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Innovation, Dynamic Capabilities and Leadership

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ABSTRACT

The world in which today's businesses operate has become not only riskier, but also more volatile, uncertain, complex, and ambiguous (VUCA). Organizations that hew too closely to traditional ways of operating will be hampered in their ability to succeed. In contrast, those that focus on new product and process developments coupled with business model innovation will leverage their dynamic capabilities. An essential overlay is entrepreneurial leadership from top management teams. Strong dynamic capabilities are impossible without it. We examine how business model innovations, dynamic capabilities, and strategic leadership intertwine to help organizations thrive in VUCA worlds.

Keywords: VUCA, Dynamic capabilities, Decision framing, Innovation, Strategic leadership

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1. Introduction

The US military coined the acronym *VUCA* (Volatility, Uncertainty, Complexity, and Ambiguity) in the late 1990s,¹ and it has become general shorthand for conditions leaders may encounter. Several authors have sought to define these and other components of environmental turbulence further, since their differences may matter when formulating specific strategies.² But leaders need to be prepared for many types of turbulence or upheaval. To pick a path through the fog, they will need organizational capabilities that can cope with insufficient insight, foresight, and understanding broadly.³

A *VUCA* world presents a shift in kind rather than just in degree. For example, the US military was accustomed to long-term, multifaceted conflict with clear enemies of known strength during the Cold War era, but had to rapidly adapt after the collapse of the Soviet Union. US forces increasingly encountered conditions of diffuse asymmetric warfare with agile, dispersed opponents motivated by ethnic and religious causes not always fully understood (such as the “War on Terror”). Similarly, for business, recent years have seen the ending of a period of relative stability, in which computers improved like clockwork, peaceful trade relations could be taken for granted, and the dominance of OECD economies appeared unassailable. The amplification of *VUCA* conditions may call for a quantum shift in decision approaches to managing innovation and competition, as discussed below.

Few managers in business, public administration, education, etc. deal with *VUCA* environments daily, and neither does the military—except during times of combat and other crisis situations.⁴ But top managers must take a longer view that includes *VUCA* awareness, or they may not be prepared when surprising events call for change. Leaders who came of age during more stable times may struggle with how to handle the turbulent or unpredictable markets in our digital age. They will likely cling to extrapolative planning, which limits their line of sight to linear projections emanating from standard planning and budgeting systems. They may continue to manage for risk (quantifiable) when they should manage for deep uncertainty (unfathomable).

Successful leadership in such instances is less about developing detailed plans and more about testing various hypotheses about emerging technologies and changing markets.⁵ Different kinds of leaderships matter here, ranging from highly visionary entrepreneurs to operationally focused managers who bring about practical change when necessary.⁶ *VUCA* conditions call for

entrepreneurial leaders who can architect new organizational capabilities that stimulate novel offerings and new business models geared toward the next big thing.⁷

Although strategic management researchers have examined the micro-foundations of organizational adaptation in groups or functions, more insight is needed about how these decision processes connect with higher-order (dynamic) capabilities such as sensing change, seizing opportunities, and transforming organizations. These three clusters are crucial to setting the directions for firm adaptation, yet are often invisible to outsiders. They entail the collective skills that organizations need when pursuing disruptive innovation, radically new business models, and strategic leadership. Such leadership can help change the mindsets of operationally oriented managers away from trying to be overly precise (and often wrong) toward trying to be roughly right. Both product and process innovation matter here depending on the organizational level considered, as well as the nature of the strategy (such as differentiation versus cost advantages). Product innovations usually face greater imitation risks than process innovations, because products can be more easily acquired, analyzed, and reverse engineered.⁸ In either case, the deeper challenge is to move beyond reactive or incremental innovations, since these will at best develop capabilities that are congruent with current operations or orientations in the firm at time when new incongruent ones are needed

Our paper examines the challenges of developing new capabilities required to escape a firm's current business model and skill sets ahead of disruptive change. An example is Shell's long term strategy to thrive in a world of clean energy, beyond oil, which entails a host of complex organizational challenges in years to come.⁹ The existential threat associated with remaining petroleum focused in a world where oil prices stay low forever requires analyzing linkages between VUCA environments, high-order organizational capabilities, business model innovations, and strategic leadership orientations. Sections 2 and 3 explore the connections between dynamic capabilities and business models. Section 4 examines the importance of leadership, including strategic reframing, when managing innovation amid uncertainty. Section 5 summarizes the paper.

2. Capabilities Needed for Innovation in VUCA

VUCA worlds are distinctive in their dynamics and kind. The classic work by Emery and Trist in the 1960s was among the first to distinguish between placid and turbulent environments, and

subsequent academic research has examined multiple dimensions of instability.¹⁰ Considering the potential diversity of VUCA worlds and the practical need for differentiated strategies and metrics, top priority must be given to high-order capabilities that can handle any environment. The distinction between ordinary and dynamic capabilities is critical, so we begin by reviewing ordinary capabilities before examining in detail the three clusters of dynamic capabilities that firms need to profit under conditions of deep uncertainty.

“Ordinary” capabilities underpin the production and sale of a defined set of products and services in the company’s current environment, such as efficient manufacturing, effective marketing, strong partnerships, and capable operational leadership. It is critical for organizations to have access to such ordinary capabilities, although they need not own them directly. In many industries, ordinary capabilities are reasonably ubiquitous and can be sourced at competitive prices. In the energy sector, for example, large firms in offshore drilling rely heavily on established networks of highly specialized contractors. The profit may not come from the drilling, which for many decades was an important ordinary capability, but from each firm’s unique in-house geological knowledge to determine where to drill, often combined with unique relationship capital linking firms to national governments.

For a reasonable chance at earning more than competitive returns, businesses must combine strong ordinary capabilities with proprietary (often intangible) assets. Dynamic capabilities enable firms to identify profitable configurations of competencies and assets, assemble and orchestrate them, and then exploit them with an innovative and agile organization. Ordinary capabilities enable identification of important process innovations, and dynamic capabilities help identify new products and services, potentially opening new markets where rivals have not yet appeared. Each type is important in different ways. Dynamic capabilities are about doing the right things at the right time, based on new product (and process) development, unique managerial orchestration processes, a strong and change-oriented organizational culture, and a prescient assessment of the business environment and technological opportunities.¹¹

Possessing ordinary capabilities alone will rarely suffice to support long-term competitive advantage, particularly in VUCA worlds, and they can even distract from preparing for the future.¹² For example, Henry Ford perfected the manufacturing efficiency of the Model T but eventually lost competitive advantage because it became the wrong car for a changing consumer market. It took Ford years to design the Model A, and in the meantime General Motors

leapfrogged Ford in the US and global markets. Likewise, Nokia was very good at making feature phones that employed a rudimentary operating system that could at best tap a small subset of the Internet that would fit a very small screen. After the 2007 introduction of the Apple iPhone demonstrated the presence of a well of latent demand for a converged phone-computer experience, Nokia was too slow to adapt and rapidly toppled from its perch as the top-selling mobile phone brand. As Nokia CEO Steve Elop acknowledge in 2011, “Our competitors aren’t taking our market share with devices; they are taking our market share with their entire ecosystem.”¹³

Developing dynamic capabilities can provide safeguards around the common pitfalls of organizations being infatuated with ordinary capabilities and best practices. Dynamic capabilities help the firm monitor its external environment to assess the durability of current business model. If the model is fragile, firms with dynamic capabilities can better create, integrate, and reconfigure internal and external competencies to tackle conditions that would otherwise undermine their current market positions.¹⁴ Dynamic capabilities also govern how ordinary capabilities should be combined and re-orchestrated inside the firm, and which capabilities need to be added or retrenched. In short, dynamic capabilities serve as the bridge between the present and future. Without them, an organization is stuck and will likely be deeply disrupted by change.

“Dynamic capabilities” is not just another name for “strategy.” In the dynamic capabilities framework, strategy is closely connected with, but separate from, capabilities. Strong dynamic capabilities lead to a coherent collection of knowledge and skills needed to address near-future market opportunities and development of a viable business model. Strategy is about the detailed determination of ways that these can best be leveraged given top management’s understanding about the behavior of rival firms. Deciding which segments to enter, creating new dimensions of competition, setting price points, structuring alliances, targeting geographical regions, and developing talent are the province of strategizing.

Because dynamic capabilities are not tied to a particular line of business, they overarch the enterprise and can provide the underpinnings of sustainable competitive advantage. A firm with strong dynamic capabilities can sense and seize opportunities before rivals do. It can grow new businesses without necessarily undermining existing activities, although it must, if necessary, be willing to cannibalize its traditional revenue stream. Strong dynamic capabilities may even enable the firm to shape the surrounding business ecosystem in its favor by setting

standards, influencing the development of regulations, or other means. These benefits can be complemented by incremental operational improvements to enhance efficiency and effectiveness. But when radical innovation is called for, incrementalism will not suffice.

Dynamic capabilities are hard to develop and deploy, and therefore will be difficult for rivals to imitate once successful. They reside, in part, in “signature” organizational processes that emerge from each firm’s unique history, investment, culture, experience, and problem-solving techniques. This path dependence will impact how future opportunities and threats are addressed.¹⁵ To be effective, dynamic capabilities need to be deeply baked into an organization’s culture, since shared values guide risk-taking, experimentation, learning, and failure tolerance. But this embeddedness may also obstruct sensible strategic moves the organization needs but is ill equipped to handle, such as making a decisive break with the past. Since dynamic capabilities may also reflect the unique experiences, intuition, and cognition of key managers, new executives may need to join the firm to turn a ship that has run aground.¹⁶

Dynamic capabilities as such consist of a broad range of activities, including new product development, business model innovation, and alliance formation. In the remainder of this section, we examine the three main pillars of capabilities that enable an organization to sense change, seize opportunities, and transform itself to navigate volatile future environments.

