Catalyzing capacity: absorptive, adaptive, and generative leadership

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Abstract

Purpose – Organizations increasingly operate under volatile, uncertain, complex and ambiguous (VUCA) conditions. Traditional command-and-control leadership can be ineffective in such chaotic environments. The purpose of this paper is to outline an alternative model to help leaders and organizations navigate effectively through VUCA environments. By developing three fundamental capacities (absorptive, adaptive and generative), leaders can cultivate organizations capable of continuous synchronization with their fitness landscapes. Central tenets of the framework include diversity, slack, learning, humility, reflection in action and abductive logic.

Design/methodology/approach – This framework is designed based on literature insights, conceptual analysis and experts' judgment. The paper integrates knowledge from a variety of disciplines and interprets them through the lens of complex adaptive systems.

Findings – This paper argues for a process centered, contemplative approach to organizational leadership and development. By providing the underlying rationale for the proposed interventions (e.g. Ashby's law of requisite variety), the paper also reorients busy leaders' mental models to show why these time investments are worth implementing.

Practical implications – This actionable framework can help leaders and organizations be more effective operating in a VUCA context.

Originality/value – This paper provides a historic context as to why prediction and certainty are favored leadership strategies, why these approaches are no longer suitable and specific steps leaders can take to develop absorptive, adaptive and generative capacities to transform their organizations. Its scholarly contribution is the synthesis of disparate bodies of literature, weaving those multiple academic perspectives into a practical roadmap to enhance organizational leadership.

Keywords Change, Leadership, Complexity, Adaptive, Absorptive, Generative

Paper type Conceptual paper

Introduction

More than 2,000 years ago, Plato's (1941) *Allegory of the Cave* suggested that people could be imprisoned by false reality if they became constrained by limited observations and perceptions. Escape from this prison becomes possible as they begin to question their interpretations, get feedback from others, and open themselves up to other possibilities. In the spirit of that ancient tale, this paper considers leadership as a portal for individuals and organizations to transcend their current situations and realize new potential opportunities. Plato's message about the value of reflective understanding still rings true, and is perhaps more important than ever in today's global environments characterized by volatility, uncertainty, complexity and ambiguity (VUCA).

Leaders can catalyze people and firms to make this shift in a variety of ways. Examples include shaping stakeholder perceptions (Cotton *et al.*, 2017; Johnson *et al.*, 2017), activating organizational performance (Rego *et al.*, 2015) and spearheading community change (Folta *et al.*, 2012). This paper argues that not just any style of leadership will do, however. Its claims proceed as follows. First, it outlines the rationale for why operating in a context of

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VUCA and chronic change requires a new approach to leadership. Next, it suggests a reason why this shift has been difficult. The paper then describes three capacities leaders must develop to achieve this shift: absorptive capacity (diversity, meaning making and slack), adaptive capacity (placing emphases on learning and asking the right questions) and generative capacity (developing a design mindset guided by abduction, the logic of potentiality). As leaders make these shifts, they open up new possibilities for the vitality and sustainability of their organizations.

The problem

> The greatest danger in times of turbulence is not the turbulence; it is to act with yesterday's logic (Peter Drucker).

Complexity and uncertainty have emerged as important themes in leadership literature (Hunt, 2004). Over the last 30 years, people and organizations have become more connected; the speed of communication has increased; more information is accessible immediately; and more diversity exists among people and institutions. To deal with this ever more complex operating environment, leadership requires a systems perspective that considers the dynamic, nonlinear nature of interactions, especially at upper levels of organizations (McCauley, 2004).

This perspective demands the development of more sophisticated conceptual maps (Jacobs and Jaques, 1990) to help people make sense of their environment and generate more appropriate responses (Weick, 1979). Because change has become the norm, these maps need to be flexible to take in new information as it becomes available, able to transcend cause-and-effect logic and accommodate thinking about time over longer horizons (Hunt, 2004), and able to accommodate diverse perspectives of multiple stakeholders. Further, they must enable spatial conceptualization across networks rather than organizing information in a linear manner (Jacobs and McGee, 2001).

Creativity is another essential component of these conceptual maps, because leaders typically must work with novelty that requires generation of new understandings and solutions (McCauley, 2004). In fact, empirical evidence has identified that embracing multiple styles of cognition is a hallmark of exceptional leaders (Bennis and Nanus, 1985; Schaubroeck *et al.*, 2011). These various forms of cognitive capacities include ability to foster meaning making and trust through shared communication, ability to focus attention, ability to create empowering opportunities, willingness to take risks, optimism rather than fearfulness and self-awareness (Bennis and Nanus, 1985; Schaubroeck *et al.*, 2011).

If the literature is so clear on what cognitive capacities are needed, why are they not more prevalent? Organizational science scholar Donald Schön (1983) argued that it was because analytical thinking—what he called technical-rational logic—has emerged as the dominant and unquestioned epistemology in modern society. Schon traced the origin of technical-rationality back to Positivism, a philosophy originating in the nineteenth century. The emergence of Positivism stemmed from the attempt to apply technological capabilities that were emerging at that time in science and industry to other fields for the betterment of humanity. The core assumption was that every problem was solvable and that outcomes could be controlled if approached in a logical, orderly manner. Hence Positivism accepted only certain types of knowledge as valid, specifically empirical, analytical and logically necessary propositions.

