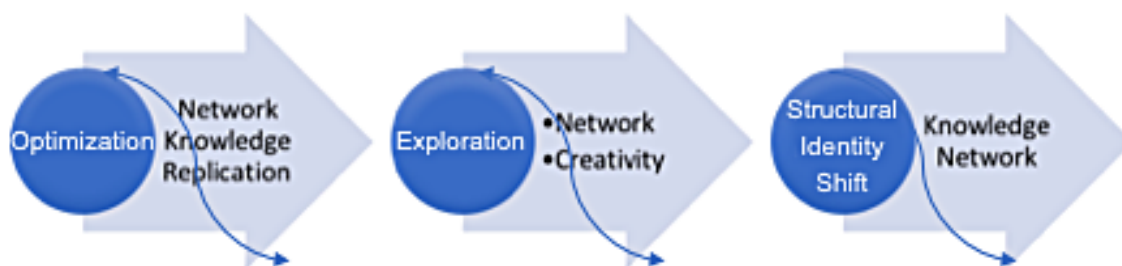


strategic replication allowed McDonald's to optimize their growth by building additional restaurants faster and with ever-greater efficiency (Love, 1995). Understanding and leveraging knowledge in organizations is a critical feature of resilient network ambidexterity. The creativity that emerges during day-to-day organizational operations is ripe with potentially replicable adaptive behaviors. Given this reality, organizations require intentional strategies that capture these new ideas, enable their transfer across organizational boundaries, and translate them into meaningful actions.

Over a decade ago, Manderscheid and Kusy (2005) expressed concern about the lack of organizational strategy transparency: "It has been our experience that many individuals who work in well-established and recognized enterprises are not aware of their organization's strategy, never mind how to execute strategy through implementation plans" (p. 3). Knowledge dissemination in this context should remain an open, egalitarian process, stimulated by the social interactions emerging within the system. This circles back to the value of seeing the complexity of the system in the sense that organizational networks optimize randomly, rather than formulaically to produce knowledge. This perspective also suggests that organizations mobilize lower levels of the organization to enhance knowledge networks across business functions (Gilbert, 2006; Raisch & Birkinshaw, 2008).

The implications of this work are that optimization cannot be fully realized without the process of exploration first taking place. A process of inquiry and creativity sets the stage for strategic refinement and extending the knowledge base of the network in ways that support the idea of replication. Even in companies where replication is essential, such as in fast food chains, coffee houses such as Starbucks, and the banking industry, exploration occurs prior to executing replicable processes (Winter & Szulanski, 2001). As new knowledge network configurations

begin to form, they proliferate and advance creativity. Consequently, as organizational structure and identity begin to change, so too does the network. In turn, the network's new identity is one that is capable of moving between exploration and optimization to both sustain and extend the network's capacity for novelty or refinement. The result is a robust knowledge network that is considered resilient. Figure 5.4 illustrates the integration of the previous description of knowledge sharing networks.



*Figure 5.4.* Weaving knowledge and creativity to produce knowledge networks.

### **The Need for Flexible Thinking**

The development of the RNA scale revealed that a practitioner's focus is primarily on the specific organizational outcomes produced during disruptions. This research also revealed that, despite adding a disruption scenario to the scale for respondents to choose from, the respondents shared their insights based on their current context rather than considering any previous organizational disruption they may have experienced. Weick's (1989) assertions on theory building best describe this reality:

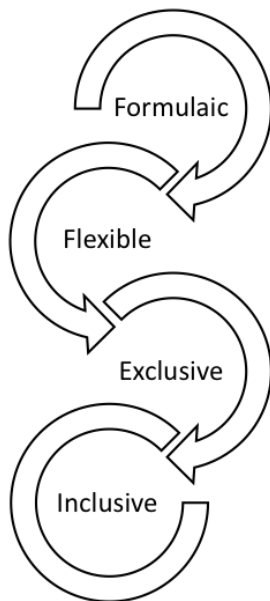
Theorists both choose the form of the problem statement and declare when their thought trials have solved the problem they pose, a sequence that resembles artificial selection. People searching for niches also may choose the form of their problem statements, but the environment declares which of their trials, if any are solutions. (p. 520)

This signals to researchers the need to consider the scale in the respondent's current organizational context. Britt (2014) argues that as researchers, "we tentatively describe

phenomena, [and] tentatively conclude what things mean and how they are explained” (p. 15).

An example of the inherent problem with specific proxy selection is highlighted in the context of the themes emergent in this study. For example, RNA was not viewed as a strategy by several participants. Instead, participants considered the virtues of RNA as a process. This fuller description of RNA as process, expands the opportunities for mobilizing the construct within organizations.

The previous assertions highlight the complex web of activities that organizations weave. Specifically, they emphasize the assumptions that affect how an organization “does RNA.” Organizations enacting a significant amount of network level inquiry and experimentation would be better positioned to begin optimizing organizational boundaries and exploring novelty. As Figure 5.5 illustrates, the critical takeaway here is that to either sustain or develop RNA, organizations, an organization should be willing to shift from formulaic to flexible and from exclusive to inclusive.



*Figure 5.5.* Cascading conduits for mobilizing RNA.

## Research Limitations

Britt (2014) asserts “If knowledge were infallible, we would not need to engage in dialogue” (p. 14). The particular claims being made in this research are based on tentative assumptions that can be disconfirmed. Coleman’s (1988) conceptualization of social capital as a collective good, not the private property of its beneficiaries. A limiting factor to the conceptualization of RNA rests in the fact that it can be manipulated in such a way that its primary use could be isolationist in nature by excluding individuals from participation in a specific network of relations.

Additionally, the development of this scale did not take into account the myriad types of alternative work contexts that exist in organizations today. The fact that the organizational environment and structure varies from one organization to another was a principal concern for practitioners evaluating the scale. Practitioner feedback suggested that in some cases how an organization explores or optimizes can either fuel or dampen ambidexterity. Litrico and Lee (2008) explored the “complex interaction of exploration and exploitation across contexts” (p. 1007). Their study supports Gibson’s and Birkinshaw’s (2004) research on how context affects ambidexterity in organizations.

Adding a disruption scenario for participants to select proved to be a limiting factor in this research. Respondents’ feedback suggested that the scale should relate to a mix of contexts, organizations, and personal experience. This study was also limited in that only a small number of factors related to ambidexterity were explored. Additionally, the sampling method was limited to individuals working in organizations that were considered innovative. Varying the context of the research to include different sectors may yield different results. Another limitation points to the accessibility of the survey being limited to those with internet access. Finally, the RNA scale

will need to undergo a more rigorous predictive validation process which can be accomplished through a confirmatory factor analysis.

### **Future Research Potential**

Whetten's (1989) paper he outlines the merits of theoretical contribution and posits: "Sensitivity to the competing virtues of parsimony and comprehensiveness is the hallmark of a good theorist" (p .490). This research has attempted to put forth a cogent explanation for the indicators that are most expressive of resilient network ambidexterity. The logic underlying this proposed conceptualization took into account that crossing paradigms would aid in formalizing a model for future inquiry. This follows Weick's (1989) assertion that "self-conscious manipulation of the selection criteria is the hallmark of theory construction" (p. 523). The previous arguments regarding selection criteria and researchers striking the right balance between classifying too much and underexploring other potential paradigmatic combinations are strong arguments for pursuing future research in the context of RNA. In this case, the selection criteria could follow a respondent's feedback that recommended re-examining the scale in the context of various levels of an organization rather than classifying the scale items in the more generalized, larger context of the organization.

**Toward building adaptive capacity through RNA's feedback.** One potential direction for mobilizing the RNA scale involves organizations considering the various stages of the adaptive cycle they are in. Gunderson and Holling (2002) cite four phases of an adaptive cycle as a useful metaphor for clarifying the transformations of interconnected systems.

- Rapid Growth ( $r$ ) phase
- Conservation ( $k$ )phase
- Release or omega ( $\Omega$ )phase

- The renewal or alpha ( $\alpha$ ) phase” (Gunderson & Holling, 2002, pp. 33–35).

Parallels can be drawn between what occurs during the phases of an adaptive cycle and the adaptive transitions of resilient networks. The front loop intersects with periods where networks are refining the structure of the organizational landscape and their capacity to extend the boundaries of knowledge sharing. An example of this could be a technology start-up experiencing a period of marked growth and, for the time, optimizing their newfound success.

The back-loop of the adaptive cycle intersects an RNA perspective that disperses novelty and reorganizes on the basis of the knowledge boundaries it has crossed. For example, building on the previous scenario, the same startup encounters a disruption. In this case, the perturbation is a “disruptive technology” (Bower & Christensen, 1995, p. 43). Apple’s iPod revolutionized the way people interfaced with their music (Fadell, 2015). Based on the disruptive technology, organizations begin either reinventing themselves or embracing the new disruption (front-loop processes) or begin exploring the new business landscape created by their competition (back-loop processes). Given this context, organizations could monitor or assess the organizations feedback for optimizing and exploring during disruptions along one of the following continuums:

- Strong to weak
- Positive to negative

Figure 5.6 illustrates the RNA feedback loops and the cyclical nature it has to produce interdependence and meaningful feedback.

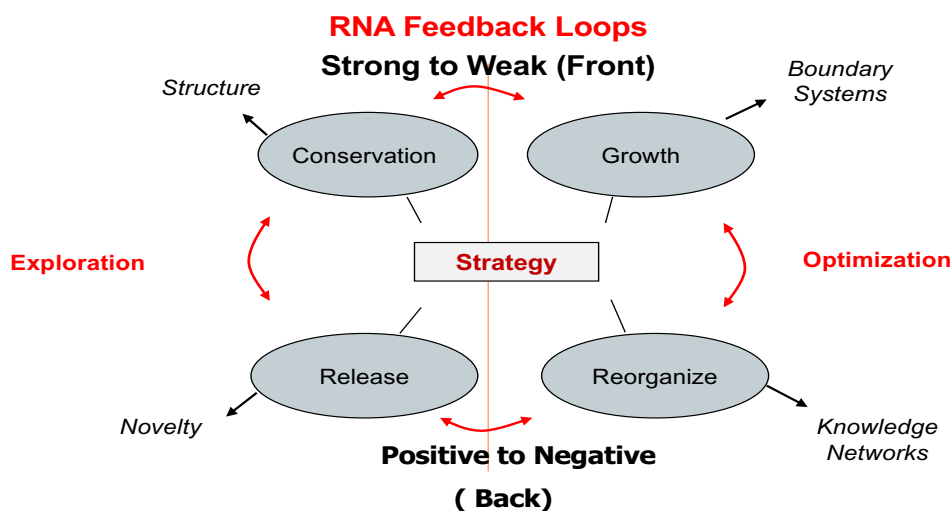


Figure 5.6. Mobilizing the feedback loops of RNA.

**Mapping RNA's potential.** Another potential direction for future research using the RNA scale stems from an ongoing collaboration I have a colleague, Dr. Lloyd Duman, who attempts to map the resilience of an organization through two specific domains. The first domain is concerned with adaptive governance. The second maps adaptive capacities in real time. Making organizations strong and open to change is a challenging endeavor that explores organizational meaning by aligning strategy with culture, people with processes, and leaders with vision. Aligning these areas may require a shift away from the linear ways organizations think about creativity, replacing formal structures with radically dynamic, flexible strategies that spur creativity, and enhance innovation.

None of this happens without strategic thinkers at every level of the organization; Kotter (2001) posits, "people who articulate such visions aren't magicians but broad based strategic thinkers who are willing to take risks" (p. 87). Expansive strategic thinking entails a willingness to explore holistic processes that make the collective organization stronger. Dixon (2000) believes in generating breakdown scenarios to enable robust decisions by way of safe-fail

experimentation. With this taken into account, the introduction of a hypothetical breakdown scenario (disruption) would initially engage the organization in a strategic response. The critical understanding here is that in order to create change, systems have to shift from mechanical to complex, and from a values perspective move away from utilitarian constructs toward existential ones.