2.1. Sensing Change

One important cluster of dynamic capabilities is sensing market changes before rivals do. In turbulent environments, it is important to detect shifts and understand their deeper implications for competition. Below, we discuss concrete ways to enhance a firm’s sensing capabilities in a VUCA world.

To detect stirrings in the external environment, organizations need to develop strong peripheral vision. This means a superior ability to notice incipient change, equivalent to “seeing around corners.” In the human eye, rod cells (used for peripheral vision) outnumber cone cells (used for central vision) by a factor of ten. In organizations, however, the opposite seems to be the case. Employees are usually focused on their jobs, and it is often unclear who is responsible for monitoring the periphery—where early warning signals are usually visible first. Since frames filter and focus attention, the periphery may not get enough attention. Day and Schoemaker provide tools to keep a partial eye on the wide periphery surrounding where an organization is

not currently focused.¹⁷ Unrecognized threats and opportunities may lurk there, especially under VUCA, and tools are essential in developing sensing capabilities in an integrated manner. For example, tools for external scanning and scenario planning should be linked systematically to dashboards that monitor key trends and uncertainties, or other types of decision support systems.¹⁸

A learning organization must enable the rapid dissemination of new knowledge laterally and vertically. The sales and marketing group of Novartis, for example, replaced its standard scripts for sales calls to doctors, as well as associated preprinted materials, with a high-tech approach. The latter entailed customized digital technologies to improve how its global sales force could interact with physicians and among themselves.¹⁹ Novartis equipped its sales representatives with mobile devices that allowed rapid access to the latest data that would be most relevant for a particular physician at a particular time. Improved interaction with physicians meant that the sales reps were more likely to get useful information (such as insight into potential opportunities) as part of a sales call. The devices also enabled direct sharing of innovative practices across locations, rather than relying primarily on one-way messages from headquarters to various regions. While some of Novartis' competitors also used digital sales tools, they were designed to support, rather than to totally transform, the conventional model.²⁰

To help organizations see future opportunities sooner, Russell Ackoff's model of "idealized design" is a powerful practical way to reframe conventional thinking.²¹ It asks managers not to focus on near-term obstacles but to think big without feeling constrained by the status quo. Ackoff did this effectively when he helped the old Ma Bell telephone system reimagine the basic telephone. First, he asked them to ignore regulatory and technological constraints. This essentially removed myopic reference points and boundaries restricting people's viewpoints. Next, he challenged AT&T leaders to imagine what an idealized telephone would look like in the future. These creativity exercises allowed AT&T to envision decades ago the features that became standard in telephones, such as voicemail, call forwarding, call memories, and conference calls. This kind of "ideal point" planning will often encounter legitimation challenges within an organization, since the newly envisioned ideal states may seem out of reach. They will remain out of reach unless leaders help employees recognize the value of such bold imagination exercises as part of a broader long-term perspective on organizational competitiveness and renewal.

At a fundamental level, sensing is about detecting weak signals in the broader marketplace, including government regulations, technological developments, economic trends, and sociopolitical currents. In VUCA worlds, weak signals may be the only kind available before a major shift erupts. To see looming threats sooner, organizations can select from approaches such as the following, depending on their need and capacity: develop scenarios to explore the combined impacts of uncertainties; harvest worrisome signals from external networks (akin to strategic radar); check internally for signs of willful blindness or normalization of risk; and guard against wishful thinking, denial, delay, and myopic responses.

Signals identified as potentially important must be further probed and tested in practical ways to arrive at a deeper understanding of embedded opportunities and threats. The following techniques, for example, can help assess opportunities: lead-user innovation and open innovation;²² prediction markets, crowdsourcing, and forecasting tournaments; dynamic management of a portfolio of growth options; rapid exploration via probes, real-options plays, and occasional first moves; and developing external networks and strategic alliances.

2.2. Seizing Opportunities

Astutely sensing opportunities and threats is necessary but not sufficient to succeed when surprises occur in a business environment. The firm must also seize opportunities in timely ways by successfully innovating and implementing new systems that take advantage of external changes. This is the second pillar of dynamic capabilities.

IBM's original success—and the stumbles of GE, Westinghouse, and Sperry Rand—in electronic computing are emblematic. IBM was a latecomer, but it doubled down under the leadership of Thomas Watson Sr. and bet the company on developing the IBM 360 system, which initiated IBM's leading market share for more than thirty years. The process of seizing can be quick or can extend over many years, as in the case of DuPont's successful entry into biofuels. DuPont's strategy involved more than a decade of research followed by years of development. Its leaders pursued a real-options approach, using small, exploratory investments and repeated assessments to winnow more than a dozen biofuel technologies down to the most promising prospects. These activities took place in a business unit created for just this purpose, so DuPont's other businesses would not interfere with the decision-making process.²³

Kodak's precipitous decline shows how difficult it can be for a successful firm to respond to external change in a timely fashion, even after recognizing threats or opportunities. Senior leaders, as well as R&D scientists inside Kodak, knew for some time that digital photography was an emerging threat.²⁴ But the digital future unfolded more quickly than top Kodak leaders' cognitive frames allowed. The first digital cameras entered the market in 1999, at which time Kodak forecasted that they would account for only 5 percent of the market ten years out. By 2009, however, 95 percent of cameras were digital, marginalizing Kodak's well-honed chemical emulsion platform for analog processing. Between 1988 and 2008, Kodak reduced its number of employees by more than 80 percent. In 2012, it filed for bankruptcy. Kodak's leaders had been overly wedded to the firm's dominant business logic and had difficulty fully understanding—let alone harnessing—the speed at which digital photography would take over. External frames, new leaders, and separate organizational structures are often necessary for new cognitive perspectives to take hold and innovations to flourish.²⁵

In other cases, the incumbent technology finds ways to become more competitive, at least for a while. This happened, for example, in the late nineteenth century, when slow sailing ships were modified to become fast “tea clippers” to compete with steamships for trade with China.²⁶ It happened again when cathode ray tubes became thinner and lighter in response to the emergence of liquid crystal displays. But such incremental changes are rarely sufficient to hold back a tidal wave launched by a VUCA-type technological disruption, unless some sort of regulatory barrier gives incumbent firms a temporary shelter.²⁷

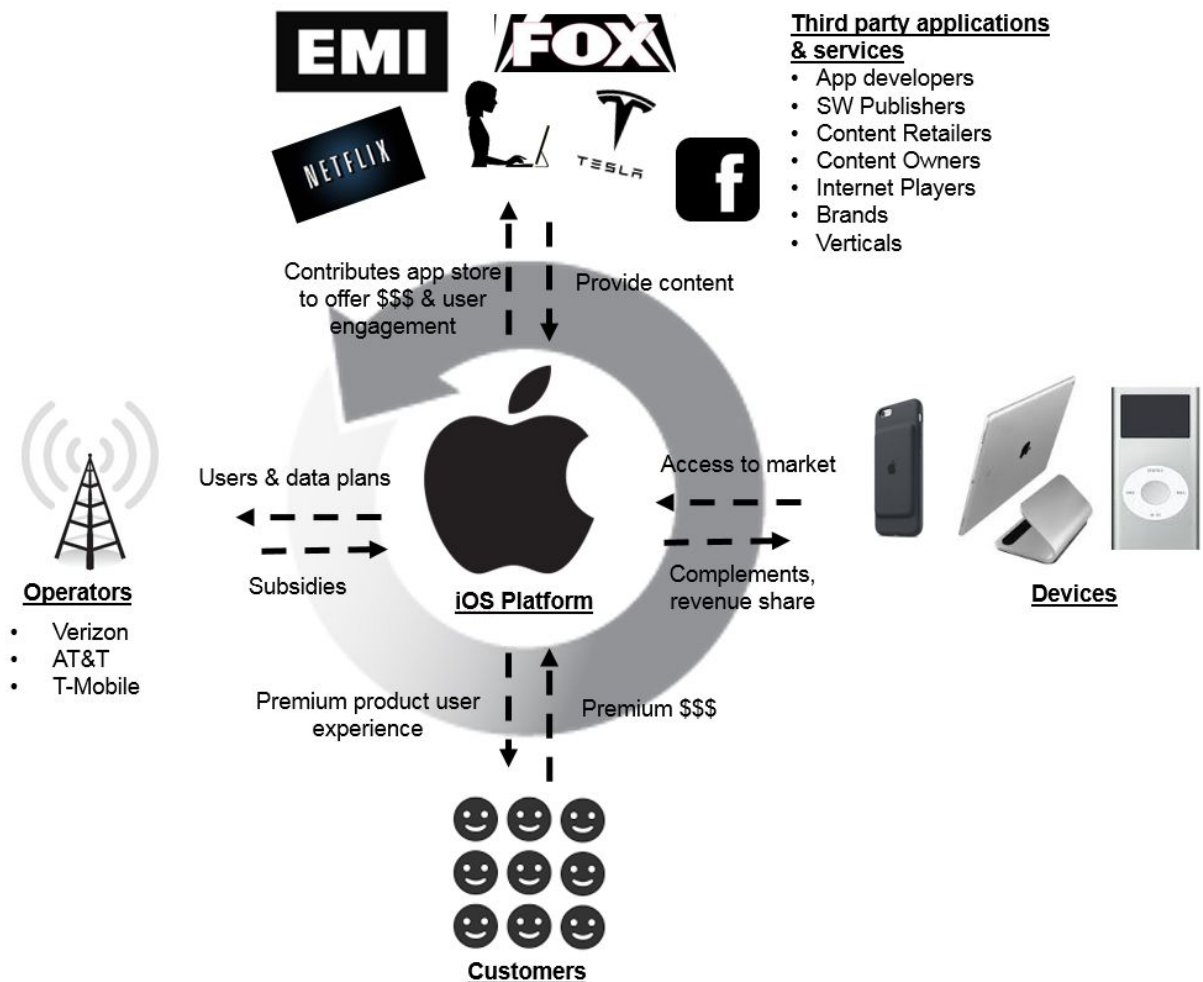
2.3. Transforming the Firm

When dealing with a VUCA environment, it is often not enough for firms to adapt to changes incrementally. They may need to reshape themselves and perhaps their ecosystems to reap full advantage of new business models. Periodic organizational renewal is the third pillar of dynamic capabilities.