In the twentieth century, Positivistic epistemology gained further popularity as it came to be seen as a way to create wealth, often through prediction and control (Schön, 1983). However, the social unrest of the 1960s raised awareness of the limitations of the technical-rational model. People became increasingly aware of complex aspects of reality

that technical-rational analysis could not adequately address. These included change, novelty and uncertainty—qualities that did not fit into the empirical paradigm of knowledge creation and acquisition. Instead of viewing reality through positivism's lens as a singular "thing" that exists "out there," leadership and organizational scholars have come to accept many other forms of scientific inquiry such as social constructionism (Berger and Luckmann, 1966), conventionalism and realism (Nellhaus, 1993). Yet, the positivist mindset that insists complex, paradoxical and ambiguous phenomena be broken down into simple black-or-white compartments remains dominant in many organizations (Ang, 2011). We argue for the need to adjust leadership styles to a complexity mindset that recognizes interdependencies, interaction effects across multiple levels and the need to catalyze the latent potential of organizations (Uhl-Bien *et al.*, 2007).

An organization's operating environment is considered complex when it includes three aspects. The first is substantial interdependence among multiple people involved in the decision making. The second is the existence of competing values that necessitate a tradeoff (i.e. a return on one value can only be obtained at a cost to the other). A third aspect is high uncertainty, where there is imperfect correspondence between information and the environment (Steinbruner, 2002). Given that organizations increasingly operate under VUCA conditions, we adopt a complexity stance toward cognition and capacity build so that organizations can move beyond positivistic approaches that no longer fit VUCA environments.

Complexity frequently entails emergence, where interactions at the micro level produce a qualitatively different phenomenon at the macro level. For example, fishes swimming individually can form a cohesive pattern (a school). Rather than a single fish imposing order, the fishes self-organize autonomously by following a few simple behavioral rules (e.g. stay close but not too close to your neighbor). Self-organization is a mechanism by which systems can spontaneously optimize energy distribution to create a more stable structure under dynamic conditions (Rickles *et al.*, 2007). Similarly, we argue in the following pages that under VUCA conditions, leaders can catalyze capacity of the organization to self-organize by developing absorptive, adaptive and generative capacities. Table I outlines the different mental models and processes that promote the shift from positivist to complex systems perspective, from controlling to embracing VUCA.

New ways of leading

Using conceptual analysis (Machado and Silva, 2007), this paper discusses how leaders can help their organizations overcome the limitations of technical-rational and positivist thinking when operating in VUCA conditions by developing three cognitive competencies—absorptive, adaptive and generative capacity. As will be shown, these three capacities enable organizations to more effectively interact with their operating environment, receive and process information, and create value through resource transformation and innovation. They support complexity because they promote self-organization, emergence and adaptability. They overcome positivistic limitations by embracing uncertainty as a resource rather than trying to control, predict or eliminate it. This section presents the three competencies in more detail, explains why they are crucial in VUCA environments, and briefly suggests ways to develop these competencies.

Absorptive capacity

As information flows ever faster, organizations must be able to quickly identify relevant data, assimilate that information, and apply it in ways that create value. This ability, known

Decision-making dimension	Technical-rational approach	Complex systems approach
Operating environment	Certain	Uncertain Complex
Power type	Hegemony (power over) Dependency	"Power to" exchange Interdependence
Cultural context	Local National Homogeneous	Global Diversity Virtual
Organizational structure	Hierarchy Bureaucracy	Networks Fractals Adhocracy
Directional orientation	Linear Cause/effect	Systems perspective Cybernetic Reflexive
Information flows	Top down	Multi-directional
Social norms	Doing and telling	Relating and asking
Cognitive styles	Induction, deduction Rational, logical Having answers	Abduction Metacognition, creativity Asking questions
Cognitive tools	Planning analysis	Appreciative inquiry, action research, learning, stories, metaphor, visualization of information
Value creation	Financial capital consumable Resource conservation	Capacity enhancement intangible assets Endogenous resource creation
Orientation	Internal focus Sustaining the organization	External (stakeholder focus) Sustaining the larger system
Outcomes	Transactional inputs/outputs	Transformative meaning, experience
Language	Either/or, "but"	"and"; multiple hypotheses
Leadership challenges	Technical	Adaptive
Purpose	Maintenance survival	Dynamic equilibrium, renewal
Leadership process	Leveraging	Developing
Leadership style	Command & control	Facilitative, distributed, humble
Governance	Fiduciary, strategic	Generative
Locus of decision making	Executive level	Wherever most information is available
Creative focus	Develop strategies, actions, tasks; solve problems	Create structures, processes, relationships and opportunities that activate potential
Intervention strategy	Root causes	Problem setting Leverage points
Evaluation focus	Summative	Formative, developmental
Temporal focus	Immediate, near future	Long-term orientation, patterns over time, retrospective sensemaking
Origin of order	Imposed	Emergent through self-organization
Tolerance for uncertainty	Eliminate uncertainty	Embrace creative potential of ambiguity
Accountability	Externally imposed (formal authority, regulations, penalties)	Internally generated. Mutual accountability among connected agents; system's structures and processes set limits