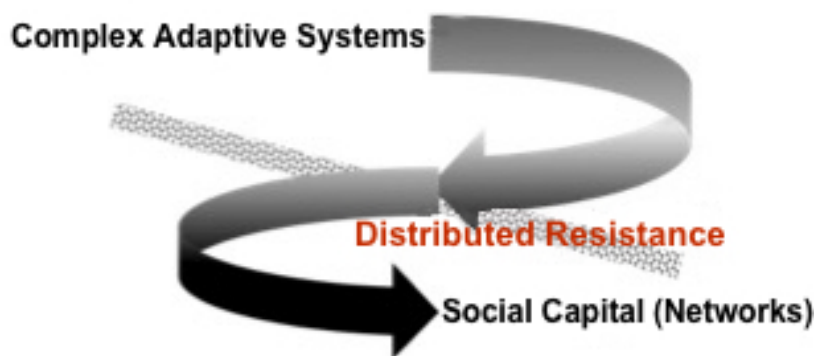
*Cognitive organizational mapping* can be defined as the result of sensemaking processes (Ladkin, 2010; Weick, 1995; Weick & Sutcliffe, 2015) that lead to interpretation by individuals and groups. Network clustering signifies a community of significant energy (knowledge) that has the potential to be maximized (Burt, 1997a; Nahapiet & Ghoshal, 1998). If the previous hypothesis is true, then organizations could track the level of resilience that exists within the system, based on how knowledge sharing, and creativity, to determine whether they are gravitating toward or moving away from minor or major disruptions. Subsequently, examining the interplay between paradigms can offer detailed insights into the existing resilience that may be tacitly residing within the system. The focus on interplay brings to bear the interconnectedness of CAS as a sensemaking tool that acknowledges both the contrasts and connections between paradigms. Weick, Sutcliffe, and Obstfeld (2005) describe the impetus for sensemaking by positing: "Sensemaking is about the interplay of action and interpretation rather than the influence of evaluation on choice" (p. 409). As such, the responses are never static and predetermined, instead, responses are emergent, adaptive, and capable of shifting the identity of the organization.

An example of embracing complexity was characterized in the strategies enacted in the wake of the events associated with the 9/11 terrorist attacks. What followed was not a series of formulaic responses. Instead, there was dialogue, and not just among the armed services



community, as is normally expected when national security has been compromised. From this catastrophic event emerged an entirely different way of mobilizing social capital. Organizations with related functions extended their collaboration networks by sharing information and resources rather than acting independently. Instead of reacting competitively, in some cases, organizational resilience today can be enhanced by knowledge sharing; the dialogue would now include a newly-vetted CIA agent, a civilian with highly developed computer skills, and the military personnel tasked with exploiting the attributes of a new ecosystem of collaborators. This shifts the paradigm from a mechanical understanding of systems to an organic one in which defining future states is less important than mapping the existing identity of an organization iteratively when circumstances require shifting between fleeting periods of complexity and order.

Zolli and Healy (2013) argue that, “paradoxically resilience is often also enhanced by the right kind of clustering—bringing resources into close proximity to one another” (p. 6). Figure 5.7 illustrates the clustering effect of the RNA indicators that could be mapped. The center clusters represent clusters of latent adaptive capacity.



*Figure 5.7.* Interplay of adaptive capacity across resilience thresholds.

Reaching or exceeding thresholds within organizations should not be the sole impetus for rethinking their adaptive capacity. Mapping the indicators of RNA appearing in the space

between complex systems and the adaptive capacity networks possess to reconfigure in novel ways has the potential to shift the way leaders perceive their organizational resilience. In an era marked by erratic, unpredictable disruptions, imbuing a system with this type of adaptive capacity-building assessment tool is imperative.

**RNA as a potential sensemaking tool for problem solving.** The fundamental premise of RNA as a sensemaking tool helps organizations consider how adept they are at identifying the type of problems they are facing, and their responses to disruptions. Sensemaking through RNA involves recognizing changes in organizations that occur through continuous learning and knowledge exchange. Heifetz (1994) points out that adaptive work requires a change in values, beliefs, or behaviors. Because a social system often allows a mix of values, there will be competition. He goes on to discuss the fact that living systems seek equilibrium. He gives the example of a forest that has been burned down followed by the seeds blown into the ash that take root as a response to disequilibrium. This is an example of a biological adaptation. It is also an example of ambidexterity and the idea that an optimized system has the capacity to reinvent itself by exploring the underlying novelty that exists within organizations. RNA as a sensemaking tool has implications for organizations as way of deciphering the types of solutions they set in motion for the problems they will inevitably face.

Heifetz (1994) made distinctions between three types of organizational problems. A Type I problem is somewhat mechanical in that one can actually find someone to get it fixed. The problem is easily defined, the solution is very clear, and the expert will be called. An example is a broken pipe in a home. The problem, requires the expertise of a plumber. Technical work of this type can be accomplished by mobilizing adaptive responses that leverage the existing knowledge of an organization (optimization).

A Type II problem is readily definable but has no clear nor obvious solution. An example is pollution showing up in the river from which a city's water originates. It is clear that there is pollution, but its source is not clear. This scenario requires more than the codification of the existing knowledge of an organization. Rather, the corresponding responses require action along two dimensions: first, through the replicable behaviors and knowledge that already exists in the coffers of the organization; and, second, through creativity to solve the problem.

A Type III problem is even more complex and difficult. The problem definition is not clear cut and technical fixes are not available. Organizational ambidexterity research has shown that organizations that achieve ambidexterity generate outcomes that would otherwise not be attainable if they did not emphasize both optimization and exploration intentionally (Gibson & Birkinshaw, 2004; He & Wong, 2004). Heifetz (1994) points out that these situations require leadership that will enhance adaptive learning among stakeholders to determine possible solutions. It is at this intersection where the simple guidelines for RNA outlined in this research are of particular relevance to organizations and practitioners. Leading change by viewing these problems through an RNA lens shifts the focus from merely problem identification and diagnosis, to intentional problem solving. Table 5.1 illustrates the integration of RNA as a sensemaking tool for leading change in terms of Heifetz's typology.

Table 5.1

*Integration of RNA as a Sensemaking Tool for Codifying Adaptive Capacity*

Problem Type	Problem Definition	Solution and Implementation	Adaptive Capacity	Kind of Work
Type I	Clear	Clear	Optimizing	Technical
Type II	Clear	Requires Organizational Ambidexterity	Optimizing and Exploring	Technical Adaptive
Type III	Requires learning	Requires Organizational Ambidexterity	Optimizing and Exploring	Adaptive

Kogut and Zander (1992) referred to “combinative capability [an organization’s ability] to synthesize and apply current and acquired knowledge” (p. 384). Table 5.1 underscores the need to consider today’s organizational problems as opportunities to enact change and combine adaptive capacities for problem solving.

### **Contributions to the Field of Organizational Ambidexterity**

The connections between resilience and ambidexterity in organizations require ongoing inquiry into the ways that fusing seemingly opposing paradigms impacts organizational outcomes. Poole and Van de Ven (1989) argue that “seemingly opposed viewpoints can inform one another” (p. 23). Organizational ambidexterity research can be considered a series of choices researchers make about paradox (Andriopoulos & Lewis, 2010). This research was framed around an enduring theme in the organizational science literature that long-term success depends on exploiting current knowledge and concurrently exploring new capacities (Levinthal & March, 1991; Tushman & O’Reilly, 1996). This has led to more recent research on the subject of organizational ambidexterity (Duncan, 1976; Tushman & O’Reilly, 1996). “Models should force us to be more explicit and open about what we are assuming, how we frame problems, what we

are attending to and ignoring and how we think things are related to one another” (Britt, 2014, p. 4).

The dynamics occurring within systems during disruption are said to be critically dependent on the complex adaptive system’s ability to self-organize and the interactions of self-organization that occur across scales in the system (Gunderson & Holling, 2002). The intractable problems organizations face typically spawn from unforeseen disruptive events. As Zolli and Healy (2013) argue, “small perturbations amplify, synchrony paradoxically corrects briefly, before chaos ensues” (p. 47). These events should not be viewed as isolated incidences nor should they be judged independent of the paradigms they cross. The meaning organizational networks extract largely enhances the importance of clarifying their goals and what knowledge is shared through relational experiences. Organizations require a scale that can assess their networks level of resilience to mobilize the features of optimization and exploration. This underscores the need to understand interactions among organizational actors as varied and unrestricted from conventional assumptions that may serve as a limiting actor in exploring the creativity they are capable of producing.

### **Final Reflection**

Decision-making and problem-solving processes have evolved in our democracy in response to the complexities of our social challenges. As technology, medical advances, educational opportunities, and globalization have increased, so have the complexities of our disruptions. Isenhardt and Spangle (2000) describe a transformational theory as one that focuses primarily on how people deal with change. People and groups are rarely static. Organizations can begin to understand and explain their current status in the organizational landscape by simply looking at the changes that occur over time. For example, an organization may be an industry

leader and be recognized for their shrewd strategic decision-making processes. However, their specific strategies may only work for a single business unit entity. Add a second department and disruptions occurs with more frequency and greater intensity. Merging or extending organizational boundaries is in and of itself a disruption. As people attempt to reduce the uncertainty associated with the change they experience, they look to their networks for support. In this sense, the organization has inflicted its own disruption, and its ability to adapt and respond effectively will undoubtedly be scrutinized by its employees. Conditions that alter the organizational landscape even briefly have implications that transform the fragile relationship that exists between people and systems. Initially, the transformation may be in small unimportant ways, however, over time many small fluctuations amount to significant disruptions.

Thinking in the greater context of organizations as social systems, I have come to realize that in order to understand systems of any kind, closer scrutiny must be given to social boundaries, and the attributes and limitations they simultaneously possess. Organizations can be perceived as primarily transactional entities, commonly concerned with generating profits. Conversely, social capital is often associated with organizational attributes that provide opportunities for social value creation through services and social empowerment. These relationships create the foreground for the possibility of wider processes of interaction and cooperation by promoting dialogue and establishing inclusive approaches. When the tensions between imagination and hope are maintained, there is a chance for improved organizations. This research attempts to reframe the multidimensional dynamics of RNA through the notion of crossing paradigms. These discoveries have led me to question the manner in which organizations flourish or fail during disruptions. And while many of the winding contradictions within organizations remain elusive to me, attempting to re-conceptualize ambidexterity in terms

of its impact on human beings and the organization where they work has led me situate RNA as an inclusive, egalitarian, and creative, endeavor.

The pace of unexpected disruptions organizations face can relegate them to major sector decline or decimation. A recent example points to how Barnes and Noble failed to translate their awareness of a changing future and ostensibly ignored the looming threats Amazon presented into an effective organizational response (see Pascale, Millemann, & Gioja, 2000, p. 27). The declining fortunes of many Fortune 500 companies serves as another prescient reminder of the need to build resilient network ambidexterity. In the period from 1975 to 1985, the rate of decline for Fortune 500 companies was only 10 percent. From 1991 to 1996, the attrition rate was 36 percent (Pascale, Millemann, & Gioja, 2000). The question is: Why are organizations fundamentally failing to reinvent themselves and mount proactive responses? Speculating the need for mobilizing the correct level of responses to build resilient network ambidexterity allows us to consider what role resilient networks play in the often-volatile organizational landscape.

The globalized frontier where millions of people are largely interconnected represents a new wave of unprecedented organizational challenges. Foresight and planning alone is simply not enough given the volatility and speed of our hyper-connected, globalized economy. The highly interactive, ubiquitous organizational landscape requires organizations that are willing to challenge mainstream assumptions for success, are inquisitive enough to want to discover underlying capacities, and are bold enough to create new platforms for divergent thinking and ambidexterity.