The rise of Apple, led by Steve Jobs, to the top of the tech world began with the systematic creation of a business model for the iPod. This strategy entailed both internal organizational change and external influences on the surrounding ecosystem. Apple was not the first to create an MP3 player, but it was the first to open a digital music sales platform, the iTunes Store, with its underlying technological and organizational infrastructure for e-commerce.

Apple realized early on that merchandising the legal downloading of music and video would require the cooperation of the content owners (record companies and music publishers) that were terrified of digital piracy following the devastating effect Napster had on compact disc sales. Apple had to transform itself from a product-driven company to an ecosystem-focused enterprise, bringing content and apps into a newly managed environment. This strategy would prove attractive to not only Apple but also its many ecosystem partners, including content providers, app developers, and network infrastructure providers (see Fig 1).

FIGURE 1: The Smartphone Ecosystem



To succeed with a platform-based business model, leaders must bring partners on board by aligning interests, developing trust, bridging differences, and engaging in deep dialogue. In the case of Apple’s iPod, the key was Apple’s orchestration of digital rights management

software, known as FairPlay, which enabled clearly specified usage rights and controls (see Fig 1). After extensive high-level negotiations, the main content owners participated because they recognized the potential for Apple's bundle of attractive hardware, intuitive software, and rights-controlled marketplace to provide the mainstream public an appealing alternative to illegal downloads. The availability of easily downloaded music was, in turn, a key attraction for consumers and undergirded Apple's success with devices.

As Apple leveraged its iPod success into the iPhone and iPad, it populated the iTunes Store with apps and videos, creating a major new revenue stream. Apple's transformative business model has become the de facto standard for the mobile environment, disrupting the markets for mobile phones, personal computers, and digital cameras. In short, Apple strategically inserted disruptive VUCA conditions into the environments of its competitors. This especially undermined the competitive advantages of electronics firms and eventually other mobile phone procedures. Apart from Apple, firms such as Whole Foods (now part of Amazon) and others have successfully deployed broad ecosystem strategies, as discussed below.²⁸

3. Dynamic Capabilities and Business Model Innovation

The destabilizing effect of VUCA conditions often demands modifications to existing business models. But as Apple showed, business model innovation can help firms take advantage of VUCA—either by adjusting their current model(s) or, more likely, creating new ones. Other examples include such “sharing economy” firms as Uber and Airbnb that save on capital and share risk with their contractor-partners. This helps those involved to be more adaptive to market changes occasioned by VUCA, while disrupting incumbents. Pharmaceutical firms like Pfizer and Sanofi, experiencing a scarcity of new drugs, are experimenting with a new risk-sharing business model by allowing NovaQuest, a private startup specializing in life sciences, to fund late-stage clinical trials of certain drugs in exchange for an interest in the potential profits.²⁹

Dynamic capabilities, as discussed above, are central to a firm's business model and innovation prowess.³⁰ The crafting of competitive business models is a critical micro-foundation of a firm's “seizing” capabilities. An effective business model articulates the logic of how a business creates and delivers value to customers. It also outlines the architecture of revenues, costs, and profits associated with the business enterprise delivering that value.³¹ Important

functions of the business model include identifying unmet customer needs, specifying the technology and organization that will address them, and capturing value.

Although data and formal analysis can be important inputs to business model design, the process is as much art as science. Business models are seldom successful “out of the box” and must be fine-tuned—and sometimes completely overhauled—before they can become scalable profit engines. The “lean startup” model that has spread beyond Silicon Valley emphasizes the capacity to “pivot” by quickly testing, discarding, and replacing ideas and models that do not work.³² Entrepreneurs (and innovative managers in larger firms) who can learn and adjust quickly are more likely to succeed. To truly prosper in a VUCA world, proactive organizational and business model innovations are required to break the reactive approach to change. This is the fundamental challenge facing firms facing VUCA conditions and often the source of failure as they respond to environmental change.

While management in VUCA worlds demands bold innovation, a degree of integration of new activities into the organization must nonetheless be managed. Not only must the internal logic of a business model remain coherent (short of splitting off the new business),³³ but the business must also have some alignment with the internal structure and overall management model of the company.³⁴ The evolution/revolution balance is hard to get right, and major business model transitions within an existing business cannot succeed without astute strategic leadership, as discussed below.

Traditional taxi companies, for example, have made scant progress in mounting a defense against the disruption led by ride-sharing companies Lyft and Uber, whose business models are based primarily on capabilities in software and data processing. These require a completely different frame than the phone calls, schedules, and axle grease that characterize the typical cab company. Many business models that are new to a given firm may bear resemblance to previous ones elsewhere. These “new” ones will likely involve a permutation or hybridization of existing models, as in the earlier example of drug companies funding clinical trials with outside investors. This model has long been used in Hollywood to fund large-scale productions.

Creative uses of the Internet have unleashed numerous new business models. Many have become winner-take-all markets characterized by strong network effects.³⁵ Business models based on many-sided platforms, like eBay, connect large but scattered groups of small buyers and numerous small sellers on a global scale.³⁶ A new wave of business model innovation is

emerging thanks to the Internet of Things (IOT) by directly connecting with industrial machines, home appliances, package locations, devices, cars, pets, and other objects. The IOT will allow firms to monitor how customers use a product, which might, for example, enable a model of usage-based rental instead of a one-time sale. Also, the availability of massive amounts of data from the sensors distributed throughout the IOT creates new possibilities for its sale or use. With so many possibilities, the dynamic capability to “orchestrate” business model components takes on particular salience. The opportunities for recombination may be virtually endless, and although many will fail, akin to the long odds facing mutations under natural selection in the biological sphere, some can spawn remarkable innovation.³⁷ Strong dynamic capabilities can help to work rapidly through the candidate combination under consideration.

Business model innovation that leads to change in an existing model is generally not straightforward, because changes in one element of a business model may entail changes in others. Internal coherence is vital, and interdependencies are not always apparent. If sequences of substitution and addition transform a once-simple business model into a complex system, new “emergent” properties or unintended consequences can arise.³⁸ For example, Facebook did not fully realize how its social media platform could lead to the spread of fake news, hacking of user profiles, and anxiety or bullying of teenager user.

Uber is a prime example of a firm that leveraged business model innovation to create VUCA conditions for its rivals. However, Uber also created multiple VUCA challenges for itself, owing to its aggressive act-first-and-ask-permission-later approach.³⁹ Uber’s software is the linchpin of its business model, integrating thousands of drivers and customers in large cities, including determining when surge pricing should be implemented due to peak demand. Uber’s core competitors—standard taxi companies—are mostly small, low-technology enterprises that use long-term contracts with drivers employing limited information technology in a defined geographical area. Before the advent of Uber, these taxi companies enjoyed restricted competition. The key assets of taxi companies are typically locational, such as regulated privileges to occupy city taxi stands near high-traffic locations like hotels, malls, hospitals, train stations, or airports. They mostly acquire customers via proximity-linked interactions, as well as partnerships and contracts.

In opposition to these “standard” companies, Uber relies heavily on software and data skills, enabled by advances in information technology and social media. Table 1 provides a more

complete list of features that help distinguish Uber’s business model from that of a traditional taxi company.⁴⁰ Uber’s model exemplifies the concept of “coherence.” Its GPS requirement, for example, provides predictable response time for the customer while facilitating the driver’s identification of the customer’s location. Similarly, preapproving credit shortens the exit time from the vehicle, improving the experience of customers, drivers, and even other motorists behind the Uber vehicles. The relative ease of entry for drivers also helps the company maintain a large base of available cars in many locations. Because of its flexible workforce, minimal investment in heavy assets like cars, and ability to leverage learning across multiple markets, Uber can manage VUCA conditions better than more rigid, asset-intensive firms.

Table 1. A Comparison of Taxi Business Models

	Traditional Taxi	Uber Cars
GPS driver guidance	Optional	Mandatory
Know exact location and arrival time of vehicle	No	Yes
Spend time in vehicle on payment	Yes	No
Easy choice of vehicle class	No	Yes
Drivers are employees or independent contractors	Mixed	Independents
Common procedure across geographies	Locally	Globally
Easy ability to provide feedback on service	No	Yes
Can be hailed on the street	Yes	No
Customer acquisition via	Partnerships	App
Driver owns or leases car	Mixed	Yes
Computer dispatched	Mixed	Yes
Payment	Cash or credit	Cashless (cards only)
How company is paid	Mixed (revenue and profit split, plus per diem)	Revenue split with driver
Customer rating of driver	Difficult and not required	Easy and required

Uber demonstrates another feature of successful business model innovations: self-reinforcing loops. In cities that did not previously have dense networks of cars for hire, Uber

brings the car services to the customer in such an improved manner that some customers see no need to own a car. This has a positive feedback effect, because as the customer base reduces its car ownership, the demand for Uber and similar services goes up.