Table I.
Leadership in certain and uncertain environments

as absorptive capacity, enables a firm to dynamically and continuously innovate (Cohen and Levinthal, 1990; Todorova and Durisin, 2007). For example, a survey of 4,000 CEOs in Spain found that absorptive capacity is an important source of competitive advantage for their firms. This was particularly true in industries operating in turbulent environments

(Escribano *et al.*, 2009). Absorptive capacity is co-created and arises through interactions at multiple levels, both within the firm and between the organization and external environment (McKelvey, 1997; Van den Bosch *et al.*, 1999). Drivers of absorptive capacity include learning relationships, environmental conditions, and internal and external knowledge. Mediators include a firm's structures, processes and strategies as well as the mental models of its members (Lane *et al.*, 2006). As a firm develops absorptive capacity, this enhances its ability to explore, exploit, innovate and rejuvenate (Lane *et al.*, 2006; Todorova and Durisin, 2007).

This paper argues that diversity, meaning making and slack are three essential yet overlooked aspects of absorptive capacity. Diversity is important because it expands capacity to absorb complexity. Ashby's (1991) law of requisite variety postulates that "the internal diversity of any self-regulating system must match the variety and complexity of its environment if it is to deal with the challenges posed by that environment" (Morgan, 2006, pp. 108-109). This suggests a firm will be successful to the degree that its internal diversity mirrors the level of external diversity of its operating environment. Offering support for this claim, a study of 95 randomly sampled companies on the S&P 500 Index found that boards of directors with higher gender diversity produced better corporate social performance (Hafsi and Turgut, 2013). Similarly, age diversity was found to have a positive effect on organizational productivity for creative tasks (Backes-Gellner and Veen, 2013).

Besides demographic diversity, organizations may also employ functional diversity (assembling teams based on roles and expertise). A mixed methods study of management team members in a Fortune 100 consumer products company found that intrapersonal functional diversity (the mix between specialists and generalists on a team) was especially valuable in promoting information sharing (Bunderson and Sutcliffe, 2002). While diversity is important for moral and social justice reasons, these empirical studies and others (De Dreu and West, 2001; Richard, 2000; Somers, 2006) suggest that diversity in multiple dimensions (e.g. expertise, ethnicity, age, locales and worldviews) enables organizations to improve decision making, performance and competitive advantage. Diversity increases firms' information intake and processing capabilities, enabling them better to absorb the variety that exists in their external environment. Organizations that fail to diversify risk withdrawing into the cave, becoming misaligned with their operating context and thus incapable of identifying and processing new information.

Meaning making is another fundamental aspect of absorptive capacity. Also known as sensemaking (Weick, 1995), this dimension is grounded in the science of semiotics, the study of signs, signals and communication processes (Desouza and Hensgen, 2005). Beyond the technical-rational, analytic processing of information, meaning making considers how new understanding evolves through discourse and dialogue (Bohm, 2004). Employees who engage in meaning making open up new possibilities for their organizations. For example, employees who drove organizational change did so by helping the firm make sense of external threats and opportunities in a way that could be understood and acted upon by other employees and managers. This sensemaking capacity played a pivotal role in the firm's long-term survival (Jones, 2006). It also helped employees in the firm re-conceptualize power relationships, becoming more vocal and less deferential in organizational decision making. Similarly, Easterby-Smith *et al.* (2008) found that the capacity to make meaning for self and others promotes better information access, flow and application as well as managing and reconfiguring organizational power relations.

Sensemaking is a socio-cognitive process because it combines and aligns individual and shared mental representations (Bergman *et al.*, 2015). For example, a study of 3,596 new product development firms found that creation of new knowledge and figuring out new uses for that knowledge were socially constructed through sensemaking processes (Mohrman *et al.*, 2003). Meaning making is also a recursive process that connects micro and macro levels of sensemaking processes (Brown *et al.*, 2015) by linking subjective experiences among

individual, dyad, group and organizational levels (Drazin *et al.*, 1999). Sensemaking is not linear, because action rather than planning often ignites it. This retrospection blurs temporal sequencing as new collective understanding arises (Thomas *et al.*, 1993; Weick, 1979).

While cognition is typically approached in terms of imposing order on an uncertain situation, meaning making entails metacognition to accommodate, reconcile and reconfigure multiple viewpoints that often seem initially opposed (Varela, 1987). Often, this process of reconfiguration results in initial confusion that may appear as disorder (Griffor, 1989). It therefore requires cognitive flexibility, a quality that can be promoted through relationships with co-workers. A study of middle managers during a restructuring initiative, for example, found that changes in schema development were socially negotiated through lateral social interactions with other managers (Balogun and Johnson, 2004).

A third aspect of absorptive capacity is slack, the excess resources at a firm's disposal at a given planning interval (Voss *et al.*, 2008). Four identified functions of slack include incentivizing participation (Cyert and March, 1963), serving as a conflict resolution resource, buffering environmental turbulence, and enabling novelty, experimentation and innovation incubation (Tan and Peng, 2003; Thompson, 1967). While organizations, especially those in the public and nonprofit sectors, are expected to operate at maximum efficiency (Lecy and Searing, 2015), this efficiency mindset may constrain a firm's capacity to explore and exploit its operating environment (Voss *et al.*, 2008) and adapt to changing conditions (Kraatz and Zajac, 2001).