## **Appendices**



## **Appendix A: Final Survey Instrument**

### **Section 1. Creativity**

*Thinking about (the disruption's name chosen above) in your organization, to what degree would you evaluate the following statements about the creativity that was exchanged during the disruption. 1 = Strongly Disagree, 6 = Strongly Agree*

- C1. My organization encouraged us to stay innovative during the disruption.*
- C2. My organization encouraged us to fine-tune what we were already very good at during the disruption.*
- C3. People in my organization were encouraged to experiment with new ideas during the disruption.*
- C4. My organization asked us to seek out new ways to stay relevant in the market we operate in.*
- C5. My organization established restrictive rules for dealing with the disruption. (Reverse score).*
- C6. People in my organization frequently made minor adjustments to innovation processes during the disruption.*
- C7. My organization challenged us to think beyond our existing capabilities.*
- C8. My organization takes the time needed to come up with many ideas.*
- C9. My organization explores each challenge from many angles.*

### **Section 2. Knowledge Sharing**

*Thinking about (the disruption's name chosen above) in your organization, to what degree would you evaluate the following statements about the information and knowledge that was exchanged during the disruption. 1 = Strongly Disagree, 6 = Strongly Agree*

- KS1. My organization enabled us to create knowledge networks to boost information sharing during the disruption.*
- KS2. My organization cultivated a learning environment.*
- KS3. People in my organization shared information regardless of the department it pertained to.*
- KS4. People in my organization relied on one others shared knowledge to solve the problem.*
- KS5. My organization inspired us to think strategically during the disruption.*
- KS6. People in my organization shared ideas across business units.*
- KS7. The employees in my organization learned from one another.*
- KS8. My organization sought out the expertise of others when working on a problem that could not be easily resolved.*
- KS9. My organization encouraged some form of job rotation among employees in different departments.*
- KS10. My organization replicates best practices across organizational boundaries.*

### **Section 3. Network Cohesion**

*Thinking about (the disruption's name chosen above) in your organization, reflect on the degree to which your organization promoted network cohesion. 1 = Strongly Disagree, 6 = Strongly Agree*

- NC1. People in my organization were encouraged to build networks across organizational boundaries during the disruption to support the mission.*

*NC2. My organization encouraged building extensive in-house networks that could be used to solicit help.*

*NC3. My organization made it comfortable to talk to anyone in my organization, regardless of his/her title.*

*NC4. People in my organization shared organizational values.*

*NC5. There was a lot of competition between departments in my organization during the disruption. (Reverse)*

*NC6. People in my organization spent time together socially while working through the disruption.*

*NC7. My organization's social network was supportive during the disruption.*

### Appendix B: Respondent Demographics

Characteristic	Number	%
Gender:		
Male	210	61.05%
Female	133	38.66%
Prefer Not to Say	1	0.29%
Age:		
18-24	23	6.69%
25-34	201	58.43%
35-44	78	22.67%
45-54	28	8.14%
55-64	9	2.62%
65-74	5	1.45%
75+	0	0.00%
Ethnicity:		
American Indian/Alaskan Native	14	4.07%
Asian/Pacific Islander	133	38.66%
Black or African American	24	6.98%
Hispanic	14	4.07%
White/Caucasian	151	43.90%
Other	8	2.33%
No Answer	0	0.00%
Education:		
Some High School	21	6.10%
Some College	38	11.05%
Associate's Degree	33	9.59%
Bachelor's Degree	171	49.71%
Master's Degree	77	22.38%
PhD, Ed, MD	3	0.87%
Other	1	0.29%
Role in Organization:		
Employee/Professional	165	47.97%
Middle Manager/Supervisor	93	27.03%
Manager	65	18.90%
Director	8	2.33%
Associate/Assistant VP	2	0.58%
Senior VP	2	0.58%
President	3	0.87%
Executive Officer	0	0.00%

Other	6	1.74%
Yearly Income:		
\$20,000-\$35,000	128	37.21%
\$35,001-\$50,000	83	24.13%
\$50,001-\$75,000	66	19.19%
\$75,001-\$100,000	45	13.08%
\$100,001-\$150,000	16	4.65%
More Than \$150,000	6	1.74%
Employed at an Organization with:		
2-4 Employees	17	4.94%
5-24 Employees	53	15.41%
25-99 Employees	75	21.80%
100-500 Employees	89	25.87%
501-1000 Employees	54	15.70%
More Than 5000 Employees	53	15.41%
I do not work for an organization	3	0.87%
		<hr/> <i>N</i> = 344 <hr/>

### **Appendix C: Confirmation of IRB Approval**

Dear Edgar Perez,

As Chair of the Institutional Review Board (IRB) for 'Antioch University Ph.D., I am letting you know that the committee has reviewed your Ethics Application. Based on the information presented in your Ethics Application, your study has been approved.

Your data collection is approved from 09/02/2017 to 09/01/2018. If your data collection should extend beyond this time period, you are required to submit a Request for Extension Application to the IRB. Any changes in the protocol(s) for this study must be formally requested by submitting a request for amendment from the IRB committee. Any adverse event, should one occur during this study, must be reported immediately to the IRB committee. Please review the IRB forms available for these exceptional circumstances.

Sincerely,

Lisa Kreeger

### Appendix D: Descriptive Statistics of Survey Items

Question Number	Section Number	N	Min	Max	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
								Skewness	SE	Kurtosis	SE
Q1	C1	346	1	6	4.76	1.036	1.074	-1.194	0.131	1.606	0.261
Q2	C2	344	1	6	4.73	1.127	1.271	-0.976	0.131	1.061	0.262
Q3	C3	345	1	6	4.53	1.246	1.552	-0.802	0.131	0.02	0.262
Q4	C4	342	1	6	4.51	1.246	1.553	-0.898	0.132	0.449	0.263
Q5	C5	346	1	6	3.71	1.484	2.201	-0.131	0.131	-1.107	0.261
Q6	C6	346	1	6	4.39	1.058	1.12	-0.639	0.131	0.341	0.261
Q7	C7	346	1	6	4.43	1.302	1.696	-0.86	0.131	0.104	0.261
Q8	C8	343	1	6	4.47	1.196	1.431	-0.896	0.132	0.537	0.263
Q9	C9	345	1	6	4.66	1.156	1.336	-1.088	0.131	1.147	0.262
Q10	KS1	346	1	6	4.34	1.211	1.467	-0.97	0.131	0.56	0.261
Q11	KS2	345	1	6	4.58	1.278	1.633	-0.921	0.131	0.454	0.262
Q12	KS3	346	1	6	4.57	1.217	1.48	-0.883	0.131	0.468	0.261
Q13	KS4	345	1	6	4.69	1.065	1.133	-0.955	0.131	1.217	0.262
Q14	KS5	345	1	6	4.58	1.174	1.378	-0.914	0.131	0.693	0.262
Q15	KS6	344	1	6	4.58	1.203	1.446	-1.009	0.131	0.775	0.262
Q16	KS7	345	1	6	4.79	1.021	1.042	-1.03	0.131	1.74	0.262
Q17	KS8	346	1	6	4.5	1.219	1.485	-0.819	0.131	0.279	0.261
Q18	KS9	346	1	6	3.91	1.522	2.317	-0.463	0.131	-0.807	0.261
Q19	KS10	343	1	6	4.34	1.208	1.46	-0.796	0.132	0.436	0.263
Q20	NC1	346	1	6	4.4	1.22	1.488	-0.784	0.131	0.259	0.261
Q21	NC2	344	1	6	4.28	1.271	1.615	-0.711	0.131	0.003	0.262
Q22	NC3	346	1	6	4.56	1.316	1.731	-0.893	0.131	0.157	0.261
Q23	NC4	343	1	6	4.72	1.089	1.186	-0.991	0.132	1.078	0.263
Q24	NC5	343	1	6	3.44	1.564	2.446	-0.012	0.132	-1.149	0.263
Q25	NC6	345	1	6	4.34	1.204	1.451	-0.811	0.131	0.425	0.262
Q26	NC7	346	1	6	4.5	1.16	1.346	-0.931	0.131	0.899	0.261

### Appendix E: Bivariate Correlation Matrices

Section 1: Creativity									
	C1	C2	C3	C4	C5	C6	C7	C8	C9
C1	1								
C2	.541**	1							
C3	.629**	.509**	1						
C4	.543**	.477**	.638**	1					
C5	<b>-0.002</b>	<b>.147**</b>	<b>0.051</b>	<b>.106*</b>	1				
C6	.420**	.336**	.426**	.439**	.113*	1			
C7	.515**	.417**	.524**	.570**	.091	.441**	1		
C8	.560**	.526**	.502**	.528**	.131*	.431**	.482**	1	

\*\* Correlation is significant at the 0.01 level (2-tailed).  
\* Correlation is significant at the 0.05 level (2-tailed).

Section 2: Knowledge Sharing										
	KS1	KS2	KS3	KS4	KS5	KS6	KS7	KS8	KS9	KS10
KS1	1									
KS2	.612**	1								
KS3	.492**	.501**	1							
KS4	.438**	.529**	.570**	1						
KS5	.579**	.607**	.475**	.535**	1					
KS6	.535**	.594**	.637**	.592**	.559**	1				
KS7	.445**	.517**	.527**	.605**	.585**	.592**	1			
KS8	.414**	.470**	.394**	.549**	.485**	.485**	.458**	1		
KS9	<b>.387**</b>	<b>.321**</b>	<b>.291**</b>	<b>.309**</b>	<b>.378**</b>	<b>.286**</b>	<b>.248**</b>	<b>.344**</b>	1	
KS10	.548**	.645**	.471**	.498**	.564**	.593**	.508**	.544**	<b>.467**</b>	1

\*\* Correlation is significant at the 0.01 level (2-tailed).  
\* Correlation is significant at the 0.05 level (2-tailed).

Section 3: Network Cohesion							
	NC1	NC2	NC3	NC4	NC5	NC6	NC7
NC1	1						
NC2	.670**	1					
NC3	.480**	.442**	1				
NC4	.504**	.553**	.617**	1			
NC5	.255**	.209**	.116*	0.081	1		
NC6	.508**	.585**	.478**	.505**	<b>.251**</b>	1	
NC7	.523**	.471**	.589**	.599**	<b>.177**</b>	.590**	1

\*\* Correlation is significant at the 0.01 level (2-tailed).  
\* Correlation is significant at the 0.05 level (2-tailed).

**Appendix F: Factor Analysis Factor Loadings**

<b>Item</b>	<b>Component</b>	
	<b>1</b>	<b>2</b>
KS1	0.775	
KS2	0.590	
KS3	0.648	
KS6	0.625	
NC1	0.895	
NC2	0.859	
NC6	0.782	
NC7	0.636	
C1		0.689
C2		0.792
C3		0.785
C4		0.803
C7		0.742



**Appendix G: Factor 1 Correlation Coefficients**

	<b>KS1</b>	<b>KS2</b>	<b>KS3</b>	<b>KS6</b>	<b>NC1</b>	<b>NC2</b>	<b>NC6</b>	<b>NC7</b>
<b>KS1</b>	1	0.613	0.478	0.527	0.667	0.578	0.508	0.486
<b>KS2</b>	0.613	1	0.504	0.594	0.536	0.539	0.506	0.564
<b>KS3</b>	0.478	0.504	1	0.635	0.445	0.484	0.435	0.469
<b>KS6</b>	0.527	0.594	0.635	1	0.497	0.480	0.393	0.563
<b>NC1</b>	0.667	0.536	0.445	0.497	1	0.665	0.503	0.520
<b>NC2</b>	0.578	0.539	0.484	0.480	0.665	1	0.578	0.460
<b>NC6</b>	0.508	0.506	0.435	0.393	0.503	0.578	1	0.582
<b>NC7</b>	0.486	0.564	0.469	0.563	0.520	0.460	0.582	1

**Appendix H: Factor 2 Correlation Coefficients**

	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>C7</b>
<b>C1</b>	1	0.540	0.631	0.545	0.521
<b>C2</b>	0.540	1	0.512	0.477	0.421
<b>C3</b>	0.631	0.512	1	0.641	0.531
<b>C4</b>	0.545	0.477	0.641	1	0.569
<b>C7</b>	0.521	0.421	0.531	0.569	1

## Appendix I: Letter Seeking Informed Consent

Greetings All,

As many of you know, I'm in the midst of completing my PhD, and will soon begin the qualitative data collection phase of my dissertation. When I started this study, I was really looking at this question of why are some organizations more ambidextrous than others? Ambidextrous organizations optimize the processes and knowledge already known, and simultaneously pursue new knowledge.

In my research, I identified the indicators that seem to have the greatest impact on organizational ambidexterity during disruptions. These all fell into a category that I refer to as adaptive capacities. Of the variables in the literature, I discovered that three of them seem to have the greatest impact on optimization and exploration, specifically, collaboration, knowledge sharing, and creativity. When these adaptive capacities come together, an organization has the potential to achieve ambidexterity during a disruption.

The revised survey will give you an opportunity to reflect on how your organization optimizes existing knowledge while exploring innovation and novelty during periods of disruption. The survey will take approximately 10 minutes or less to read and evaluate. At this stage I am asking participants to help me refine the scale by answering as many of the following questions as possible.

- Do you consider the scale to be a useful tool for strategy development?
- Are optimization and exploration terms you would use to describe Ambidexterity?
- How does your organization explore and optimize?
- Do you think of optimization and exploration as two distinct functions? Or the same thing on opposite sides of a continuum?
- How could this scale be improved?

*Risks:* There are minimal, if any, risks to participation. Your identity and your organization's will be confidential. You will not be asked for your name and no known sensitive demographic information will be collected. The results of the scale will be combined with results from other team members and used in refining the scale. Your Individual responses will not be shared in a way that identifies any team member.