However, Uber has recently run into difficulties in part because founder and former CEO Travis Kalanick appears to have insufficient empathy for disrupted constituencies.⁴¹ Uber's business practices in other areas have been seriously challenged, too, from haphazard management styles to theft of intellectual property and gender discrimination. The major reputational hits the company has taken, including the forced resignation of Kalanick, highlight the value of retaining support from key stakeholders when navigating turbulent social and political issues. Other challenges remain as well, such as the safety of self-driving cars.

Of course, pioneering a new business model is hardly a guaranteed path to success. But for platform-based business models, a first-mover advantage can be quite durable due to their "installed base" characteristics, which can be enhanced by creating switching costs. Amazon's business model, for example, aims to make customer relationships "sticky." Its Amazon Prime offers free music, movie streaming, special Kindle features, unlimited two-day shipping of purchases, and more for a fee of about \$100 per year. This strategy helps reduce the short-term vulnerability of a firm to VUCA effects, giving it more time to respond to an unforeseeable shock.

There is usually not one "right" business model innovation, since there is no way to be certain in advance of which variations will thrive in a world shaped by VUCA. But it helps win the innovation game if the business model is asset light, scalable, coherent, agile, and robust—although this is not all easy to achieve. For example, online retailers from Amazon to specialty clothing manufacturers are still experimenting with finding the right role of brick-and-mortar operations using limited inventories and short-term leases in an effort to expand their customer bases.

4. Leadership, Reframing, and Innovation

Navigating a VUCA world at the head of a company, business unit, or team requires special leadership to keep the organization nimble, committed, and profitable.⁴² The more uncertain the environment, the less likely that the strategy and business model working today will be viable tomorrow. Leaders must be like classical musicians who follow a tight script for the part of the

strategy deemed robust, as well as jazz performers who can improvise around key themes as necessitated by unexpected change. In this section, we examine how leaders can develop the individual capacity to better manage these inherent paradoxes and how they can create organizations adept at developing strong dynamic capabilities.

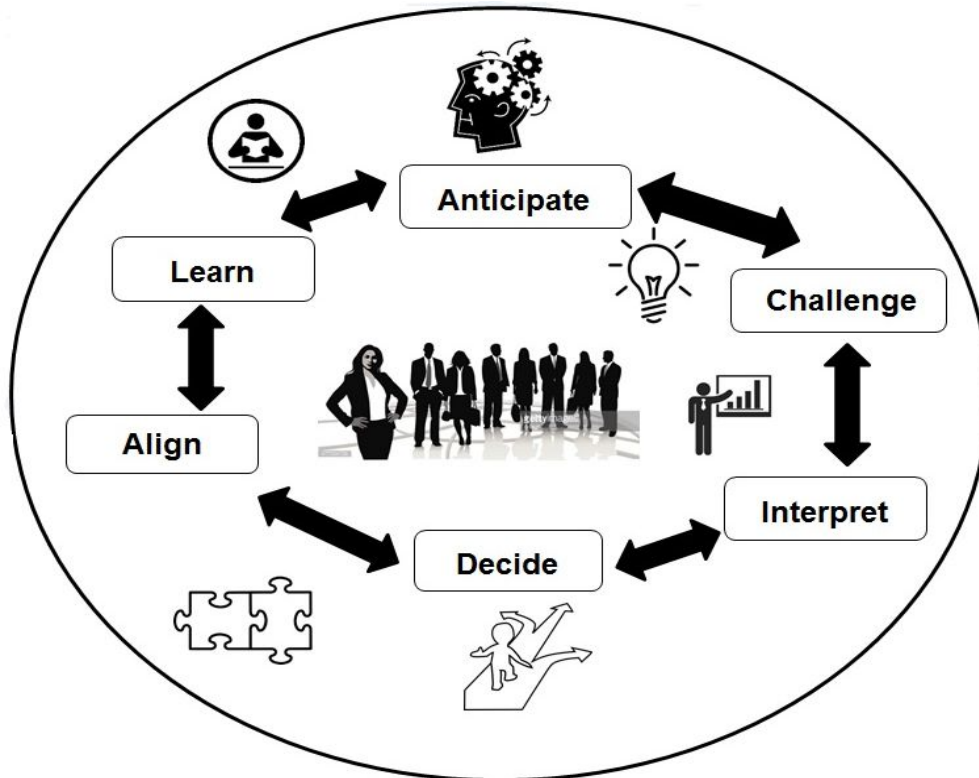
The entrepreneurial leader needs to be confident but also open to information, insights, and observations from others. Leaders are motivated to make a difference, or as Steve Jobs put it, they aspire to “make a small dent in the universe.”⁴³ Merely seeking wealth for themselves can be counterproductive, as it likely leads to a short-term focus rather than building sustainable competitive advantage. There has to be deep passion. Jobs, for example, was enthralled with calligraphy, which sensitized him to the value of font design. Years later, his attention to fonts helped make Apple’s Macintosh computer a leader in desktop publishing. Jobs imbued all of Apple’s product design efforts with his vision of elegant simplicity. It brought Apple higher margins on its products than competitors who were primarily focused on product functionality with little feel for product aesthetics.

When an organization is under serious threat, the entrepreneurial leader usually feels a sense of stewardship and strives to preserve viability. Such leaders will be unrelentingly committed to achieving organizational survival via renewal and rebirth. Managers can play three types of roles in such organizations: operational, entrepreneurial, and leadership.⁴⁴ These roles might be split across different jobs or combined in a single individual. Most business schools teach the skills needed for the first role, operational management. Entrepreneurial and leadership skills, in contrast, are difficult to teach and absorb if they have not already developed naturally. Entrepreneurs identify new avenues for growth and develop a vision of the future, while leaders convince others in the organization to share the vision and work toward the success of the organization as a whole. The combination of entrepreneurship and leadership in a single individual or small team constitutes what has been called “entrepreneurial management” and “strategic leadership.”⁴⁵

Figure 2 lists six critical characteristics of strategic leaders to succeed in VUCA.⁴⁶ Well-known leaders have mastered these leadership disciplines at high levels. Jeff Bezos, the founder of Amazon.com, *anticipates* what lies around the corner, as evidenced in his serial successes with Kindle and Amazon Web Services, which fit together as part of a coherent whole. Key to this is his willingness to take a long-term view, often at the expense of short-term profits. In his

words, “We’re willing to be misunderstood for long periods of time.”⁴⁷ This patience and anticipatory capacity allow him to sense and seize opportunities well before rivals do.

Figure 2. Six Leadership Disciplines Needed for VUCA



Challenge and interpretation are leadership disciplines that undergird an organization’s ability to sense and seize in a timely manner. Pope Francis is an exemplar of a leader willing to *challenge* his own organization to realign with changing realities while guarding Catholic canons. Charles Holliday, DuPont’s CEO in 2007, astutely *interpreted* weak signals foreshadowing the 2008 recession by connecting disparate dots. One concerned a major Japanese customer’s cash-flow problems; another signal was an unusually low occupancy rate in DuPont’s Wilmington, Delaware, hotel; and a third came from Detroit carmakers being unable to provide production plans on time.

The ability to *decide* with incomplete information was exemplified by Laurence Golborne as minister of mining in Chile. In August 2010, a coal mine collapse trapped thirty-three miners seven hundred meters underground. As a former business executive, Golborne took personal charge and challenged the traditional mining rescue model, such as digging one tunnel

versus multiple. As minister, he was able to *align* divergent perspectives about where and how to drill tunnels.⁴⁸ Being decisive inside the fog of uncertainty and bringing others along are leadership traits that strongly connect with an organization's capacity to seize opportunities at the right time, even if uncertainty remains high. Alignment also plays a central role in transforming an organization—the third dynamic capability discussed earlier.

Last, in terms of *learning*, Nelson Mandela stands out. Being a lifelong socialist and early on even a communist, he fought fiercely for the oppressed and was imprisoned for twenty-eight years. After being elected president of South Africa in 1994, he wanted to nationalize many of the country's large industries. But communist leaders from China and Vietnam told him during a World Economic Forum in Davos, Switzerland, that they favored privatization instead. In response, Mandela (at age 86) radically changed his lifelong socialist dogma and embraced not just individual freedoms for citizens but also freedom for economic markets.⁴⁹ A mindset open to learning and exploration is especially crucial in seizing, as this often requires an options approach by staged investments. Learning is also highly relevant in sensing and transforming.

When companies lack specific leadership skills (detailed in Table 2), their organizations will have insufficient capacity to detect, interpret, and act on ambiguous signals of fresh threats or new opportunities emerging at the periphery.⁵⁰ By nature, organizations are narrowly focused on their current businesses—a complicated landscape of markets, customers, competitors, regulations, technology, media, and stakeholders. But a singular focus on operations will only maintain acceptable performance in stable times with modest competition. Under VUCA conditions, wide-angled perception and new visions become crucial. This entails monitoring other industries, remote markets, new research, emerging business models, and arcane demographic data that may seem to have little relevance. It means knowing where to look for clues, how to interpret weak signals, and when to act amid ambiguous signals. Most crucially, it requires that leaders know how to unleash controlled revolution in their organizations to counter the deeply rooted inertia that keeps firms anchored in the past.