Slack includes both time and resources. In terms of time, for example, a study of 182 employees in the manufacturing and service sector found that low time pressure was positively associated with employees' knowledge application, whereas high time pressure led to withholding knowledge application as they focused on task completion instead (Rai and Prakash, 2016). In terms of resources, a study of 190 business unit managers in Belgium found that budgetary slack was associated with innovation and the adoption of longer time horizons. Lack of budgetary slack resulted in tighter resource control and employing a short-term time horizon (Van der Stede, 2000). However, too much surplus also puts a firm at risk. A study of 467 takeover bids for large firms in the USA found that higher cash flow increased their takeover risk (Davis and Stout, 1992). Two studies by Tan and Peng (2003) found a curvilinear relationship between performance and slack, suggesting that there exists an optimal range for slack, beyond which slack can instead hurt performance. Similarly, Lecuona and Reitzig (2014) found that slack human resources became valuable when firms faced increasing competitive pressure, and became less important in routine operating conditions marked by substantial standardization. A study of 102 public and private hospitals in the United Arab Emirates found that extensive strategic planning mediates the relationship between organizational performance and slack (Fadol *et al.*, 2015).

As described above, diversity, meaning making and slack promote absorptive capacity in both potential and realized forms. The potential form includes acquisition and assimilation of new external knowledge. Realized forms include the capacity to transform and exploit (Zahra and George, 2002). A 2002 study of 462 general managers in a large, European financial service firm found that coordination capabilities (e.g. cross-functional interfaces, job rotation and participation in decision making) were antecedents to the development of potential absorptive capacity in their business units. Socialization capabilities (e.g. creating linkages between employees, encouraging newcomers to interpret information and respond within cultural norms) were found to be antecedents of realized absorptive capacity. Formalization (codification of rules and procedures) promoted transformation and exploitation of new external knowledge through recombination. In contrast, routinization (organizing tasks so they require little attention) negatively affected potential absorptive capacity, possibly because it separated knowledge and constrained joint learning (Jansen *et al.*, 2005).

Because absorptive capacity exhibits path dependence, an underinvestment in absorptive capacity today may seriously limit future options and an organization's future development (Cohen and Levinthal, 1990; Todorova and Durisin, 2007). Therefore, leadership and management decisions must consider not just current outcomes, but also how today's decisions might impact future environmental fit and value creation potential (Van den Bosch *et al.*, 1999). Leaders can enhance their organization's absorptive capacity by promoting diversity in hiring and stakeholder engagement practices. Similarly, building in opportunities for meaning making in meetings and through other socialization processes can help people become more comfortable with ambiguity and recognize power differentials that affect knowledge acquisition, assimilation and transformation (Todorova and Durisin, 2007).

Adaptive capacity

> No amount of sophistication is going to allay the fact that all your knowledge is about the past and all your decisions are about the future (Ian E. Wilson).

Adaptive capacity loosely refers to the ability of leaders to change to become more fit with the environment in which they operate, including but not limited to modifying existing procedures, adjusting to new circumstances, and updating knowledge and skills to meet new situational demands. In these VUCA times, adaptive capacity is critical at multiple levels of organization. Organizational structures are ever more ambiguous and dynamic. Employees not only belong to multiple teams and report to multiple leaders, but they also represent a high degree of diversity in terms of demographic and cultural backgrounds, abilities, working styles and preferences—all of which leaders need to take into accounts to be effective. To keep up with these constant changes means leaders need to continually learn, change and keep a flexible mindset.

At first glance, this proposition appears to be obvious. The natural question that follows is: if it is common sense that adaptive capacity is important, why are so many leaders lacking this skill? Two of the most important answers to this question are cultural—the culture of the USA does not perceive leaders showing change or inconsistency in a positive light—and psychological—leaders do not seek feedback as frequently as they should.

US-based research continues to dominate the leadership literature. Implicit within that scholarship is the American cultural assumption that doing and telling are more important than relating and asking (Schein, 2013). Task accomplishment is the rubric against which performance is measured, the key to career advancement, and the gold medal of success. In such a culture, it is no surprise that leaders have been referred to by both academics and the popular press as idols, heroes, saviors, warriors, magicians, and omnipotent and omniscient demi-gods (Morris *et al.*, 2005). These strong, heroic images presume that leaders are almighty, righteous, know all the answers and do what is best to save the company or the community they are leading.

Subsequently, these implicit cultural norms create expectations for leaders' behaviors that, if fulfilled, would result in more positive ratings of their leadership (Epitropaki and Martin, 2005). As a result, to maintain their status in organizations, leaders need to prove themselves capable (Huising, 2014) by asserting their experience, knowledge and confidence (Bonner and Bolinger, 2013). They also must be consistent in what they say and do, because inconsistency is perceived as incompetent or irrational (Mercier, 2011). All of these cultural and social pressures force leaders to create professional images that are all-knowing, confident and impervious to mistake or changes (Yanow, 2009). As a consequence of trying to protect their status and credibility, many leaders become reluctant to seek feedback or knowledge from others.