*Benefits:* The possible benefits of the research include contributing to the development of the Resilient Network Ambidexterity Scale, which will be a valuable tool for teams to assess the elements needed to achieve optimizing and creative synergy. Your team will also be provided an assessment about their level of ambidexterity. Your organization may choose to use the results to further develop the creative synergy within the team.

This survey is part of my dissertation research at Antioch University in the Leadership & Change Program. Study results will form the basis for my research and following data analysis; will be assessed for various forms of validity. At the end of the survey you may choose to opt-in to receive an email once the results are ready. The study results may also be included in future

presentations and publications.

Your participation is voluntary, and you may elect to discontinue your participation at any time. The University Committee on Research Involving Human Participants at Antioch University has approved this project. If you have any questions regarding your rights as a research participant, please contact: Dr. Lisa Kreeger Chair, Institutional Review Board Ph.D. in Leadership and Change, Antioch University @ [REDACTED] **You do NOT need to return the Informed Consent, just your comments based on the provided prompts.**

If you have any questions about the study or the scale, please contact me at:

Eddie Perez Ph.D. Student, Principal Investigator Antioch University  
[REDACTED]

Thank you for helping me achieve this goal!

## References

- Abell, N., Springer, D. W., & Kamata, A. (2009). *Developing and validating rapid assessment instruments*. Oxford, UK: Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780195333367.001.0001>
- Abernathy, W. J. (1978). *The productivity dilemma: Roadblock to innovation in the automobile industry*. Baltimore, MD: Johns Hopkins.
- Ackerman-Anderson, L., & Anderson, D. (n.d.). Awake at the wheel: Moving beyond change management to conscious change leadership. *Change Leader's Network*. Retrieved from <http://changeleadersnetwork.com/free-resources/awake-at-the-wheel-moving-beyond-change-management-to-conscious-change-leadership>
- Acquaah, M. (2007). Managerial social capital, strategic orientation, and organizational performance in an emerging economy. *Strategic Management Journal*, 28(12), 1235–1255. <https://doi.org/10.1002/smj.632>
- Adam, F., & Rončević, B. (2003). Social capital: Recent debates and research trends. *Social Science Information*, 42(2), 155–183. <https://doi.org/10.1177/0539018403042002001>
- Adger, W. N. (2000). Social and ecological resilience: Are they related. *Progress in Human Geography*, 24(3), 347–364. <https://doi.org/10.1191/030913200701540465>
- Adger, W. N. (2006). Vulnerability. *Global Environmental Change*, 16(3), 268–281. <https://doi.org/10.1016/j.gloenvcha.2006.02.006>
- Adger, W. N., Brooks, N., Bentham, G., Agnew, M., & Eriksen, S. (2005). *New indicators of vulnerability and adaptive capacity* (Technical Report 7). Tyndall Centre for Climate Change Research, Norwich, UK.
- Adler, P. S., & Kwon, S. W. (2002). Social capital: Prospects for a new concept. *Academy of Management Review*, 27(1), 17–40. <https://doi.org/10.5465/AMR.2002.5922314>  
<https://doi.org/10.2307/4134367>
- Adler, P. S., Goldoftas, B., & Levine, D. I. (1999). Flexibility versus efficiency? A case study of model changeovers in the Toyota production system. *Organization Science*, 10(1), 43–68. <https://doi.org/10.1287/orsc.10.1.43>
- Aldrich, D. (2012). *Building resilience: Social capital in post disaster recovery*. Chicago, IL: University of Chicago Press. <https://dx.doi.org/10.7208/chicago/9780226012896.001.0001>
- Alexander, D. E. (2013). Resilience and disaster risk reduction: An etymological journey. *Natural Hazards & Earth System Sciences*, 13(11), 2707–2716. <https://doi.org/10.5194/nhess-13-2707-2013>

- Anderson, A. R., & Miller, C. J. (2003). "Class matters": Human and social capital in the entrepreneurial process. *The Journal of Socio-economics*, 32(1), 17–36. [https://doi.org/10.1016/S1053-5357\(03\)00009-X](https://doi.org/10.1016/S1053-5357(03)00009-X)
- Anderson, P. (1999). Perspective: Complexity theory and organization science. *Organization Science*, 10(3), 216–232. <https://doi.org/10.1287/orsc.10.3.216>
- Andrews, R. (2010). Organizational social capital, structure and performance. *Human Relations*, 63(5), 583–608. <https://doi.org/10.1177/0018726709342931>
- Andriopoulos, C., & Lewis, M. W. (2009). Exploitation-exploration tensions and organizational ambidexterity: Managing paradoxes of innovation. *Organization Science*, 20(4), 696–717. <https://doi.org/10.1287/orsc.1080.0406>
- Argote, L. (1999). *Organizational learning: Creating, retaining, and transferring knowledge*. New York, NY: Springer.
- Armitage, D., Berkes, F., & Doubleday, N. (2010). Introduction: Moving beyond co-management. In D. Armitage, F. Berkes, & N. Doubleday (Eds.), *Adaptive co-management: Collaboration, learning, and multi-level governance* (pp. 1–15). Vancouver, Canada: UBC Press.
- Atuahene-Gima, K., & Murray, J. Y. (2007). Exploratory and exploitative learning in new product development: A social capital perspective on new technology ventures in China. *Journal of International Marketing*, 15(2), 1–29. <https://doi.org/10.1509/jimk.15.2.1>
- Bagozzi, R. P., Yi, Y., & Phillips, L. W. (1991). Assessing construct validity in organizational research. *Administrative Science Quarterly*, 421–458, 36(3), <https://doi.org/10.2307/2393203>
- Baker, W. (1990). Market networks and corporate behavior. *American Journal of Sociology*, 96(3), 589–625. <https://doi.org/10.1086/229573>
- Baron, J. N., & Hannan, M. T. (1994). The impact of economics on contemporary sociology. *Journal of Economic Literature*, 32(3), 1111–1146.
- Belliveau, M. A., O'Reilly, C. A., & Wade, J. B. (1996). Social capital at the top: Effects of social similarity and status on CEO compensation. *Academy of Management Journal*, 39(6), 1568–1593. <https://doi.org/10.2307/257069>
- Berkes, F. (2009). Evolution of co-management: role of knowledge generation, bridging organizations and social learning. *Journal of Environmental Management*, 90(5), 1692–1702. <https://doi.org/10.1016/j.jenvman.2008.12.001>
- Berkes, F., Colding, J., & Folke, C. (2000). Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications*, 10(5), 1251–1262. [https://doi.org/10.1890/1051-0761\(2000\)010\[1251:ROTEKA\]2.0.CO;2](https://doi.org/10.1890/1051-0761(2000)010[1251:ROTEKA]2.0.CO;2)

- Berkes, F., Colding, J., & Folke, C. (2003). Introduction. In Berkes, F., Colding, J., & Folke, C. (Eds.), *Navigating social ecological systems: Building resilience for complexity and change* (pp. 1–30). New York, NY: Cambridge University Press.
- Berkes, F., & Ross, H. (2013). Community resilience: toward an integrated approach. *Society & Natural Resources*, 26(1), 5–20. <https://doi.org/10.1080/08941920.2012.736605>
- Bhamra, R., Dani, S., & Burnard, K. (2011). Resilience: The concept, a literature review and future directions. *International Journal of Production Research*, 49(18), 5375–5393. <https://doi.org/10.1080/00207543.2011.563826>
- Blaikie, P., Cannon, T., Davis, I., & Wisner, B. (1994). *At risk: Natural hazards, people's vulnerability, and disaster*. London, UK: Routledge
- Bogdan, R. C., & Biklen, S. K. (2007). *Research for education: An introduction to theories and methods*. New York, NY: Pearson.
- Borgatti, S. P., & Halgin, D. S. (2011). On network theory. *Organization Science*, 22(5), 1168–1181. <https://doi.org/10.1287/orc.1100.0641>
- Boulding, K. E. (1956). General systems theory—The skeleton of science. *Management science*, 2(3), 197–208. <https://doi.org/10.1287/mnsc.2.3.197>
- Bourdieu, P. (1989). Social space and symbolic power. *Sociological Theory*, 7(1), 14–25. <https://doi.org/10.2307/202060>
- Bourdieu, P. (1990). *The logic of practice* (R. Nice, Trans.). Stanford, CA: Stanford University Press.
- Bower, J. L., & Christensen, C.M. (1995). Disruptive technologies: Catching the wave. *Harvard Business Review*, 73(1), 43–53.
- Boyatzis, R. E. (2006). An overview of intentional change from a complexity perspective. *Journal of Management Development*, 25(7), 607–623. <https://doi.org/10.1108/02621710610678445>
- Brand, F. S., & Jax, K. (2007). Focus the meaning(s) of resilience: Resilience as a descriptive concept and a boundary object. *Ecology and Society*, 12(1). <http://dx.doi.org/10.5751/ES-02029-120123>
- Bridges, W. (2009). *Managing transitions: Making the most of change*. Cambridge, MA: Da Capo Press.
- Britt, D. W. (2014). *A conceptual introduction to modeling: Qualitative and quantitative perspectives*. New York, NY: Psychology Press.
- Brooks, N. (2003). *Vulnerability, risk and adaptation: A conceptual framework*. (Working Paper 38). Norwich, UK: Tyndall Centre for Climate Change Research.

- Brooks, N., Adger, W. N., & Kelly, P. M. (2005). The determinants of vulnerability and adaptive capacity at the national level and the implications for adaptation. *Global Environmental Change*, *15*(2), 151–163. <https://doi.org/10.1016/j.gloenvcha.2004.12.006>
- Brown, T. A. (2014). *Confirmatory factor analysis for applied research* (2nd ed.). New York, NY: Guilford Publications.
- Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's Mechanical Turk: A new source of inexpensive, yet high-quality, data?. *Perspectives on Psychological Science*, *6*(1), 3–5. <https://doi.org/10.1177/1745691610393980>
- Burt, R. S. (1992). *Structural holes: The social structure of competition*. Cambridge, MA: Harvard University Press.
- Burt, R. S. (1997a). A note on social capital and network content. *Social Networks*, *19*(4), 355–373. [https://doi.org/10.1016/S0378-8733\(97\)00003-8](https://doi.org/10.1016/S0378-8733(97)00003-8)
- Burt, R. S. (1997b). The contingent value of social capital. *Administrative Science Quarterly*, *42*(2), 339–365. <https://doi.org/10.2307/2393923>
- Burt, R. S. (2000). The network structure of social capital. *Research in Organizational Behavior*, *22*, 345–423. [https://doi.org/10.1016/S0191-3085\(00\)22009-1](https://doi.org/10.1016/S0191-3085(00)22009-1)
- Cameron, K. S., & Quinn, R. E. (1998). *Diagnosing and changing organizational culture: Based on the competing values framework*. New York, NY: John Wiley & Sons.
- Capra, F. (1996). *The web of life: A new synthesis of mind and matter*. New York, NY: HarperCollins.
- Cardona, O. D. (2006). A system of indicators for disaster risk management in the Americas. In J. Birkmann (Ed.), *Measuring vulnerability to natural hazards—Towards disaster resilient societies* (pp. 189–209). New Delhi, India: TERI.
- Carley, K. M., & Hill, V. (2001). Structural change and learning within organizations. In A. Lomi & E. R. Larsen (Eds.), *Dynamics of organizations: Computational modeling and organizational theories* (pp. 63–92). Cambridge, MA: MIT Press.
- Carmeli, A., Ben-Hador, B., Waldman, D. A., & Rupp, D. E. (2009). How leaders cultivate social capital and nurture employee vigor: implications for job performance. *Journal of Applied Psychology*, *94*(6), 1553–1561. <https://doi.org/10.1037/a0016429>
- Carpenter, S., Walker, B., Anderies, J. M., & Abel, N. (2001). From metaphor to measurement: Resilience of what to what? *Ecosystems*, *4*(8), 765–781. <https://doi.org/10.1007/s10021-001-0045-9>
- Caspin-Wagner, K., Ellis, S., & Tishler, A. (2012, August). *Balancing exploration and exploitation for firm's superior performance: The role of the environment*. Presentation to Academy of Management 72nd Annual Meeting, Boston, MA.



- Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research*, 1(2), 245–276. [https://doi.org/10.1207/s15327906mbr0102\\_10](https://doi.org/10.1207/s15327906mbr0102_10)
- Chakravarthy, B. S. (1982). Adaptation: a promising metaphor for strategic management. *The Academy of Management Review*, 7(1), 35–44. <https://doi.org/10.5465/AMR.1982.4285438>
- Chapin, F. S., III, Peterson, G., Berkes, F., Callaghan, T. V., Angelstam, P., Apps, M., . . . & Elmqvist, T. (2004). Resilience and vulnerability of northern regions to social and environmental change. *AMBIO: A Journal of the Human Environment*, 33(6), 344–349. <https://doi.org/10.1579/0044-7447-33.6.344>
- Chiles, T. H., Meyer, A. D., & Hench, T. J. (2004). Organizational emergence: The origin and transformation of Branson, Missouri's musical theaters. *Organization Science*, 15(5), 499–519. <https://doi.org/10.1287/orsc.1040.0095>
- Chrislip, D., & Larson, C. (1994). *Collaborative leadership: How citizens and civic leaders can make a difference*. San Francisco, CA: Jossey-Bass.
- Cilliers, P. (1998). *Complexity and postmodernism. Understanding complex systems*. London, UK: Routledge
- Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment*, 7(3), 309–319. <http://dx.doi.org/10.1037/1040-3590.7.3.309>
- Coleman, J.S (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94, S95–S120. <https://doi.org/10.1086/228943>
- Contractor, N. S., Wasserman, S., & Faust, K. (2006). Testing multi-theoretical, multilevel hypotheses about organizational networks: An analytic framework and empirical example. *Academy of Management Review*, 31(3), 681–703. <https://doi.org/10.5465>  
<https://doi.org/10.5465/AMR.2006.21318925>
- Crabtree, B. F., & Miller, W. L. (Eds.). (1999). *Doing qualitative research*. Thousand Oaks, CA: Sage.
- Creswell, J.W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks, CA: Sage.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297–334. <https://doi.org/10.1007/BF02310555>
- Cutter, S. L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, E., & Webb, J. (2008). A place-based model for understanding community resilience to natural disasters. *Global Environmental Change*, 18(4), 598–606. <https://doi.org/10.1016/j.gloenvcha.2008.07.013>

- Daly, J., Kellehear, A., & Gliksman, M. (1997). *The public health researcher: A methodological approach*. Melbourne, Australia: Oxford University Press.
- Dalziell, E. P., & McManus, S. T. (2004, December). Resilience, vulnerability, and adaptive capacity: Implications for system performance. Paper presented at International Forum for Engineering Decision Making (IFED), St. Gallen, Switzerland.
- Dervitsiotis, K. (2003). The pursuit of sustainable business excellence: Guiding transformation for effective organizational change. *Total Quality Management & Business Excellence*, 14(3), 251–267. <https://doi.org/10.1080/1478336032000046599>
- DeVellis, R. (2015). *Scale development: Theory and applications* (4th ed.). Thousand Oaks, CA: Sage.
- Dhanaraj, C., & Parkhe, A. (2006). Orchestrating innovation networks. *Academy of Management Review*, 31(3), 659–669. <https://doi.org/10.5465/AMR.2006.21318923>
- Dietz T., Ostrom, E., & Stern, P. C. (2003). The struggle to govern the commons. *Science*, 302 (5652), 1902–1912. <https://doi.org/10.1126/science.1091015>
- Dixon, N. M. (2000). *Common knowledge: How companies thrive by sharing what they know*. Boston, MA: Harvard Business School Press.
- Donovan, D. G., & Puri, R. K. (2004). Learning from traditional knowledge of non-timber forest products: Penan Benalui and the autecology of *Aquilaria* in Indonesian Borneo. *Ecology and Society*, 9(3). <http://dx.doi.org/10.5751/ES-00678-090303>
- Duncan, R. B. (1976). The ambidextrous organization: Designing dual structures for innovation. In R. H. Kilmann, L. R. Pondy, & D. P. Slevin (Eds.), *The management of organization: Strategy and implementation* (pp. 167–188). New York, NY: North-Holland.
- Eakin, H., & Luers, A. L. (2006). Assessing the vulnerability of social-environmental systems. *Annual Review of Environment and Resources*, 31, 365–394. <https://doi.org/10.1146/annurev.energy.30.050504.144352>
- Edmondson, A.C. & Mcmanus, S.E. (2007). Methodological fit in management field research. *Academy of Management Review*, 32 (4), 1155–1179. <https://doi.org/10.5465/AMR.2007.26586086>
- Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532–550. <https://doi.org/10.2307/258557>
- Eisenberg, E., & Monge, P. (1987). Emergent networks. In F. M. Jablin, L. L. Putnam, K. Roberts, & L. Porter (Eds.), *Handbook of organizational communication: An interdisciplinary perspective* (pp. 303–351). Los Angeles, CA: Sage.
- Engle, N. L. (2011). Adaptive capacity and its assessment. *Global Environmental Change*, 21(2), 647–656. <https://doi.org/10.1016/j.gloenvcha.2011.01.019>

- Erlandson, D. A., Harris, E. L., Skipper, B. L., & Allen, S. D. (1993). *Doing naturalistic inquiry: A guide to methods*. Newbury Park, CA: Sage.
- Ernst, C., & Chrobot-Mason, D. (2011). Flat world, hard boundaries: How to lead across them. *MIT Sloan Management Review*, 52(3), 81–88.
- Evans, P. (1996). Government action, social capital and development: reviewing the evidence on synergy. *World development*, 24(6), 1119–1132.  
[https://doi.org/10.1016/0305-750X\(96\)00021-6](https://doi.org/10.1016/0305-750X(96)00021-6)
- Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, 4(3), 272–299. <https://doi.org/10.1037/1082-989X.4.3.272>
- Fadell, T. (2015, March). *The first secret of design is . . . noticing* [Video file] Retrieved from [https://www.ted.com/talks/tony\\_fadell\\_the\\_first\\_secret\\_of\\_design\\_is\\_noticing](https://www.ted.com/talks/tony_fadell_the_first_secret_of_design_is_noticing)
- Fankhauser, S., Smith, J. B., & Tol, R. S. (1999). Weathering climate change: Some simple rules to guide adaptation decisions. *Ecological Economics*, 30(1), 67–78.  
[https://doi.org/10.1016/S0921-8009\(98\)00117-7](https://doi.org/10.1016/S0921-8009(98)00117-7)
- Fiksel, J. (2006). Sustainability and resilience: toward a systems approach. *Sustainability: Science, Practice and Policy*, 2(2), 14–21.  
<https://doi.org/10.1080/15487733.2006.11907980>
- Fine, B., & Green, F. (2000). Economics, social capital and the colonisation of the social sciences. In S. Baron (Ed.), *Social capital: Critical perspectives* (pp. 78–93). Oxford, UK: Oxford University Press.
- Floyd, F. J., & Widaman, K. F. (1995). Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessment*, 7(3), 286–299.  
<http://dx.doi.org/10.1037/1040-3590.7.3.286>
- Folke, C. (2006). Resilience: The emergence of a perspective for social-ecological systems analyses. *Global Environmental Change*, 16(3), 253–267.  
<https://doi.org/10.1016/j.gloenvcha.2006.04.002>
- Folke, C., Carpenter, S., Elmqvist, T., Gunderson, L., Holling, C. S., & Walker, B. (2002). Resilience and sustainable development: building adaptive capacity in a world of transformations. *AMBIO: A Journal of the Human Environment*, 31(5), 437–440.  
<https://doi.org/10.1579/0044-7447-31.5.437>
- Folke, C., Carpenter, S., Walker, B., Scheffer, M., Chapin, T., & Rockstrom, J. (2010). Resilience thinking: Integrating resilience, adaptability, and transformability. *Ecology and Society*, 15(4). Retrieved from <http://dx.doi.org/10.5751/ES-03610-150420>

- Folke, C., Hahn, T., Olsson, P., & Norberg, J. (2005). Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources*, 30, 441–473. <https://doi.org/10.1146/annurev.energy.30.050504.144511>
- Freudenberg, M. (2003). *Composite indicators of country performance: A critical assessment* (Working Paper No. 2003/16). Paris, France: OECD. <https://doi.org/10.1787/405566708255>
- Gabbay, S. M., & Zuckerman, E. W. (1998). Social capital and opportunity in corporate R&D: The contingent effect of contact density on mobility expectations. *Social Science Research*, 27(2), 189–217. <https://doi.org/10.1006/ssre.1998.0620>
- Gadgil, M., Olsson, P., Berkes, F., & Folke, C. (2003). Exploring the role of local ecological knowledge in ecosystem management: three case studies. In F. Berkes, J. Colding, & C. Folke (Eds.), *Navigating social-ecological systems: building resilience for complexity and change* (189–209). Cambridge, UK: Cambridge University Press.
- Gallopín, G. C. (2006). Linkages between vulnerability, resilience, and adaptive capacity. *Global Environmental Change*, 16(3), 293–303. <https://doi.org/10.1016/j.gloenvcha.2006.02.004>
- Garvin, D. A. (2000). *Learning in action: A guide to putting the learning organization to work*. Boston, MA: Harvard Business Review Press.
- Geerts, A., Blindenbach-Driessen, F., & Gemmel, P. (2010, August). *Achieving a balance between exploration and exploitation in service firms: A longitudinal study*. Paper presented at the 70th Academy of Management Annual Meeting, Montreal, Canada.
- Gibson, C. B., & Birkinshaw, J. (2004). The antecedents, consequences, and mediating role of organizational ambidexterity. *Academy Management Journal*, 47(2), 209–226. <https://doi.org/10.2307/20159573>
- Gignac, G. E. (2009). Partial confirmatory factor analysis: Described and illustrated on the NEO-PO-R. *Journal of Personality Assessment*, 91(1), 40–47. <https://doi.org/10.1080/00223890802484126>
- Gilbert, C. G. (2006). Change in the presence of residual fit: Can competing frames coexist? *Organizational Science*, 17(1), 150–167. <https://doi.org/10.1287/orsc.1050.0160>
- Gioia, D. A., & Pitre, E. (1990). Multiparadigm perspectives on theory building. *Academy of Management Review*, 15(4), 584–602. <https://doi.org/10.5465/AMR.1990.4310758>
- Gittel, R., & Vidal, A. (1998). *Community organizing: Building social capital as a development strategy*. New York, NY: Sage.
- Goodreau, S. M. (2007). Advances in exponential random graph ( $p^*$ ) models applied to a large social network. *Social Networks*, 29(2), 231–248. <https://doi.org/10.1016/j.socnet.2006.08.001>

- Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, 78(6), 1360–1380. <https://doi.org/10.1086/225469>
- Granovetter, M. (1983). The strength of weak ties: A network theory revisited. *Sociological Theory*, 1(1), 201–233. <https://doi.org/10.2307/202051>
- Granovetter, M. (1985). Economic action and social structure: the problem of embeddedness. *American Journal of Sociology*, 91(3), 481–510. <https://doi.org/10.1086/228311>
- Groysberg, B., & Lee, L. E. (2009). Hiring stars and their colleagues: Exploration and exploitation in professional service firms. *Organization Science*, 20(4), 740–758. <https://doi.org/10.1287/orsc.1090.0430>
- Gunderson, L. H. (2000). Ecological resilience—In theory and application. *Annual Review of Ecology & Systematics*, 31, 425–439. <https://doi.org/10.1146/annurev.ecolsys.31.1.425>
- Gunderson, L., & Holling, C. S. (Eds.). (2002). *Panarchy: Understanding transformations in human and natural systems*. Washington, DC: Island Press.
- Gupta, V. K., Huang, R., & Yayla, A. A. (2011). Social capital, collective transformational leadership, and performance: A resource-based view of self-managed teams. *Journal of Managerial Issues*, 23(1), 31–45.
- Gurman, M., & Zaleski, O. (2016, December 7). Fitbit buys software assets from Smartwatch startup Pebble. *Bloomberg Technology*. Retrieved from <https://www.bloomberg.com/news/articles/2016-12-07/pebble-said-to-discuss-selling-software-assets-to-fitbit>
- Hair, J. F., Jr., Black, W. C., Babin, B. J. & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Upper Saddle River, NJ: Prentice Hall.
- Hamel, G., & Välikangas, L. (2003). The quest for resilience. *Harvard Business Review*, 81(9), 52–63.
- Hansen, M. (1999). The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. *Administrative Science Quarterly*, 44(1), 82–111. <https://doi.org/10.2307/2667032>
- Hardesty, D. M., & Bearden, W. O. (2004). The use of expert judges in scale development: Implications for improving face validity of measures of unobservable constructs. *Journal of Business Research*, 57(2), 98–107. [https://doi.org/10.1016/S0148-2963\(01\)00295-8](https://doi.org/10.1016/S0148-2963(01)00295-8)
- Hawley, S. R., St.Romain, T. S., Rempel, S. L., Orr, S. A., & Molgaard, C. A. (2011). Generating social capital through public health leadership training: a six-year assessment. *Health Education Research*, 4(1), 671–679. <https://doi.org/10.1093/her/cyr037>.
- He, Z. L., & Wong, P. K. (2004). Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis. *Organizational Science*, 15(4), 481–494. <https://doi.org/10.1287/orsc.1040.0078>