Table 2: **Strategic Leader Skills for VUCA**

Anticipate

Most leaders focus on what’s directly ahead, lacking “peripheral vision.” This leaves them vulnerable to rivals who detect and act on ambiguous signals. Leaders who anticipate:

- ✓ Look for game-changing information at the periphery
- ✓ Search beyond current boundaries
- ✓ Build wide networks to help them scan the horizon

Challenge

“Conventional wisdom” is tempting—but woe be to the leader who swallows every myth and opinion at face value. Critical thinkers question everything. They tend to:

- ✓ Reframe problems to understand root causes
- ✓ Challenge current beliefs and mindsets
- ✓ Uncover hypocrisy, manipulation, and bias

Interpret

Ambiguity is unsettling. Faced with it, many leaders rush to judgment. The strategic leader holds steady, synthesizing information from many sources before developing a viewpoint. Savvy sense makers:

- ✓ Seek to understand patterns from multiple data points
- ✓ Engage others to weigh, filter, and develop insights
- ✓ Check for decision biases and test multiple hypotheses

Decide

Many leaders fall prey to “analysis paralysis.” Strategic leaders use process and discipline to arrive at a “good enough” position. They tend to:

- ✓ Carefully frame the decision and approach
- ✓ Balance speed, rigor, quality, and agility
- ✓ Make (asset-light) commitments even with incomplete information

Align

Perfect consensus is rare. A strategic leader must foster open dialogue and engage key stakeholders, especially when views diverge. An alignment-focused leader can:

- ✓ Understand what drives diverse agendas and is hidden
- ✓ Ensure tough issues are surfaced to pinpoint misalignment
- ✓ Provide a compelling strategic vision

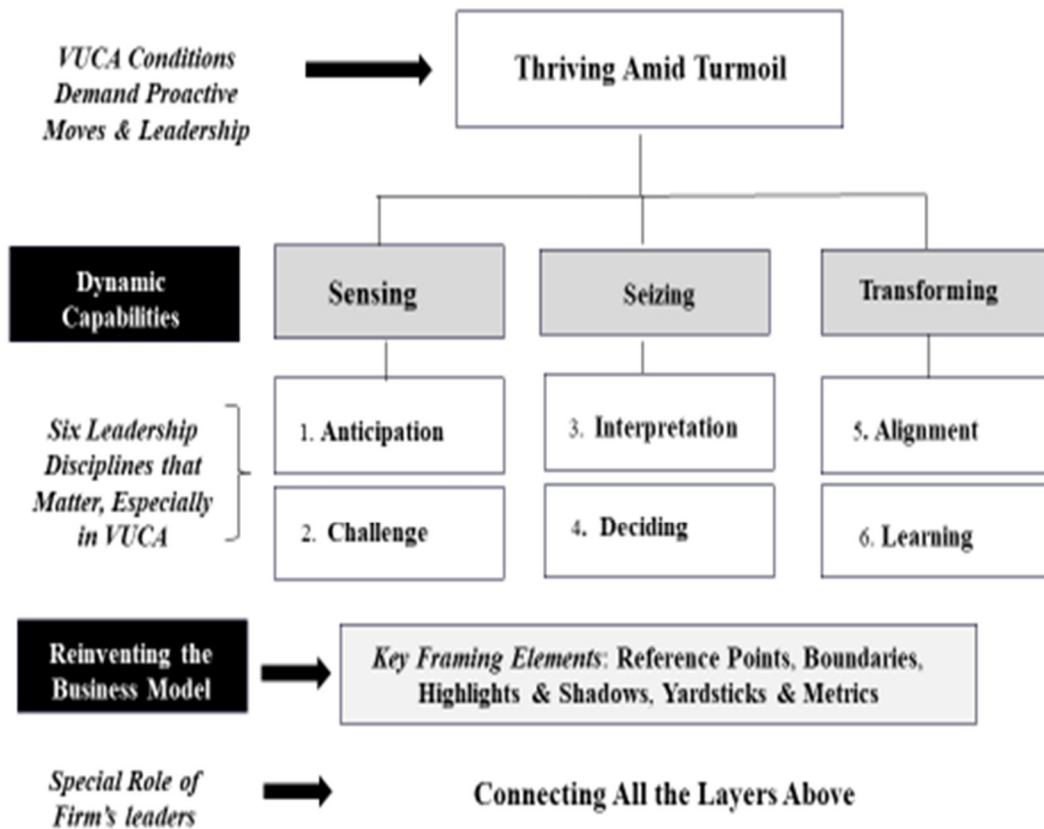
Learn

Strategic leaders embrace and encourage feedback, viewing success and failure as sources of critical insight. Learning leaders:

- ✓ Encourage and exemplify transparent, rigorous debriefs
- ✓ Stay agile and course-correct quickly if off track
- ✓ Celebrate success and the right kind of failures

Figure 3 illustrates how the dynamic capabilities in organizations, individual leadership skills, and strategic reframing are connected. The chart highlights some of the main linkages among these elements, but components should ideally be a tightly integrated system. This means that the bonds are not one-to-one but many-to-many. Mandela’s leadership, for example, showed the leadership elements of Figures 2 and 3 in abundance. This elevated him from a leader who conquered apartheid in South Africa to an inspirational icon for oppressed people worldwide. Organizations benefit greatly if they master the three dynamic capabilities we discussed at the start, but these can only be developed, honed, and deployed when guided by strong leaders who withstand the strong centripetal forces of the status quo. Leaders build organizational capabilities but must also make sure that they are implemented and deployed at ground levels by operational managers when innovation challenges are tackled.

Figure 3 How the Major Components Combine



Below, we examine key elements of strategic framing, since these come into play whenever surprises happen and important decisions have to be made. Table 3 summarizes some main points and examples. The framing of competitive opportunities and threats, for example, must be broader under conditions of VUCA than when dealing with relatively stable environments. The consequences of solving the wrong problem can be monumental. However, adopting new frames may feel “wrong” at first because it challenges the suitability of traditional tools and what the organization may define as “good management.” Thinking in innovative frames therefore often requires fresh talent that is less beholden to the past.

Table 3: Key Elements of Strategic Framing

Key elements	Implications and examples
Competitive reference points	Choose the right competitive reference point for the future. <ul style="list-style-type: none"> The US car industry failed to track foreign entrants such as Toyota decades ago and now is slow with Tesla and Google.
Mental boundaries	Surface and challenge people's implicit mental boundaries. <ul style="list-style-type: none"> The emergence of the iPhone blindsided Blackberry, which dismissed the iPhone as lacking the sophisticated security features of its own product; they failed to project what could be.
Highlights and shadows	Embrace a future-oriented mindset by explaining how goals are set and decision rights assigned, and which language or symbolisms matter most. <ul style="list-style-type: none"> Jeff Bezos consistently emphasized his “It's always Day 1” mantra to reinforce that Amazon will never stop being a startup.
Yardsticks and metrics	Choose the right yardsticks and metrics to measure performance. <ul style="list-style-type: none"> Wells Fargo's sales scandal was due partly to bad yardsticks, such as “Go for Gr-eight,” meaning selling eight products per customer; branches became misaligned store fronts with high staff turnover.

To illustrate the power of decision frames in a world of VUCA, we next review examples of firms that focused too narrowly. These firms may have excelled at ordinary capabilities, but their dynamic capabilities, particularly related to sensing, were weak. The frames in these examples—some classic and some current—concern the questions fundamental to every

business: How is our world changing? Who are our competitors? What do our customers really want? What is important for our business? How do we know if we're doing well?

4.1. Competitive Reference Points. We start with an example dating back to when Ford, GM, and Chrysler owned the American automobile market. Without much foreign competition, these three players used each other as their main competitive reference points. They refined their ordinary capabilities by benchmarking against each another. Had they invested instead in stronger dynamic capabilities, such as having R&D staff in California or overseas, they might have seen the move to smaller, higher-quality cars before the Japanese car market share jumped up. Their scanning could have sensed other ominous uncertainties on the horizon concerning oil shocks, the Toyota Production System, foreign imports penetrating deep into the market in California, and environmental concerns that would have challenged their outdated frames.

As a consequence of being blindsided, the US car industry went from an export surplus to a \$60 billion import deficit in twenty years. Foreign imports rose from 1 percent in 1955 to over 30 percent in 1987, and in 2013 accounted for 59 percent of vehicles sold in America.⁵¹ Today's automobile industry recognizes that the right frame for the future includes Tesla, Apple, and Google as new competitors, and this change in perspective has brought car companies from around the world to Silicon Valley.

The future of the automobile industry is still murky at this time of writing. Participants are competing amid a heavy fog laden with opportunities and threats. Many analysts predict that autonomous cars, trucks, and airplanes will be commercialized soon. But without more detail, such observations are of little value. However, these potential developments are driven by at least three waves of enabling technologies: connectivity (especially 5G mobile), artificial intelligence, and block chains. The future features of autonomous vehicles can be gleaned by monitoring the evolution of these technologies—especially their intersections. A new automotive ecosystem will also be modulated by regulatory and social issues involving safety, data security, privacy and the ethics of embedded algorithms. Imaginative entrepreneurs will eventually configure products that both appeal to car owners, regulators and the public.

Just as Henry Ford shaped the automotive industry with the Model T and Steve Jobs reconfigured portable electronics with the iPhone ecosystem, visionary leaders will shape the design of autonomous vehicles. Their broad guidance and special touches will impact the lives of

millions. Trillion-dollar global markets have yet to be addressed effectively. Sensing and seizing loops will be travelled by multiple parties using different technologies and approaches. Farsighted entrepreneurs backed by patient investors and not encumbered by existing market positions are the most likely to emerge as serious contenders.