However, a major cause of leadership derailment is the very lack of continual feedback (Ashford *et al.*, 2003; Goleman *et al.*, 2013). Previous research shows that many organizational

leaders do not seek feedback and, if they receive it, often show dissent (Nemeth, 1997; Sprague and Ruud, 1988). Seeking feedback from others puts the seeker in a position of vulnerability and dependence; it is risky and not comfortable. Ashford and colleagues (2003) identified three reasons why people seek feedback: to get valuable information to help them achieve their goals; to defend, protect and enhance their ego; and to maintain and enhance self-image. They speculated that leaders' limited feedback-seeking behaviors would tend to fall into the latter two categories, which often manifested as impression management. Consequently, many leaders fall victim to defensive mechanisms (Argyris, 1985), and together they create a culture of organizational silence (Morrison and Milliken, 2000). Their positions of power, coupled with the lack of feedback and information from below, reinforce their discounting of other people's opinions (Yaniv and Kleinberger, 2000). This paradoxically boosts their self-confidence while simultaneously fostering inaccuracy in their decision making (See *et al.*, 2011).

There are many accounts of organizational disasters that occurred because leaders made bad decisions while ignoring information from lower-level employees (Dotlich and Cairo, 2003). Take the recent rapid downfall of the tech giant Nokia, for example. Nokia lost the smartphone battle and sold its handset business to Microsoft for $7.2bn in September 2013, a fraction of its estimated worth at $250bn in the early 2000s. As Vuori and Huy (2016) revealed in their recent study, Nokia failed because their leaders had created a culture of silence and fear within the organization. Top management put pressure to keep up with innovations in the market on middle management in a threatening way, while middle management's fear prevented them from reporting negative information they received from their engineers. As a result, top management became overly optimistic with Nokia's technological capacities and made strategic decisions that turned out to be mistaken. In this case, the lack of adaptive capacity at different levels of leadership rendered a competent organization helpless in the face of market changes.

In order to develop adaptive capacity, it is crucial to reconstruct the image and role of leadership. In a time characterized by VUCA, it is impossible for anyone to know everything. The role of leaders, then, should shift away from providing directions and solutions. Instead, leaders should focus on providing support to, connection with and integration among the different interdependent parts of the organization. To do this, leaders must ask better questions and build better relationships. They must transcend the dominant existing cultural norms of doing and telling. As Ed Schein (2013) asserted, "in an increasingly complex, interdependent, and culturally diverse world, we cannot hope to understand and work with people from different occupational, professional, and national cultures if we do not know how to ask questions and build relationships that are based on mutual respect and the recognition that others know things that we may need to know in order to get a job done" (pp. 1-2). This shift requires leaders to develop a sense of humility. Here, humility is not underestimating oneself, but rather the courage and ability to acknowledge one's limitations. Humble leaders appreciate learning and adaptation as required components of success in an increasingly unpredictable workplace (Kotter, 2007; Senge, 2006).

Some leaders may be concerned that showing humility may make them appear as lacking confidence or not being able to motivate others. However, recent research has shown that the opposite is true. Collins (2001) demonstrated that personal humility, along with strong professional will, distinguish great leaders from ordinary and good ones. Similarly, Owens and Hekman (2012) found that humble leaders produced positive organizational outcomes by providing their followers with good models of professional development, assurance and comfort about the feelings of uncertainty along their developmental journey. Owens *et al.* (2013) continued to show how humble leaders fostered learning-oriented teams and thereby increase employee engagement, job satisfaction and retention. Ou *et al.* (2014) presented evidence of humble CEOs' ability to connect top and middle management by

creating an organizational climate that emphasized empowerment and collective goals, thus ultimately improving their work engagement, affective commitment and job performance.

Building adaptive capacity starts with developing what Schein calls the "here-and-now humility"—the embrace of one's vulnerability and dependency upon other. This process takes several steps. First, leaders need to become self-aware of their own strengths and weaknesses (Owens *et al.*, 2013), have a grounded view of self and others (Tangney, 2000) and view their contributions within the larger context of the whole organization or community (Kallasvuo, 2007). Well-documented techniques such as mindfulness, double-loop learning (Argyris, 2002) and reflection in action (Schön, 1984) would help with this first step.

Second, leaders need to appreciate the contribution of others and learn to empower and delegate (Ou *et al.*, 2014; Owens and Hekman, 2012). Exemplary leadership involves fostering collaboration, strengthening others, showing appreciation for others' accomplishments and creating a community spirit to celebrate one another's wins (Kouzes and Posner, 2012). Third, leaders need to have a learning agenda for self-development. This may include being open to and aware of opportunities to learn from experience (DeRue and Wellman, 2009), genuinely seeking developmental feedback (Ashford *et al.*, 2003) and engaging in humble inquiry, "the fine art of drawing someone out, of asking questions to which you do not already know the answer, of building a relationship based on curiosity and interest in the other person" (Schein, 2013, p. 2).

Generative capacity

While absorptive and adaptive capacities are important to tackle such problems, they alone are not enough. Organizations must also build generative capacity, the two-pronged ability to both innovate and evoke affordances that promote ongoing innovation (Avital and Te'eni, 2009). Complex problems are challenging because they are novel—they do not fit into pre-existing categories, analytical frameworks or technical-rational conceptual maps. Therefore, they often require the generation of entirely new solutions. A generative approach is well suited for highly uncertain environments where there is very little information available (Steinbruner, 2002). It transcends analysis and rationality out of necessity, because there are no relevant empirical data to analyze. Like an alchemist, it transmutes uncertainty into a resource, an opportunity to invent new frames, structures, processes and relationships.