- Heifetz, R. (1994). *Leadership without easy answers*. Cambridge, MA: Harvard University Press.
- Hickman, G. R. (2010). *Leading change in multiple contexts: Concepts and practices in organizational, community, political, social, and global change settings*. Thousand Oaks, CA: Sage.
- Hinkel, J. (2011). Indicators of vulnerability and adaptive capacity: Towards a clarification of the science–policy interface. *Global Environmental Change*, *21*(1), 198–208. <https://doi.org/10.1016/j.gloenvcha.2010.08.002>
- Hinkin, T. R. (1995). A review of scale development practices in the study of organizations. *Journal of Management*, *21*(5), 967–988. <https://doi.org/10.1177/014920639502100509>
- Hitt, M. A., & Duane, R. (2002). The essence of strategic leadership: Managing human and social capital. *Journal of Leadership & Organizational Studies*, *9*(1), 3–14. <https://doi.org/10.1177/107179190200900101>
- Holland, J. H. (1992). Complex adaptive systems. *Daedalus*, *121*(1), 17–30.
- Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics*, *4*, 1–23. <https://doi.org/10.1146/annurev.es.04.110173.000245>
- Hunt, J. G. J., Osborn, R. N., & Boal, K. B. (2009). The architecture of managerial leadership: Stimulation and channeling of organizational emergence. *The Leadership Quarterly*, *20*(4), 503–516. <https://doi.org/10.1016/j.leaqua.2009.04.010>
- Hutcheson, G. D., & Sofroniou, N. (1999). *The multivariate social scientist: Introductory statistics using generalized linear models*. Thousand Oaks, CA: Sage.
- Isenhardt, M. W., & Spangle, M. L. (2000). *Collaborative approaches to resolving conflict*. Thousand Oaks, CA: Sage.
- Jansen, J. J., van den Bosch, F. A., & Volberda, H. W. (2005). Managing potential and realized absorptive capacity: How do organizational antecedents matter? *Academy of Management Journal*, *48*(6), 999–1015. <https://doi.org/10.5465/AMJ.2005.19573106>
- Jansen, J. J., Vera, D., & Crossan, M. (2009). Strategic leadership for exploration and exploitation: The moderating role of environmental dynamism. *The Leadership Quarterly*, *20*(1), 5–18. <https://doi.org/10.1016/j.leaqua.2008.11.008>
- Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement*, *20*(1), 141–151. <https://doi.org/10.1177/001316446002000116>
- Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, *39*(1), 31–36. <https://doi.org/10.1007/BF02291575>

- Kaly, U., Pratt, C., & Mitchell, J. (2004, December). *The environmental vulnerability index (EVI) 2004* (South Pacific Applied Geoscience Commission Report No. 84). Retrieved from <http://islands.unep.ch/EVI%202004%20Technical%20Report.pdf>
- Kaspersen, L. B. (2000). *Anthony Giddens: an introduction to a social theorist*. Oxford, UK: Blackwell.
- Katila, R., & Ahuja, G. (2002). Something old, something new: A longitudinal study of search behavior and new product introduction. *Academy of Management Journal*, 45(6), 1183–1194. <https://doi.org/10.2307/3069433>
- Katila, R., & Chen, E. L. (2008). Effects of search timing on innovation: The value of not being in sync with rivals. *Administrative Science Quarterly*, 53(4), 593–625. <https://doi.org/10.2189/asqu.53.4.593>
- Kauffman, S. A. (1993). *The origins of order: Self-organization and selection in evolution*. New York, NY: Oxford University Press.
- Kauppila, O. P. (2010) Creating ambidexterity by integrating and balancing structurally separate interorganizational partnerships. *Strategic Organization*, 8(4), 283–312. <https://doi.org/10.1177/1476127010387409>
- Kilduff, M., & Brass, D. J. (2010). Organizational social network research: Core ideas and key debates. *The Academy of Management Annals*, 4(1), 317–357. <https://doi.org/10.1080/19416520.2010.494827>
- Kim, T. Y., Oh, H., & Swaminathan, A. (2006). Framing interorganizational network change: A network inertia perspective. *Academy of Management Review*, 31(3), 704–720. <https://doi.org/10.5465/AMR.2006.21318926>
- Kirkby-Geddes, E., King, N., & Bravington, A. (2013). Social capital and community group participation: Examining “bridging” and “bonding” in the context of a healthy living centre in the UK. *Journal of Community & Applied Social Psychology*, 23(4), 271–285. <https://doi.org/10.1002/casp.2118>
- Klein, R. J., Nicholls, R. J., & Thomalla, F. (2003). Resilience to natural hazards: How useful is this concept? *Global Environmental Change Part B: Environmental Hazards*, 5(1/2), 35–45. <https://doi.org/10.1016/j.hazards.2004.02.001>
- Kogut, B., & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science*, 3(3), 383–397. <https://doi.org/10.1287/orsc.3.3.383>
- Kogut, B., & Zander, U. (1996). What firms do? Coordination, identity, and learning. *Organization Science*, 7(5), 502–518. <https://doi.org/10.1287/orsc.7.5.502>
- Koka, B. R., & Prescott, J. E. (2002). Strategic alliances as social capital: A multidimensional view. *Strategic Management Journal*, 23(9), 795–816. <https://doi.org/10.1002/smj.252>

- Kotter, J. P. (2001, December). What leaders really do. *Harvard Business Review*, 79(11), 85–97
- Krackhardt, D. (1994). Constraints on the interactive organization as an ideal type. In C. Hecksher & A. Donellon (Eds.), *The post-bureaucratic organization: New perspectives on organizational change* (pp. 211–222). Thousand Oaks, CA: Sage.
- Krackhardt, D., & Brass, D. J. (1994). Intraorganizational networks: The micro side. In S. Wasserman (Ed.), *Intraorganizational networks* (pp. 207–229). Thousand Oaks, CA: Sage.
- Krackhardt, D., & Hanson, J. R. (1993). Informal networks: The company behind the chart. *Harvard Business Review*, 71(4): 104–111.
- Krackhardt, D., & Porter, L. W. (1985). When friends leave: A structural analysis of the relationship between turnover and stayers' attitudes. *Administrative Science Quarterly*, 30(2), 242–261. <https://doi.org/10.2307/2393107>
- Kuhn, T. S. (1977). *The essential tension: Selected studies in scientific tradition and change*. Chicago, IL: University of Chicago Press.
- Kyriakopoulos, K., & Moorman, C. (2004). Tradeoffs in marketing exploitation and exploration strategies: The overlooked role of market orientation. *International Journal of Marketing*, 21(3), 219–240. <https://doi.org/10.1016/j.ijresmar.2004.01.001>
- Labianca, G., & Brass, D. J. (2006). Exploring the social ledger: Negative relationships and negative asymmetry in social networks in organizations. *Academy of Management Review*, 31(3), 596–614. <https://doi.org/10.5465/AMR.2006.21318920>
- Ladkin, D. (2010). *Rethinking leadership: A new look at old leadership questions*. Cheltenham, UK: Edward Elgar.
- Laumann, E. O., Marsden, P. V., & Prensky, D. (1983). The boundary specification problem in network analysis. In R. S. Burt & M. J. Minor (Eds.), *Applied network analysis: A methodological introduction* (pp. 18–34). Beverly Hills, CA: Sage.
- Laursen, K., & Salter, A. (2006). Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms. *Strategic Management Journal*, 27(2), 131–150. <https://doi.org/10.1002/smj.507>
- Lawrence, P. R., & Lorsch, J. W. (1967). Differentiation and integration in complex organizations. *Administrative Science Quarterly*, 12(1), 1–47. <https://doi.org/10.2307/2391211>
- Lazerson, M. 1995. A new phoenix: Modern putting-out in the Modena knitwear industry. *Administrative Science Quarterly*, 40(1) 34–59. <https://doi.org/10.2307/2393699>



- Levi, M. (1996). Social and unsocial capital: A review essay of Robert Putnam's *Making Democracy Work*. *Politics & Society*, 24(1), 45–55.  
<https://doi.org/10.1177/0032329296024001005>
- Levin, S. A., Barrett, S., Aniyar, S., Baumol, W., Bliss, C., Bolin, B., ... & Holling, C. S. (1998). Resilience in natural and socioeconomic systems. *Environment and Development Economics*, 3(2), 221–262. <https://doi.org/10.1017/S1355770X98240125>
- Levinthal, D., & March, J. G. (1991). A model of adaptive organizational search. *Journal of Economic Behavior & Organization*, 2(4), 307–333. [https://doi.org/10.1016/0167-2681\(81\)90012-3](https://doi.org/10.1016/0167-2681(81)90012-3)
- Levinthal, D. A., & March, J. G. (1993). The myopia of learning. *Strategic Management Journal*, 14(S2), 95–112. <https://doi.org/10.1002/smj.4250141009>
- Li, C. R. (2013). How top management team diversity fosters organizational ambidexterity: The role of social capital among top executives. *Journal of Organizational Change Management*, 26(5), 874–896. <https://doi.org/10.1108/JOCM-06-2012-0075>
- Li, M. (2013). Social network and social capital in leadership and management research: A review of causal methods. *The Leadership Quarterly*, 24(5), 638–665.  
<https://doi.org/10.1016/j.leaqua.2013.04.005>
- Lichtenstein, B. B. (2000). Self-organized transitions: A pattern amid the “chaos” of transformative change. *Academy of Management Executive*, 14(4), 128–141.  
<http://dx.doi.org/10.5465/AME.2000.3979821>
- Lichtenstein, B. B., & Plowman, D. A. (2009). The leadership of emergence: A complex systems leadership theory of emergence at successive organizational levels. *The Leadership Quarterly*, 20(4), 617–630. <https://doi.org/10.1016/j.leaqua.2009.04.006>
- Lin, N. (1999a). Building a network theory of social capital. *Connections*, 22(1), 28–51.  
 Retrieved from [http://www.insna.org/PDF/Connections/v22/1999\\_I-1-4.pdf](http://www.insna.org/PDF/Connections/v22/1999_I-1-4.pdf)
- Lin, N. (1999b). Social networks and status attainment. *Annual Review of Sociology*, 25, 467–487. <https://doi.org/10.1146/annurev.soc.25.1.467>
- Lin, N. (2000). Inequality in social capital. *Contemporary Sociology*, 29(6), 785–795.  
<https://doi.org/10.2307/2654086>
- Lin, N., Ensel, W. M., & Vaughn, J. C. (1981). Social resources and strength of ties: Structural factors in occupational status attainment. *American Sociological Review*, 46(4), 393–405.  
<https://doi.org/10.2307/2095260>
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage

- Litrico, J.B. and Lee, M.D. (2008). Balancing exploration and exploitation in alternative work arrangements: A multiple case study in the professional and management services industry. *Journal of Organizational Behavior*, 29(8), 995–1020. <https://doi.org/10.1002/job.553>
- Loevinger, J. (1957). Objective tests as instruments of psychological theory. *Psychological Reports*, 3(3), 635–694. <https://doi.org/10.2466/pr0.1957.3.3.635>
- Love, J. F. (1995). *McDonald's: Behind the arches* (Rev. ed.). New York, NY: Bantam.
- Ludwig, D., Mangel, M., & Haddad, B., 2001. Ecology, conservation, and public policy. *Annual Review of Ecology and Systematics*, 32, 481–517. <https://doi.org/10.1146/annurev.ecolsys.32.081501.114116>
- Luers, A. L., Lobell, D. B., Sklar, L. S., Addams, C. L., & Matson, P. A. (2003). A method for quantifying vulnerability, applied to the agricultural system of the Yaqui Valley, Mexico. *Global Environmental Change*, 13(4), 255–267. [https://doi.org/10.1016/S0959-3780\(03\)00054-2](https://doi.org/10.1016/S0959-3780(03)00054-2)
- MacCallum, R. C., Widaman, K. F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological Methods*, 4(1), 84–99. <http://dx.doi.org/10.1037/1082-989X.4.1.84>
- MacKenzie, S. B. (2003). The dangers of poor construct conceptualization. *Journal of the Academy of Marketing Science*, 31(3), 323–326. <https://doi.org/10.1177/0092070303254130>
- Madhavan, R., Koka, B. R., & Prescott, J. E. (1998). Networks in transition: How industry events (re)shape interfirm relationships. *Strategic Management Journal*, 19(5), 439–459. [https://doi.org/10.1002/\(SICI\)1097-0266\(199805\)19:5<439::AID-DIA952>3.0.CO;2-2](https://doi.org/10.1002/(SICI)1097-0266(199805)19:5<439::AID-DIA952>3.0.CO;2-2)
- Mäler, K. G., Li, C. Z., & Destouni, G. (2007). *Pricing resilience in a dynamic economy environment system: A capital theoretical approach* (Discussion Paper No. 208). Stockholm, Sweden: Beijer Institute of Ecological Economics. Retrieved from [http://www.beijer.kva.se/PDF/55023238\\_Disc208.pdf](http://www.beijer.kva.se/PDF/55023238_Disc208.pdf)
- Mallak, L. (1998). Measuring resilience in health care provider organizations. *Health Manpower Management*, 24(4), 148–152. <https://doi.org/10.1108/09552069810215755>
- Manderscheid, S., & Kusy, M. (2005). How to design strategy with no dust—Just results! *Organization Development Journal*, 23(2), 62–70.
- Manyena, S. B. (2006). The concept of resilience revisited. *Disasters*, 30(4), 434–450. <https://doi.org/10.1111/j.0361-3666.2006.00331.x>
- March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, 2(1), 71–87. <https://doi.org/10.2466/PR0.3.7.635-694>
- March, J. G., & Simon, H. A. (1967). *Organizations*. New York, NY: John Wiley & Sons.