Elon Musk, an entrepreneurial leader and founder, CEO, and lead designer of Space Exploration Technologies (SpaceX), has imbued his company with strong dynamic capabilities in the satellite launch market. The design, manufacturing, and operations of competing launch platforms remained largely unmodified since the early days of NASA's Mercury program in the 1960s. Government sponsorship and bureaucratic aversion to change favored the status quo. The traditional players favored a subcontractor model, structured around development and production contracts issued by the prime contractor and/or NASA. These contracts were largely cost-plus. Safety was preeminent, especially after the 1986 explosion of the spacecraft *Challenger*, and reducing commercial risk became paramount.

In stark contrast, SpaceX has adopted a vertical integration business model and eschews suppliers accustomed to a heavy diet of cost-plus government contracts. As one observer noted: "Design and manufacturing occurs in the same building; technicians and engineers interact face to face regularly. This vertical integration is a dramatic speed improvement...there is a major focus on optimizing the time it takes to launch a rocket."⁵² Elon Musk is likely to have as much impact on the space industry as scores of NASA officials before him had collectively. SpaceX's launch of the Falcon Heavy in January 2018 heralded a new space race.⁵³ This three-booster rocket launch set a record in weight (140,000 pounds) and cost (\$90 million), with fast development time (2015 start).⁵⁴ Musk plans to use this new platform to allow passengers to orbit the moon in a few years and drop a Tesla car on the surface of Mars during the next decade. This bold example underscores the enormous transformative impact that innovative business models, when led by visionary leaders, can have on industries and societies. They are game changers who excel at transcending boundaries, disrupting the status quo, and conquering new terrains, although not without risk. Critics, for example, have noted that landing a Tesla car on Mars may inadvertently introduce earthly bacteria on this planet, with unknown consequences.⁵⁵

4.2. Mental Boundaries. Reframing is essentially about challenging people's cognitive boundaries and stimulating their imaginations.⁵⁶ Nearly all strategic choices entail some borders,

implicit or explicit, in terms of what is in and out of consideration when a problem is framed. Apart from how rivals are defined, this would also include the set of options considered for key decisions, criteria used for evaluating various outcomes, and consequences examined for each option under consideration. In business, mental boundaries can take the form of geographic regions, time frames, functions, budgets, or how goals are defined. For example, managers may think only in domestic terms (ignoring international implications) or discount anything beyond five years (bounding out more distant futures). They may undertake measurement with just economic yardsticks, disregarding humanistic, environmental, or strategic dimensions. Decisions may be driven by mental images and unconscious forces invisible to the leader and perhaps the team.⁵⁷

Managing innovation in a world of VUCA requires a strategic shifting of problem boundaries by challenging people's mental models. If firms fail to do so, they are likely to make mistakes like those of the leaders at RIM, the maker of the once-popular BlackBerry phone, in response to the first-generation iPhone. After watching the video of the iPhone's unveiling in 2007, RIM's top managers dismissed it because, "It wasn't secure. It had rapid battery drain and a lousy [digital] keyboard."⁵⁸ They also criticized its use of the older, slower 2G network. The framing trap was that RIM did not see around the corner how an internet-capable phone would continue to improve. Four years later, improved iPhones were outselling BlackBerry handsets and RIM's sales had started a rapid decline. RIM had completely missed the huge latent demand for ultra-mobile computing and narrowly defined the desirable feature set as just what they were doing already.

4.3. Highlights and Shadows. Leaders can also help their organizations embrace a future-oriented mindset by explaining what goals are set, how decision rights are assigned, and which languages and symbolisms will matter most going forward. Each of these can help shift an organization's root metaphors, which tend to function like spotlights or legitimators, toward what leaders deem important (while deemphasizing what should now be in the shadows). At Amazon, as noted earlier, Bezos has consistently called for the whole company to keep a "Day 1" startup mindset.⁵⁹ At Wells Fargo, the retail side of the business strongly shifted its metaphor away from managing branches to operating store fronts, such that cross-selling became the focus. As a result, the sales target was increased to 8 products per customer, whereas 2.6 was normal in

banking. Also, turnover of salespeople reached 41 percent per year, which may be okay for McDonald's, perhaps, but not for a bank dealing in trust and relationship building.⁶⁰

At times, leaders need to rethink the root images and deeper cultural values of their firms, just as Procter & Gamble (P&G) did years ago in product management. The company decided to reject the conventional product lifecycle metaphor as unduly self-limiting. P&G moved instead toward a more dynamic evolutionary analogy in which products must continuously adapt for survival. These two ways of framing new product development can lead to quite different responses when a manager faces declining sales. In the product lifecycle view, an analysis based on ordinary capabilities (considering net present value or return on investment) may emphasize that some products must be allowed to die. A dynamic capabilities view, in contrast, will lead to constant scans for new and unexpected ways users can employ this current product and thus create innovation opportunities.

4.4. Yardsticks and Metrics. Frames also influence managerial thinking in terms of the *yardsticks* and *metrics* the organization uses to measure performance. The sales scandal that erupted at Wells Fargo in 2016 was also partly due to yardsticks that became unduly narrow and subject to gaming. The company's sales motto of "Go for Gr-eight" led to goals being measured in terms of *hourly reports* of new sales, and all tellers were asked to make one hundred cross-sells per quarter. In some regions, sales became a boiler room operation with high-pressure selling and fake accounts. In one extreme case, a branch manager's teenage daughter ended up with twenty-four accounts, his adult child with eight, his brother with fourteen, and his father with four. When sales run amok and metrics become games, managers need to pause rather than turn a blind eye.⁶¹

Normally, yardsticks will be less egregiously flawed, but they can still be seriously misaligned. For example, advertising agencies were traditionally paid a straight 15 percent of their clients' media budgets, since this was a simple input yardstick. Today, many big customers are paying advertisers instead on the basis of efficacy and output, as measured by clicks or sales generated. The remarkable success of the balanced scorecard approach highlights the importance of measuring the right things. The key is a balanced set of dashboards, covering metrics for financial performance and internal operations, as well as customer service and innovation

yardsticks, customized such that they fit the strategy or plan well.⁶² Ideally, these metrics will be assessed in real time or even prospectively, rather than relying just on historical data. Looking through the rearview mirror seldom paints an accurate picture of what is happening now or what lies ahead, especially in dynamic environments.

When the world changes around a company and innovation becomes critical for survival, how leaders think, speak, and act becomes paramount. One study of over 160 senior executives showed clearly that a vigilant attitude in leaders was the most significant component of a superior dynamic capability to anticipate and adapt.⁶³ Leaders essentially define what an organization sees and how it makes sense. They also determine which voices are heard or ignored. Leadership at various levels opens the organization to weak signals from the environment—especially its extended networks of suppliers, partners, and customers. It also matters whether signals from inside the firm are surfaced or shut out. Even an organization with the strongest systems and processes for peripheral vision can find itself handicapped by leaders who deny reality.⁶⁴

Organizational diversity, in all its dimensions, is crucial in assuring that managerial decision frames capture the full realities facing the firm.⁶⁵ Just as genetic heterogeneity is critical in how species adapt to change, organizations must mirror the complexity of the environment they face. Ashby's law of requisite variety in systems theory captures this notion well, arguing that a system controller, such as a room thermostat, cannot control its environment well unless it reflects the complexity of that environment.⁶⁶ A room with many doors, windows, or people moving in and out may need more temperature sensors to maintain the desired level than would a small and quiet room. For organizations, this means becoming a microcosm of the world they operate in now and later, in terms of people, values, and culture.

Leaders need to 'listen' to people with diverse views, as Andy Grove did so well at Intel. This helped the company successfully pivot from a commodified memory business into a profitable microprocessor trajectory. Diverse views are easier to come by when the people being consulted are diverse in terms of background and expertise. To promote sufficient diversity of thought, Hala Modellmog, former president of Atlanta, Georgia-based Arby's Restaurant Group Inc., a fast-food chain with about 3,400 locations, surrounded herself with colleagues of different races, geographies, socioeconomic classes, and personality styles. "You really don't need another you," she said.⁶⁷ Staying open to different viewpoints helps ensure leaders are not unduly

hindered by decision traps and can instead open their eyes to information or solutions that were not previously considered.⁶⁸

Another useful type of diversity is geographic. Global companies must capture regional and cultural diversity to stay in touch with their customers, partners, suppliers, and ecosystems. But this type of diversity can be challenging to manage. Xerox, headquartered in Connecticut, set up Xerox PARC in Silicon Valley in 1970. Unfortunately, the company had not also created structures for internalizing and leveraging all the radical innovations that could be developed, and so other companies, especially Apple, ultimately reaped the greatest benefit.

5. Conclusions

Companies increasingly face VUCA-type worlds. The destabilizing effect of volatile, uncertain, complex, and ambiguous conditions requires more than simply having better ordinary capabilities; it calls for strong dynamic capabilities, which take time to develop and hone. And deeply rooted ordinary capabilities may actually get in the way of this renewal process.

The three clusters of dynamic capabilities—sensing external change, seizing new opportunities, and transforming organizations—seek to enhance a firm’s long-term evolutionary fitness rather than merely enable high efficiency in the current period. Companies that master these three clusters will see emerging trends and undercurrents sooner than rivals, position themselves more favorably for future scenarios, and respond more rapidly as the future unfolds. A firm with strong dynamic capabilities can stay ahead with rapid innovation and distinctive business models.