How can organizations in an ever-changing VUCA world methodically approach goal attainment to promote generativity? Effectuation offers a model (Sarasvathy, 2001). This theory posits that rather than organizations positioning themselves to exploit existing situations, entrepreneurs effectuate (create) new opportunities, such as developing new markets that never previously existed. In contrast to traditional management approaches based on causation (e.g. positioning a firm to achieve a goal through control and implementation of a plan), effectuational decision making uses heuristics like experimentation, novelty seeking and risk taking measured by affordable loss (Chandler *et al.*, 2011). It enables dynamism so the organization can remain closely coupled to its operating environment.

Effectuation also turns uncertainty into a resource by leveraging contingency (Sarasvathy, 2001). It does so by employing flexibility, openness, organic (vs mechanistic) organizational structure and a transformational leadership style (Read *et al.*, 2009). Providing empirical support for the value of this approach, a study of 2,532 project managers found that those who operated in high-innovation contexts employed an effectuation approach (e.g. using heuristics and thought experiments). In contrast, those operating in low-innovation contexts used causal logic focused on evidence and control (Brettel *et al.*, 2012). Similarly, a study on marketing decision making under uncertain

conditions found that 27 experienced entrepreneurs employed effectuation logic, emphasizing the importance of co-creating markets with partners and stakeholders. In contrast, the 37 less experienced managers relied on traditional predictive techniques, such as planning to gain competitive advantage (Read *et al.*, 2009).

While traditional strategic planning seeks to impose order through prescriptive action, this can result in detachment and misalignment from the operating environment in conditions of high uncertainty, as happened with in the Nokia example shared earlier. Developing generative capacity focuses on the creation of process structures to promote nonlinear epigenesis (Cicchetti and Rogosch, 1996), the capacity to achieve a preferred future through the development of multiple pathways to get there. This approach fosters organizational fitness by maintaining flexibility to accommodate changing conditions. This dynamic stability is maintained by focusing collective attention on the intangible and symbolic layers of reality (e.g. values, mission, patterns, processes, learning and relationships). This enables an organization to both adapt and sustain its identity over time. A generative approach also fosters interdependence. Whereas technical-rational management seeks to isolate variables and reduce analysis to individual components, process structures provide paths for feedback loops that accommodate recursive influences and reflexive causation, promoting information flow between internal and external boundaries at multiple scales (Todorova and Durisin, 2007).

Simon (1996) called this generative approach science before the fact, in contrast to traditional empiricism's science after the fact. He argued that systematic and rigorous processes of knowledge creation can be employed to increase an organization's capacity to anticipate, assess and create future potentials through the science of design. Importantly, he noted that design, because of its future orientation, requires very different methods of inquiry compared to empirical methods used to scientifically investigate the past. He argued that technical-rational cognition (positivism) works well for understanding past events and for managing situations with a high degree of information. In uncertain environments where there is little or no information, abduction, the logic of potentiality (Magnani, 2001) and practical reasoning (Donmoyer, 2009) are analytical methods that promote better fit. Tools of abduction include metaphor and visualization of information. As these generate new insights, ideas are captured not just in words but also through graphic and physical representations such as concept maps, affinity diagraming, storyboarding, sketching and model making (Pacione, 2010). Metaphors are also helpful to make novel and uncertain environments more understandable by juxtaposing them with known situations (Casakin, 2007).

Design can also serve as a future-oriented risk management function to decrease the chance of loss while expanding potential for future opportunities. Several industries employ design as a risk mitigation strategy. These include businesses that rely on innovation, e.g., the National Football League (Albergotti, 2012); exploration, e.g., oil and mineral companies (Borthwick, 1997) and High Reliability Organizations (Weick *et al.*, 1999) such as the military (Leedom, 2001), health care organizations (Begun *et al.*, 2003) and homeland security (US Department of Homeland Security, 2011).

Discussion

In natural systems, fitness is an organism's ability to survive and reproduce (Kauffman, 1993). Organisms and species that survive over time are those that fit with their environment. These dynamics also apply to organizations (McKelvey, 1999). What can leaders do to develop organizational fitness, particularly in times of VUCA? The conceptual analysis above suggests the need for an adaptive approach to leadership and capacity development. For contexts that feature abundant information, routine tasks, homogeneity and agreement about goals and values, traditional management strategies (e.g. prediction,

control, efficiency, cost/benefit analysis) are effective. When operating in VUCA environments characterized by uncertainty, heterogeneity, instability and interdependencies, it is essential to develop a new mindset to develop absorptive, adaptive and generative capacity because these three capacities promote information intake, flow and processing. They also maintain fitness by fostering flexibility (nimbleness) and continuous coupling with the operating environment through co-evolution.

The conceptual analysis further suggests that both the organization and its employees must develop these capacities. In complex systems, an efficient way to obtain a macro outcome (organizational development) is by activating the micro-level inputs. Expanding information intake and processing capacity of employees can foster self-organization through relational ties to increase capacity at the organizational level too (Roberts *et al.*, 2012). The development of absorptive, adaptive and generative capacity at both the micro and macro levels reflects another important quality of complex systems, self-similarity (patterns that repeat across multiple scales). Figure 1 illustrates this model.