- Marion, R. (1999). *The edge of organization: Chaos and complexity theories of formal social organizations*. Newbury Park, CA: Sage.
- Marion, R., & Uhl-Bien, M. (2001). Leadership in complex organizations. *The Leadership Quarterly*, 12(4), 389–418. [https://doi.org/10.1016/S1048-9843\(01\)00092-3](https://doi.org/10.1016/S1048-9843(01)00092-3)
- McCarney, R., Warner, J., Iliffe, S., van Haselen, R., Griffin, M., & Fisher, P. (2007). The Hawthorne Effect: A randomised, controlled trial. *BMC Medical Research Methodology*, 7(1), 30. <https://doi.org/10.1186/1471-2288-7-30>
- McDonald, N. (2006). Organisational resilience and industrial risk. In E. Hollnagel, D. D. Woods, & N. Leveson (Eds.), *Resilience engineering: Concepts and precepts* (pp. 155–180). Boca Raton, FL: CRC.
- McFadyen, M. A., & Cannella, A. A. (2004). Social capital and knowledge creation: Diminishing returns of the number and strength of exchange relationships. *Academy of Management Journal*, 47(5), 735–746. <https://doi.org/10.2307/20159615>
- McKelvey, B. (1999). Complexity theory in organization science: Seizing the promise or becoming a fad? *Emergence*, 1(1), 5–32. [https://doi.org/10.1207/s15327000em0101\\_2](https://doi.org/10.1207/s15327000em0101_2)
- McLain, R., and R. Lee. 1996. Adaptive management: promises and pitfalls. *Journal of Environmental Management*, 20(4), 437–448. <https://doi.org/10.1007/BF01474647>
- Mehra, A., Dixon, A. L., Brass, D. J., & Robertson, B. (2006). The social network ties of group leaders: Implications for group performance and leader reputation. *Organization Science*, 17(1), 64–79. <https://doi.org/10.1287/orsc.1050.0158>
- Meyer, A. D., Gaba, V., & Colwell, K. A. (2005). Organizing far from equilibrium: Nonlinear change in organizational fields. *Organization Science*, 16(5), 456–473. <https://doi.org/10.1287/orsc.1050.0135>
- Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative data analysis: An expanded sourcebook* (3rd ed.). Thousand Oaks, CA: Sage.
- Mintzberg, H., & McHugh, A. (1985). Strategy formation in an adhocracy. *Administrative Science Quarterly*, 30(2), 160–197. <https://doi.org/10.2307/2393104>
- Monge, P. R., & Contractor, N. S. (2003). *Theories of communication networks*. New York, NY: Oxford University Press.
- Monge, P. R., & Eisenberg, E. M. (1987). Emergent communication networks. In F. Jablin, L. L. Putnam, K. Roberts, & L. Porter (Eds.), *Handbook of organizational communication* (pp. 304–342). Newbury Park, CA: Sage.
- Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, 23(2), 242–266. <https://doi.org/10.2307/259373>

- Narayan, D., & Cassidy, M. F. (2001). A dimensional approach to measuring social capital: development and validation of a social capital inventory. *Current Sociology*, *49*(2), 59–102. <https://doi.org/10.1177/0011392101049002006>
- Neill, J. (2017). *Exploratory factor analysis: Lecture 5. Survey Research & Design in Psychology* [PowerPoint presentation]. Retrieved from <https://www.slideshare.net/jtneill/exploratory-factor-analysis>
- Nelson, D. R., Adger, W. N., & Brown, K. (2007). Adaptation to environmental change: contributions of a resilience framework. *Annual Review of Environment and Resources*, *32*, 395–419. <https://doi.org/10.1146/annurev.energy.32.051807.090348>
- Norris, F. H., Stevens, S. P., Pfefferbaum, B., Wyche, K. F., & Pfefferbaum, R. L. (2008). Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. *American Journal of Community Psychology*, *41*(1/2), 127–150. <https://doi.org/10.1007/s10464-007-9156-6>
- Nystrom, M., & Folke, C. (2001). Spatial resilience of coral reefs. *Ecosystems*, *4*(5), 406–417. <https://doi.org/10.1007/s10021-001-0019-y>
- Obstfeld, D. (2005). Social networks, the *tertius lungen* orientation, and involvement in innovation. *Administrative Science Quarterly*, *50*(1), 100–130. <https://doi.org/10.2189/asqu.2005.50.1.100>
- Oh, H., Kilduff, M., & Brass, D. J. (1999, August 11). *Communal social capital, linking social capital, and economic outcomes*. Paper presented at the Academy of Management Annual Conference, Chicago, IL.
- Oh, H., Labianca, G., & Chung, M. H. (2006). A multilevel model of group social capital. *Academy of Management Review*, *31*(3), 569–582. <https://doi.org/10.5465/AMR.2006.21318918>
- Olsson, P., Folke, C., & Berkes, F. (2004). Adaptive comanagement of building resilience in social-ecological systems. *Environmental Management*, *34*(1), 75–90. <https://doi.org/10.1007/s00267-003-0101-7>
- Ostrom, E. (1994). Constituting social capital and collective action. *Journal of Theoretical Politics*, *6*(4), 527–562. <https://doi.org/10.1177/0951692894006004006>
- Parsons, T. (1964). Evolutionary universals in society. *American Sociological Review*, *29*(3), 339–357. <http://dx.doi.org/10.2307/2091479>
- Pascale, R. T., Millemann, M., & Gioja, L. (2000). *Surfing the edge of chaos: The laws of nature and the new laws of business*. New York, NY: Crown Business.
- Pastoriza, D., & Ariño, M. A. (2013). Does the ethical leadership of supervisors generate internal social capital? *Journal of Business Ethics*, *118*(1), 1–12. <https://doi.org/10.1007/s10551-012-1536-7>

- Paxton, P. (1999). Is social capital declining in the United States? A multiple indicator assessment. *American Journal of Sociology*, *105*(1), 88–127. <https://doi.org/10.1086/210268>
- Pelling, M. (2003). *The vulnerability of cities: Natural disasters and social resilience*. Sterling, VA: Earthscan.
- Perrow, C. (1999). Organizing to reduce the vulnerabilities of complexity. *Journal of contingencies and crisis management*, *7*(3), 150–155. <https://doi.org/10.1111/1468-5973.00108>
- Peterson, S. J., & Luthans, F. (2003). The positive impact and development of hopeful leaders. *Leadership & Organization Development Journal*, *24*(1), 26–31. <https://doi.org/10.1108/01437730310457302>
- Pfeffer, J. and R. I. Sutton (2000). *The knowing-doing gap: How smart companies turn knowledge into action*. Boston, MA: Harvard Business School Press.
- Pickett, S. T., Cadenasso, M. L., & Grove, J. M. (2004). Resilient cities: Meaning, models, and metaphor for integrating the ecological, socio-economic, and planning realms. *Landscape and Urban Planning*, *69*(4), 369–384. <https://doi.org/10.1016/j.landurbplan.2003.10.035>
- Plowman, D. A., & Duchon, D. (2008). Dispelling the myths about leadership: From cybernetics to emergence. In: R. Marion, M. Uhl-Bien, & P. Hanges (Eds.), *Complexity theory and leadership: Leadership dynamics in the knowledge era* (pp. 129–154). Greenwich, CT: Information Age.
- Plowman, D. A., Solansky, S., Beck, T. E., Baker, L., Kulkarni, M., & Travis, D. V. (2007). The role of leadership in emergent, self-organization. *The Leadership Quarterly*, *18*(4), 341–356. <https://doi.org/10.1016/j.leaqua.2007.04.004>
- Poole, M. S., & Van de Ven, A. H. (1989). Using paradox to build management and organization theories. *Academy of Management Review*, *14*(4), 562–578. <https://doi.org/10.2307/258559>
- Poole, M. S., & Van de Ven, A. H. (1989). Using paradox to build management and organization theories. *Academy of Management Review*, *14*(4), 562–578. <https://doi.org/10.5465/AMR.1989.4308389>
- Porter, M. E. (1985). Technology and competitive advantage. *Journal of Business Strategy*, *5*(3), 60–78. <https://doi.org/10.1108/eb039075>
- Portes, A. (2000). Social capital: Its origins and applications in modern sociology. *Knowledge & Social Capital*, *24*(1), 43–67. <https://doi.org/10.1016/B978-0-7506-7222-1.50006-4>
- Preacher, K. J., & MacCallum, R. C. (2003). Repairing Tom Swift's electric factor analysis machine. Understanding statistics: *Statistical Issues in Psychology, Education, & the Social Sciences*, *2*(1), 13–43. [https://doi.org/10.1207/S15328031US0201\\_02](https://doi.org/10.1207/S15328031US0201_02)

- Prigogine, I. (1968). *Introduction to thermodynamics of irreversible processes*. Geneva, Switzerland: Interscience.
- Putman, R. D. (1993a). *Making democracy work*. Princeton, NJ: Princeton University Press.
- Putnam, R. D. (1993b). The prosperous community: Social capital and public life. *The American Prospect*, 6(13), 1–24. Retrieved from <http://prospect.org/article/prosperous-community-social-capital-and-public-life>
- Quiggin, J. (2011). What have we learned from the global financial crisis? *Australian Economic Review*, 44(4), 355–365. <https://doi.org/10.1111/j.1467-8462.2011.00661.x>
- Ragin, C. C. (1994). Introduction to qualitative comparative analysis. In T. Janoski & A. M. Hicks (Eds.), *The comparative political economy of the welfare state* (pp. 299–309). Cambridge, UK: Cambridge University Press.
- Raisch, S., & Birkinshaw, J. (2008). Organizational ambidexterity: Antecedents, outcomes, and moderators. *Journal of Management*, 34(3), 375–409. <https://doi.org/10.1177/0149206308316058>
- Raisch, S., Birkinshaw, J., Probst, G., & Tushman, M. L. (2009). Organizational ambidexterity: Balancing exploitation and exploration for sustained performance. *Organization Science*, 20(4), 685–695. <https://doi.org/10.1287/orsc.1090.0428>
- Romero, J. (2013). The rise and fall of Circuit City. *Econ Focus*, 3, 31–33. Retrieved from [https://www.richmondfed.org/~media/richmondfedorg/publications/research/econ\\_focus/2013/q3/pdf/economic\\_history.pdf](https://www.richmondfed.org/~media/richmondfedorg/publications/research/econ_focus/2013/q3/pdf/economic_history.pdf)
- Rothaermel, F. T., & Alexandre, M. T. (2009). Ambidexterity in technology sourcing: The moderating role of absorptive capacity. *Organization Science*, 20(4), 759–780. <https://doi.org/10.1287/orsc.1080.0404>
- Salancik, G. R. (1995). Wanted: A good network theory of organization. *Administrative Science Quarterly*, 40(3), 345–349. <https://doi.org/10.2307/2393642>
- Scharmer, C. O. (2009). *Theory U: Learning from the future as it emerges*. San Francisco, CA: Berrett-Koehler.
- Schipper, E. L. F., & Langston, L. (2015). *A comparative overview of resilience measurement frameworks* (Working Paper No. 422). London, UK: Overseas Development Institute.
- Schneider, M., & Somers, M. (2006). Organizations as complex adaptive systems: Implications of complexity theory for leadership research. *The Leadership Quarterly*, 17(4), 351–365. <https://doi.org/10.1016/j.leaqua.2006.04.006>
- Schultz, M., & Hatch, M. J. (1996). Living with multiple paradigms: The case of paradigm interplay in organizational cultural studies. *Academy of Management Review*, 21(2), 529–557. <https://doi.org/10.2307/258671>