Since dynamic capabilities encompass diverse organizational processes, they require leaders who can architect and operationalize them in a specific organizational setting. The six VUCA leadership skills we discussed are crucial in this regard. The abilities to *anticipate*, *challenge*, and *interpret* especially require strong cognitive skills. The abilities to *decide* and *align* entail considerable emotional and social intelligence. And the ability to *learn* involves all three forms of intelligence, especially when leading organizations in times of change or turmoil. The leadership disciplines are closely linked to the clusters of dynamic capabilities. The organization’s ability to anticipate, challenge, and interpret clearly underpins how to *sense* change. The disciplines of deciding, aligning, and learning are closely tied to how to *seize*

opportunities. All six disciplines feature prominently in how to *transform* an organization, and where possible parts of its ecosystem, as we illustrated with the examples of Apple and Uber.

The process of business model innovation starts with anticipating impending change. This requires that leaders can both mind and mine the periphery.⁶⁹ The ability to “mind” a broad periphery requires *divergent* attention and actions across many domains. After all, one doesn’t know whether the next relevant signal will come from the realm of economics, the world of geopolitics, the domain of technology, or customers or competitors. In contrast, when dealing with a well-defined part of the periphery, such as pending regulations or a specific technological improvement, leaders should encourage the organization to thoroughly “mine” this for strategic implications in more narrow applications. A close examination may reveal key insights, especially if it is possible to triangulate among multiple sources of information. In contrast to scanning, mining the periphery requires a strong *convergent* focus on a specific part of the surrounding and then rapidly developing the capacity to respond to it.

Management in VUCA worlds is neither simple nor cheap. Developing and maintaining dynamic capabilities takes time and resources. A single visionary leader in a small startup is a possible shortcut, but it takes conscious effort, time, and team work for most firms. To strengthen dynamic capabilities, managers can conduct a capability audit in which they list the specific competencies they need, identify the gaps between current and desired levels, and take steps to reinforce those that are most critical to supporting a given strategy.⁷⁰ Top management’s early involvement in allocating organizational attention is critical, since employees will likely pay more attention to existing projects than new ones.⁷¹ The latter tend to be more uncertain and challenging, which means that key talent may deem them risky and will not venture there.

Performing well in a VUCA world requires business model innovation guided by strong sensing and seizing capabilities. This calls for wise, passionate, and committed leaders who know how to develop flexible organizational processes and when to embark on organizational or ecological transformations.⁷² Dynamic capabilities, business model renewal, and leadership must be tightly connected to produce the kind of product, process, and commercial innovations that VUCA conditions demand. Being vigilant and prepared will give a firm its best chance to respond adroitly to challenges and opportunities that may arise, as well as to reshape the broader environment to its own advantage when and where possible.

ENDNOTES

¹ W.E. Whiteman, *Training and educating army officers for the 21st century: Implications for the United States Military Academy* (Fort Belvoir, VA: Defense Technical Information Center, 1998).

² N. Bennett and G.J. Lemoine, "What VUCA really means for you: Understanding threats to performance in a VUCA world," *Business Horizons* 57 (2014b), 311–317. Earlier typologies for mapping environmental conditions were proposed by Hugh Courtney, Gerard J. Tellis, and Peter N. Golder, *20/20 Foresight* (Audio-Tech Business Book Summaries, 2001); and Paul Schoemaker, *Profiting from uncertainty: Strategies for succeeding no matter what the future brings* (Simon and Schuster, 2012).

³ For example, what matters for innovation is the organizational ability to recognize and respond to differences of kind rather than of degree, since the former likely invalidate existing approaches. The Knightian demarcation in 1921 between risk and uncertainty, for example, is about a fundamental difference of kind rather than different flavors within each category; see F.H. Knight, *Risk, uncertainty and profit* (New York, NY: Harper, 1921).

⁴ Michael Porter and Clay Christensen have debated to what extent disruption is the norm or the exception in business; see J. Lepore, "The disruption machine," *The New Yorker* 23 (2014): 30–6. Our view is that the digital transformation wave has not yet crested and that more turbulence is in store. Even if not, nearly all firms need some level of adaptive capability unless survival and innovation does not matter to them. A.A. King and B. Baatarogtokh, "How Useful is the Theory of Disruptive Innovation?" *MIT Sloan Management Review* 57/1 (2015): 77–90.

⁵ J. Conger, "Developing Leadership Capability: What's Inside the Black Box," *Academy of Management Perspectives* 18/3 (August 2004): 136–139. Warren Bennis, *On Becoming a Leader* (New York: Basic Books, 2009); see also Warren Bennis, "The Challenges of Leadership in the Modern World: Introduction to the Special Issue," *American Psychologist* 62/1 (2007): 2.

⁶ W.G. Rowe, "Creating Wealth in Organizations: The Role of Strategic Leadership," *The Academy of Management Executive* 15/1(2001): 81–94.

⁷ C. O'Reilly and M. Tushman, "Ambidexterity as a dynamic capability: Resolving the innovator's dilemma," *Research in Organizational Behavior* 28 (2008): 185–206.

⁸ With process innovations, the technologies involved can often be kept under wraps by denying access to the manufacturing facility and internal workings of the firm. As such, the commercialization strategies for product and processes are likely to differ.

⁹ This means getting out of tar sands and other stranded asset risks in a scenario when oil prices remain low; see Shell Faces 'Lower Forever', *Fortune Magazine*, February 1, 2018.

¹⁰ F.E. Emery and E.L. Trist, "The causal texture of organizational environments," *Human relations* 18/1 (1965): 21–32; I.P. McCarthy, T.B. Lawrence, B. Wixted, and B.R. Gordon, "A Multidimensional Conceptualization of Environmental Velocity," *Academy of Management Review* 35/4 (2010): 604–626.

¹¹ D.J. Teece, "The foundations of enterprise performance: Dynamic and ordinary capabilities in an (economic) theory of firms," *Academy of Management Perspectives* 28/4 (2014): 328–352, p. 331.

¹² For this reason, dynamic capabilities need to be prioritized over ordinary capabilities in VUCA worlds. Ambidexterity, while important, does not imply that ordinary capabilities are as important as dynamic capabilities. In VUCA worlds, they are generally less important.

¹³ See "Nokia CEO Stephen Elop Rallies Troops," *Engadget* (February 8, 2011).

¹⁴ D.J. Teece, G. Pisano, and A. Shuen, “Dynamic capabilities and strategic management,” *Strategic Management Journal* 18/7 (1997): 509–533; D.J. Teece, “Explicating dynamic capabilities: the nature and micro-foundations of (sustainable) enterprise performance,” *Strategic Management Journal* 28 (2007): 1319–1350.

¹⁵ Signature processes are defined as processes that have evolved internally from executives’ values and aspirations; see L. Gratton and S. Ghoshal, “Beyond best practice,” *Sloan Management Review* 46 (2005): 49–57.

¹⁶ D.J. Teece, “Dynamic capabilities: Routines versus entrepreneurial action,” *Journal of Management Studies* 49/8 (2012): 1395–1401.

¹⁷ G.S. Day and P.J.H. Schoemaker, *Peripheral Vision: Detecting the Weak Signals that Will Make or Break Your Company* (Cambridge, MA: Harvard Business School Press, 2006).

¹⁸ P.J.H. Schoemaker, G.S. Day, and S.A. Snyder, “Integrating Organizational Networks, Weak Signals, Strategic Radars and Scenario Planning,” *Technological Forecasting & Social Change* 80 (2013): 815–824.

¹⁹ For specifics, see D.A. Marchand and P. Bochukova, *Digital Transformation at Novartis to Improve Customer Engagement*, case study IMD-32437 (Lausanne, Switzerland, January 1, 2014); Novartis Pharmaceuticals, “From Monologue to Dialogue: Fostering Meaningful Engagement with the Medical Community” (April 22, 2015); and S. Bennett, “From Snitch Pill to Xbox sensors, Novartis goes Digital,” *Bloomberg.com* (March 24, 2015).

²⁰ This Novartis example is more fully discussed in G.S. Day and P.J.H. Schoemaker, “Adapting to fast-changing markets and technologies,” *California Management Review* 58/4 (2016): 59–77.

²¹ R.L. Ackoff, J. Magidson, and H.J. Addison, *Idealized Design* (Upper Saddle River, NJ: Wharton School Publishing, 2006).

²² Open innovation methodologies can also help build seizing capability by driving innovation quickly to meet market opportunities; see D.J. Teece, M. Peteraf, and S. Leih, “Dynamic Capabilities and Organizational Agility: Uncertainty and Entrepreneurial Management in the Innovation Economy,” *California Management Review* 58 (2016): 13–25.

²³ The DuPont example is examined in further detail by Day and Schoemaker (2016), op. cit.

²⁴ The first patents for digital cameras were published by Texas Instruments in 1972, and a Kodak engineer demonstrated a digital camera prototype in 1975. The company also filed several early patents for capturing digital images and initiated an alliance with Microsoft in the 1990s to tackle the digital imaging market.

²⁵ D. Kahneman and D. Lovallo, “Timid choices and bold forecasts: A cognitive perspective on risk and risk taking,” *Management Science* 39 (1993): 17–31.

²⁶ Wikipedia.com, “Clipper,” retrieved April 24, 2017, available at: <https://en.wikipedia.org/wiki/Clipper>; Encyclopaedia Britannica, “Opium Trade: British and Chinese History” (no date), available at <https://www.britannica.com/topic/opium-trade>

²⁷ J. Mokyr, *The Lever of Riches: Technological Creativity and Economic Progress* (New York, NY: Oxford University Press, 1990).

²⁸ For a leadership account of how Whole Foods developed its ecosystem, see S. Krupp and P.J.H. Schoemaker, *Winning the Long Game: How Strategic Leaders Shape the Future* (New York: Public Affairs, 2014): 143–151.