Importantly, the model includes affective, cognitive and qualitative components that facilitate the process of information flow. It also illuminates neglected aspects sometimes missing from the capacity-building literature: diversity, meaning making and slack (absorptive capacity); openness to change, humility and feedback (adaptive capacity); and design, abduction and effectuation (generative capacity).

Developing a relational approach to organizing is fundamental to this model. At its heart, organizational viability is rooted in the dynamic interplay between internal and external relationships and their interdependence across time and space. Internally, macro-level effects depend upon the emergence of micro-level actions and interactions. Capacity to produce those micro-level effects depends on policies, practices, organizational structure and leadership at the macro level. Externally, capacity depends on relational embeddedness and

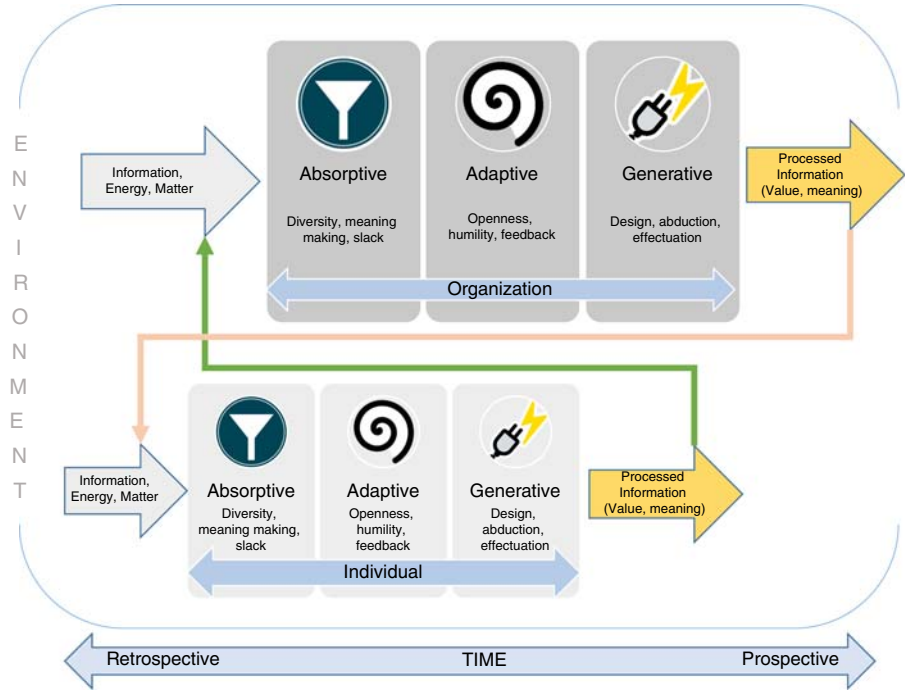

Figure 1.
Absorptive, adaptive, and generative leadership capacity in a complex system (VUCA environment)

interface with people and other organizations in the operating environment. For example, a study of 218 projects in German mechanical and plant engineering industries captures this dynamic. It found that "absorptive capacity emerges as an unintended consequence from organizational boundary spanners' external and internal relational embeddedness and their relational empowerment" (Ebers and Maurer, 2014, p. 318).

Shared leadership and genuine concern for employees fosters a process of mutual influence that further supports knowledge creation (Rai and Prakash, 2012). Rather than relying solely on hierarchical organizing, in a VUCA context leaders employ organismic (adhocratic, relational) rather than mechanistic (bureaucratic, compartmental) structures and processes (Johnson and Johnson, 1989). Organic organizational structures promote broader interaction among employees across hierarchical levels, often through face-to-face communications (Ramezan, 2011) that occurs more quickly and frequently (Nahm *et al.*, 2003). For example, a study of 251 firms with high competence in human resource management found that the degree of organic organizational structure had a positive relationship with perceptions of performance, mediated by learning capability of the organization (Mallén *et al.*, 2015).

Implications for practice

Collectively, absorptive, adaptive and generative capacities reflect key competencies that leaders and organizations need to thrive in VUCA environments. Building on the insights above, there is much that leaders can do to develop these three capacities within their organizations. In so doing, it will be important to think about and remain mindful of time horizons and cascade effects. This is because efficiency plays out differently under dynamic conditions (Ghoshal and Moran, 1996). Rather than looking to simply maximize financial returns today, the strategic questions become: what steps can we take to improve our situation now (e.g. developing realized capacity) that will simultaneously increase tomorrow's options (potential capacity)? What interventions at one level will also generate returns at other levels? Below are examples of such actions for implementation at the individual, group and organizational levels.

At the individual level, one of the most effective interventions is to develop employee engagement. Worker engagement is associated with increased absorptive, adaptive and generative capacity (Daghfous, 2004; Macey and Schneider, 2008; Whitney and Cooperrider, 2011). Engagement means that workers bring their full selves (cognitive, emotional and physical energy) to tasks (Kahn, 1990). A meta-analysis of 90 studies covering more than 25,000 employees found a strong correlation between employee engagement and work outcomes across multiple levels of analysis (Christian *et al.*, 2011). In the USA, only 25 percent of employees report being actively engaged, while 75 percent are neutral or actively disengaged (Fleming *et al.*, 2005). Evidence-based practices that increase engagement are supportive coaching and mentoring (e.g. regular developmentally focused performance reviews, goal setting and feedback), participation in decision making, and recognizing employee accomplishments (Serrano and Reichard, 2011).