- Schulze, P. (2009). *Balancing exploitation and exploration: Organizational antecedents and performance effects of innovation strategies*. Wiesbaden, Germany: Gabler.
- Schwartz, D. (1997). *Culture and Power: The sociology of Pierre Bourdieu*. Chicago, IL: University of Chicago Press.
- Senge, P. M., Scharmer, C. O., Jaworski, J., & Flowers, B. S. (2008). *Presence: Human purpose and the field of the future*. New York, NY: Doubleday.
- Sidhu, J. S., Volberda, H. W., & Commandeur, H. R. (2004). Exploring exploration orientation and its determinants: Some empirical evidence. *Journal of Management Studies*, 41(6), 913–932. <https://doi.org/10.1111/j.1467-6486.2004.00460.x>
- Silverman, D. (1993). *Interpreting qualitative data: Methods for analysing talk, text and interaction*. London, UK: Sage.
- Simms, L. J. (2008). Classical and modern methods of psychological scale construction. *Social & Personality Psychology Compass*, 2(1), 414–433. <https://doi.org/10.1111/j.1751-9004.2007.00044.x>
- Smit, B., Burton, I., Klein, R., & Wandel, J. (2000). An anatomy of adaptation to climate change and variability. In S. M. Kane & G. W. Yohe (Eds.), *Societal adaptation to climate variability and change* (pp. 223–251). Dordrecht, Netherlands: Springer.
- Smit, B., & Wandel, J. (2006). Adaptation, adaptive capacity and vulnerability. *Global Environmental Change*, 16(3), 282–292. <https://doi.org/10.1016/j.gloenvcha.2006.03.008>
- Smith, W. K., & Tushman, M. L. (2005). Managing strategic contradictions: A top management model for managing innovation streams. *Organizational Science*, 16(5), 522–536. <https://doi.org/10.1287/orsc.1050.0134>
- Snijders, T. A. B., Steglich, C. E. G., & Schweinberger, M. 2007. Modeling the co-evolution of networks and behavior. In K. van Montfort, H. Oud, & A. Satorra (Eds.), *Longitudinal models in the behavioral and related sciences* (pp. 41–71). Mahwah, NJ: Lawrence Erlbaum.
- Somers, S. (2009). Measuring resilience potential: An adaptive strategy for organizational crisis planning. *Journal of Contingencies & Crisis Management*, 17(1), 12–23. <https://doi.org/10.1111/j.1468-5973.2009.00558.x>
- Solomon, B. (2016, July 25). Yahoo sells to Verizon in saddest \$5 billion deal in tech history. *Forbes*. Retrieved from <https://www.forbes.com/sites/briansolomon/2016/07/25/yahoo-sells-to-verizon-for-5-billion-marissa-mayer/#58004456450f>
- SPSS. (n.d.). *SPSS: Descriptive statistics*. Retrieved from <http://psychology.illinoisstate.edu/jccutti/138web/spss/spss3.html>

- Staber, U., & Sydow, J., (2002). Organizational adaptive capacity: a structuration perspective. *Journal of Management Inquiry*, 11(4), 408–424. <https://doi.org/10.1177/1056492602238848>
- Stacey, R. D. (1992). *Managing the unknowable: Strategic boundaries between order and chaos in organizations*. New York, NY: John Wiley & Sons.
- Stake, R. E. (1995). *The art of case study research*. Berkeley, CA: Sage.
- Strauss, A., & Corbin, J. M. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Berkeley, CA: Sage.
- Suhr, D. (2003, March). Exploratory or confirmatory factor analysis? *Proceedings of the Thirty-First Annual SAS Users Group International Conference* (Paper No. 200-31). Cary, NC: SAS Institute. Retrieved from <http://www2.sas.com/proceedings/sugi31/200-31.pdf>
- Sull, D., & Eisenhardt, K. M. (2015). *Simple rules: How to thrive in a complex world*. Washington, DC: Houghton Mifflin Harcourt.
- Swenson, R. (1989). Emergent attractors and the law of maximum entropy production: foundations to a theory of general evolution. *Systems Research and Behavioral Science*, 6(3), 187–197. <https://doi.org/10.1002/sres.3850060302>
- Szreter, S., & Woolcock, M. (2004). Health by association? Social capital, social theory, and the political economy of public health. *International Journal of Epidemiology*, 33(4), 650–667. <https://doi.org/10.1093/ije/dyh013>
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics*. Boston, MA: Allyn & Bacon/Pearson Education.
- Tagliaventi, M. R., & Mattarelli, E. (2006). The role of networks of practice, value sharing, and operational proximity in knowledge flows between professional groups. *Human Relations*, 59(3), 291–319. <https://doi.org/10.1177/0018726706064175>
- Tansley, C., & Newell, S. (2007). Project social capital, leadership and trust: A study of human resource information systems development. *Journal of Managerial Psychology*, 22(4), 350–368. <https://doi.org/10.1108/02683940710745932>.
- Thurstone, L. L. (1947). *Multiple factor analysis*. Chicago, IL: University of Chicago Press.
- Tierney, K., & Bruneau, M. (2007). Conceptualizing and measuring resilience: A key to disaster loss reduction. *TR News*, (250), 14–17.
- Timmerman, P. (1981). *Vulnerability, resilience and collapse of society* (Environmental Monograph No. 1). Toronto, Canada: Institute for Environmental Studies, University of Toronto.



- Tsai, W., & Ghoshal, S. (1998). Social capital and value creation: The role of intrafirm networks. *Academy of Management Journal*, 41(4), 464–476. <https://doi.org/10.2307/257085>
- Turner, B. A. (1976). The organizational and interorganizational development of disasters. *Administrative Science Quarterly*, 21(3), 378–397. <https://doi.org/10.2307/2391850>
- Tushman, M. L., & Anderson, P. (1986). Technological discontinuities and organizational environments. *Administrative Science Quarterly*, 31(3), 439–465. <https://doi.org/10.2307/2392832>
- Tushman, M. L., & O'Reilly, C. A., III. (1996). Ambidextrous organizations: Managing evolutionary and revolutionary change. *California Management Review*, 38(4), 8–29. <https://doi.org/10.2307/41165852>
- Uhl-Bien, M. (2006). Relational leadership theory: Exploring the social processes of leadership and organizing. *The Leadership Quarterly*, 17(6), 654–676. <https://doi.org/10.1016/j.leaqua.2006.10.007>
- Uhl-Bien, M., & Marion, R. (Eds.). (2008). *Complexity leadership: I. Conceptual Foundations*. Charlotte, NC: IAP.
- Uhl-Bien, M., Marion, R., & McKelvey, B. (2007). Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era. *The Leadership Quarterly*, 18(4), 298–318. <https://doi.org/10.1016/j.leaqua.2007.04.002>
- Uzzi, B. (1999). Embeddedness in the making of financial capital: How social relations and networks benefit firms seeking financing. *American Sociological Review*, 40(2), 481–505. <https://doi.org/10.2307/2657252>
- Venkatraman, N., Lee, C. H., & Iyer, B. (2005, August). *Strategic ambidexterity and sales growth: A longitudinal test in the software sector*. Paper presented at the Academy of Management Annual Meeting, Honolulu, HI.
- Vermeulen, F., & Barkema, H. (2002). Pace, rhythm, and scope: Process dependence in building a profitable multinational corporation. *Strategic Management Journal*, 23(7), 637–653. <https://doi.org/10.1002/smj.243>
- Vincent, K. (2004). *Creating an index of social vulnerability to climate change for Africa* (Working Paper 56). Norwich, UK: Tyndall Center for Climate Change Research.
- Vogel, C., Moser, S. C., Kasperson, R. E., & Dabelko, G. D. (2007). Linking vulnerability, adaptation, and resilience science to practice: Pathways, players, and partnerships. *Global Environmental Change*, 17(3/4), 349–364. <https://doi.org/10.1016/j.gloenvcha.2007.05.002>

- Volberda, H. W., Baden-Fuller, C., & van den Bosch, F. A. (2001). Mastering strategic renewal: Mobilising renewal journeys in multi-unit firms. *Long Range Planning*, *34*(2), 159–178. [https://doi.org/10.1016/S0024-6301\(01\)00032-2](https://doi.org/10.1016/S0024-6301(01)00032-2)
- Walker, B., Holling, C. S., Carpenter, S., & Kinzig, A. (2004). Resilience, adaptability, and transformability in social ecological systems. *Ecology and Society*, *9*(2). <https://doi.org/10.5751/es-00650-090205>
- Walker, B., & Salt, D. (2006). *Resilience thinking: Sustaining ecosystems and people in a changing world*. Washington, DC: Island Press.
- Walker, B., & Salt, D. (2012). *Resilience practice: Building capacity to absorb disturbance and maintain function*. Washington, DC: Island Press.
- Weick, K.E. (1976). Educational organizations as loosely coupled systems. *Administrative Science Quarterly*, *21*(1), 1–19. <https://doi.org/10.2307/2391875>
- Weick, K. E. (1989). Theory construction as disciplined imagination. *Academy of Management Review*, *14*(4), 516–531. <https://doi.org/10.2307/258556>
- Weick, K. E. (1995). *Sensemaking in organizations*. Thousand Oaks, CA: Sage.
- Weick, K. E., & Sutcliffe, K. M. (2015). *Managing the unexpected: Sustained performance in a complex world* (3rd ed.). Hoboken, NJ: John Wiley & Sons.
- Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (2005). Organizing and the process of sensemaking. *Organization Science*, *16*(4), 409–421. <https://doi.org/10.1287/orsc.1050.0133>
- Wheatley, M. (2005). *Finding our way*. San Francisco, CA: Berrett-Koehler.
- Wheatley, M. (2006). *Leadership and the new science*. San Francisco, CA: Berrett-Koehler
- Whetten, D. A. (1989). What constitutes a theoretical contribution? *Academy of Management Review*, *14*(4), 490–495. <https://doi.org/10.2307/258554>
- Wilbanks, T. J., & Kates, R. W. (1999). Global change in local places: how scale matters. *Climatic Change*, *43*(3), 601–628. <https://doi.org/10.1023/A:1005418924748>
- Williams, B., Onsmann, A., & Brown, T. (2010). Exploratory factor analysis: A five-step guide for novices. *Australasian Journal of Paramedicine*, *8*(3), 1–13. Retrieved from <https://ajp.paramedics.org/index.php/ajp/article/view/93/90>
- Willmott, H. (1993). Breaking the paradigm mentality. *Organization Studies*, *14*(5), 681–719. <https://doi.org/10.1177/017084069301400504>
- Winter, S. G., & Szulanski, G. (2001). Replication as strategy. *Organization Science*, *12*(6), 730–743. <https://doi.org/10.1287/orsc.12.6.730.10084>

- Woolcock, M. (1998). Social capital and economic development: Toward a theoretical synthesis and policy framework. *Theory and Society*, 27(2), 151–208.  
<https://doi.org/10.1023/A:1006884930135>
- Woolcock, M., & Narayan, D. (2000). Social capital: Implications for development theory, research, and policy. *The World Bank Research Observer*, 15(2), 225–249.  
<https://doi.org/10.1093/wbro/15.2.225>
- Worthington, R. L., & Whittaker, T. A. (2006). Scale development research a content analysis and recommendations for best practices. *The Counseling Psychologist*, 34(6), 806–808.  
<https://doi.org/10.1177/0011000006288127>
- Yong, A. G., & Pearce, S. (2013). A beginner's guide to factor analysis: Focusing on exploratory factor analysis. *Tutorials in Quantitative Methods for Psychology*, 9(2), 79–94.
- Zaiontz, C. (2017). Validity of correlation matrix and sample size. *Real statistics using Excel*. Retrieved from <http://www.real-statistics.com/multivariate-statistics/factor-analysis/validity-of-correlation-matrix-and-sample-size/>
- Zolli, A., & Healy, A. M. (2013). *Resilience: Why things bounce back*. New York, NY: Simon & Schuster.