Developing employees' personal resources (e.g. knowledge, relationships and psychological capital) is also associated with increased engagement (Serrano and Reichard, 2011). Psychological capital—having a sense of optimism, hope, resilience and agency—can be developed intentionally (Luthans *et al.*, 2007) through skills training to increase a worker's sense of mastery. It is also developed by leaders encouraging and expressing belief in their employees (Eden *et al.*, 2000). Expanding employees' openness to cognitive diversity (e.g. believing that others should be allowed to freely express differing opinions, recognizing that divergent perspectives have value) is also effective (Anderson and West, 1998). For example, openness to cognitive diversity is associated with enhanced knowledge creation capacity. A study of 98 workplace teams found that such openness led

to more robust discussion, debate and improved decision-making processes that facilitated knowledge creation (Mitchell *et al.*, 2009). Developing employees' personal resources will enhance their absorptive, adaptive and generative capacities.

At the group level, building a supportive work community (Maslach and Leiter, 1997) can increase workers' sense of psychological safety and sharing of their authentic selves (Kahn, 1990; Serrano and Reichard, 2011). To develop community, leaders must build a trustworthy culture (Macey *et al.*, 2009) and promote social cohesion (Shirom, 2006). Embracing and modeling relationally oriented behaviors such as open communication, enthusiastic collaboration and trustworthiness are effective ways for leaders to build social capital (cohesion) in firms (Carmeli *et al.*, 2009). Investment in these relational resources develops work groups' absorptive, adaptive and generative capacities and, in turn, generates increasing returns because engaging one employee tends to have a cascade effect among work groups (Bakker and Xanthopoulou, 2009).

At the organizational level, developing a learning culture is perhaps the most effective way to create openness and flexibility (Argyris, 2002; Argyris and Schon, 1978; Senge, 2006). Learning promotes first a change in mindset and then a change in behavior. Firms that invest time and resources solely in exploitation may enjoy short-term gains, but risk long-term self-destruction by ignoring learning, development and exploration (March, 1991). To develop a continuous orientation to learning, leaders and employees should co-create a learning agenda to frame developmental goals for the organization and its members. Processes such as appreciative inquiry can blend productivity with learning by investigating organizational problems through this action research approach (Argyris and Schon, 1978; Cooperrider and Srivastva, 1987). An appreciative inquiry approach invites reflection, mindfulness and humble inquiry. Further, it helps organizations check their assumptions, develop capacity to see their blind spots, and generate new ways of discovering and creating alternatives through double-loop learning (Argyris, 2002). It can also help firms surface and work through conflict, turning it from a problem into a resource. While organizations often try to avoid or minimize conflict, leaders can reframe disagreements as gifts of energy (Erwin and Pryzdia, personal communication, March 2017). Practices such as dialogue, authentic listening and conflict mediation can help organizations leverage and rechannel this energy to align efforts toward shared goal attainment.

Because organizational culture is a resource that can be endogenously created, it is thus within reach of every organization that wants to succeed in volatile, uncertain environments. This requires reconfiguring its cultural ethos from one that values and rewards only task and performance, to one that recognizes the important value creation potential of slack to accommodate learning, development and the emergence of opportunities that cannot yet be imagined. Structures and processes must be able to accommodate and promote emergence through self-organization rather than imposing control. Diversification of human capital, teams, board of directors and executive leadership will further expand the cognitive and information processing capacity of firms.

Concluding thoughts

The model outlined here offers guideposts to help leaders and organizations navigate more effectively through VUCA environments. By developing three fundamental capacities (absorptive, adaptive and generative), leaders can cultivate organizations capable of continuous synchronization with their fitness landscapes. The model extends prior scholarship by addressing gaps in the literature, particularly the essential role that diversity, slack, learning, humility, reflection in action and abductive logic play in developing capacity. By providing the underlying rationale for the proposed interventions (e.g. Ashby's law of requisite variety), the paper reorients busy leaders' mental models from traditional positivistic approaches (e.g. prediction, control and certainty) to show why capacity-building time investments are worth implementing.

Exploring the notion of evolvability (Kernbach *et al.*, 2009; Wagner, 2008; Wagner and Altenberg, 1996) is a promising path to further develop this model. While biological evolution can be explained through mutation, recombination and selection processes, research on complex systems and evolutionary computing suggests that adaptation also requires evolvability, the ability to incorporate and leverage random variations to produce improvement. Computational science (e.g. agent-based modeling) is a promising methodology to explore this line of inquiry since it accommodates randomness (Macy and Willer, 2002; Railsback and Grimm, 2012; Squazzoni, 2010; Wilensky and Rand, 2015). Programming would also need to include affective and relational parameters. As it has been shown in this paper, a relational orientation and willingness to embrace uncertainty are fundamental to success and sustainability in VUCA contexts. The key to breaking free from Plato's cave is to look beyond a technical-rational approach to organizational science, instead recognizing and developing intangible layers of reality (e.g. processes, knowledge and relationships) through metacognition and humility. Leaders are the key to catalyzing this shift.

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