²⁹ D. Roland, “Drug makers take page from Hollywood to spread the risk,” *Wall Street Journal* (April 30, 2017), available at: <https://www.wsj.com/articles/drug-makers-take-page-from-hollywood-to-spread-the-risk-1493557202>.

³⁰ G. Day, *Innovation prowess: Leadership strategies for accelerating growth* (Wharton Digital Press, 2013).

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- ³¹ D.J. Teece, "Business models, business strategy and innovation," *Long Range Planning* 43/2 (2010): 172–194, p. 173.
- ³² E. Ries, *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses* (New York: Crown Business, 2011).
- ³³ T. Ritter, *Alignment² [Alignment^{squared}]: Driving Competitiveness and Growth Through Business Model Excellence* (Frederiksberg, Denmark: CBS Competitiveness Platform, 2014).
- ³⁴ J. Birkinshaw and S. Ansari, "Understanding management models: going beyond 'what' and 'why' to 'how' work gets done in organizations," in N.J. Foss and T. Saebi (eds.), *Business Model Innovation: The Organizational Dimension* (Oxford: Oxford University Press, 2015): 85–103.
- ³⁵ M.L. Katz and C. Shapiro, "Systems competition and network effects," *Journal of Economic Perspectives* 8/2 (1994): 93–115; D.J. Teece, "The new managerial economics of firm growth: the role of intangible assets and capabilities," in C.R. Thomas and W.F. Shughart (eds.), *The Oxford Handbook of Managerial Economics* (Oxford: Oxford University Press, 2013).
- ³⁶ M. Armstrong, "Competition in two-sided markets," *Rand Journal of Economics* 37/3 (2006): 668–691.
- ³⁷ O. Schön, "Business model modularity—a way to gain strategic flexibility?" *Controlling & Management* 56/2 (2012): 73–78; A. Osterwalder and Y. Pigneur, *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers* (Hoboken, NJ: Wiley, 2010).
- ³⁸ N.M. Kay, S. Leih, and D.J. Teece, "The role of emergence in dynamic capabilities: a restatement of the framework and some possibilities for future research," *Industrial and Corporate Change* (forthcoming).
- ³⁹ The full story of Uber has yet to be written. As a private company, the strength of its value capture remains a subject of conjecture. Numbers that have emerged suggest that the firm is running a loss globally, but its name recognition, technology, and continuing growth clearly fuel investors' hopes for a rosy future.
- ⁴⁰ This table and the related discussion of Uber draw on anDavid Teece, "Business Models and Dynamic Capabilities," *Long Range Planning*, Volume 51, Issue 1, February 2018, Pages 40–49; <https://www.sciencedirect.com/science/article/pii/S0024630117302868>
- ⁴¹ See M. Murphy, "CEO fiascos typically start with a lack of empathy," *Forbes* (April 21, 2017), available at: <https://www.forbes.com/sites/markmurphy/2017/04/21/ceo-fiascos-typically-start-with-a-lack-of-empathy/#b9873ad590b2>
- ⁴² M. Useem, "Four Lessons in Adaptive Leadership," *Harvard Business Review* 88/11 (2010): 86–90; D. Scott DeRue, "Adaptive Leadership Theory: Leading and Following as a Complex Adaptive Process," *Research in Organizational Behavior* 31 (2011): 125–150. See also Gary Yukl and Richard Lepsinger, *Flexible Leadership: Creating Value by Balancing Multiple Challenges and Choices* (San Francisco, CA: John Wiley & Sons, 2004); Ronald Abadian Heifetz, Alexander Grashow, and Martin Linsky, *The Practice of Adaptive Leadership: Tools and Tactics for Changing Your Organization and the World* (Boston: Harvard Business Press, 2009). For a thorough academic overview of the strategic leadership literature, see Sidney Finkelstein, Donald C. Hambrick, and Albert A. Cannella, *Strategic Leadership: Theory and Research on Executives, Top Management Teams, and Boards* (New York, NY: Oxford University Press, 2009).
- ⁴³ Steve Jobs, Stanford University commencement address (June 12, 2005).
- ⁴⁴ D.J. Teece, "Dynamic capabilities and entrepreneurial management in large organizations: toward a theory of the (entrepreneurial) firm," *European Economic Review* 86 (2016): 202–216.
- ⁴⁵ A good primer on leadership is Peter G. Northouse, *Leadership: Theory and Practice* (Thousand Oaks, CA: Sage Publications, 2013). Practical advice can be found in James M. Kouzes and Barry Posner, *The Leadership*

Challenge: How to Make Extraordinary Things Happen in Organizations (San Francisco, CA: Jossey-Bass, 2012); or Richard Lepsinger, *Closing the Execution Gap: How Great Leaders and Their Companies Get Results* (San Francisco, CA: Jossey-Bass, 2010).

⁴⁶ Based on P.J.H. Schoemaker, S. Krupp, and S. Howland, "Strategic Leadership: The Essential Skills," *Harvard Business Review* (Jan/Feb 2013): 131–134.

⁴⁸ Golborne was less successful when he later ran for President of Chile when he got involved in two financial scandals that forced him to withdraw his candidacy; see <http://www.foxnews.com/world/2013/04/29/financial-scandals-force-center-right-candidate-golborne-to-quit-chile.html>

⁴⁹ P.J.H. Schoemaker. "Nelson Mandela as a strategic leader," *European Business Review* (Jan–Feb 2014): 48–52.

⁵⁰ For further analyses of how strategic management and leadership are related, see Steven Krupp and Paul J.H. Schoemaker, *Winning the Long Game: How Strategic Leaders Shape the Future* (New York: Public Affairs, 2014). The appendix of this book offers a more integrated academic treatment of strategy and leadership (pp. 263–275).

⁵¹ Association of Global Automakers and American International Automobile Dealers Association, *Redefining the American Auto Industry* (2014; see <http://www.globalautomakers.org/posts/press-release/international-automakers-now-account-45-u.s.-auto-production-59-u.s.-vehicle-sales>).

⁵² J. Knox, "What is Space X's Business Model?" Quora (March 14, 2016).

⁵³ K. Chang, "Falcon Heavy, in a Roar of Thunder, Carries SpaceX's Ambition Into Orbit," *New York Times* (February 6, 2018), available at: <https://www.nytimes.com/2018/02/06/science/falcon-heavy-spacex-launch.html>

⁵⁴ Development time is hard to measure exactly but it was very short; <https://www.space.com/39779-falcon-heavy-facts.html>

⁵⁵ D. Reisinger, "How Elon Musk's Tesla Could Contaminate Mars With Earth Bacteria," *Fortune* (February 28, 2018), available at: <http://fortune.com/2018/02/28/elon-musks-tesla-mars-bacteria/>

⁵⁶ See E. Peper, "Why Business Leaders Need to Read More Science Fiction," *Harvard Business Review* (July 14, 2017).

⁵⁷ Manfred F.R. Kets de Vries, *Organizations on the Couch: Clinical Perspectives on Organizational Behavior and Change* (San Francisco, CA: Jossey-Bass, 1991); Manfred F.R. Kets de Vries and Danny Miller, *The Neurotic Organization: Diagnosing and Changing Counterproductive Styles of Management* (San Francisco, CA: Jossey-Bass, 1984); Manfred F.R. Kets de Vries (ed.), *Organizational Paradoxes: Clinical Approaches to Management*, Vol. 4. (New York, NY: Routledge, 2013); Kiran Trehan, "Psychodynamic and Critical Perspectives on Leadership Development," *Advances in Developing Human Resources* 9/1 (2007): 72–82.

⁵⁸ J. McNish and S. Silcoff, *Losing the Signal: The Untold Story Behind the Extraordinary Rise and Spectacular Fall of Blackberry* (New York: Flatiron Books, 2015): 133.

⁵⁹ See Amazon, *2016 Letter to Shareholders* (April 12, 2017), available at: <https://www.amazon.com/p/feature/z6o9g6sysxur57t>

⁶⁰ G. Colvin, "Can Wells Fargo Get Well?" *Fortune Five Hundred* (June 15, 2017): 138–146.

⁶¹ M. Heffernan, *Willful blindness: Why We Ignore the Obvious at Our Peril* (Simon and Schuster, 2011).

⁶² R. Kaplan and D. Norton, "The balanced scorecard: Measures that drive performance," *Harvard Business Review* 70/1 (1992): 71–99.

⁶³ G.S. Day and P.J.H. Schoemaker (2016), op. cit.

⁶⁴ M. Uhl-Bien, R. Marion, and B. McKelvey, "Complexity Leadership Theory: Shifting Leadership from the Industrial Age to the Knowledge Era," *The Leadership Quarterly* 18/4 (2007): 298–318; Nick Obolensky, *Complex Adaptive Leadership: Embracing Paradox and Uncertainty* (Surrey, England: Gower Publishing, 2010); Ronald A. Heifetz and Marty Linsky, "When Leadership Spells Danger," *Educational Leadership* 61/7 (2004): 33–37. See also Ronald Heifetz, Alexander Grashow, and Marty Linsky, "Leadership in a (Permanent) Crisis," *Harvard Business Review* 87/7–8 (2009): 62–69.

⁶⁵ F.G. Stevens, Victoria C. Plaut, and J. Sanchez-Burks, "Unlocking the benefits of diversity: All-inclusive multiculturalism and positive organizational change," *Journal of Applied Behavioral Science* 44/1 (2008): 116–133; MEM Barak, *Managing diversity: Toward a globally inclusive workplace*. (Thousand Oaks, CA: Sage Publications, 2016).

⁶⁶ W.R. Ashby and W. Ross, "Requisite variety and its implications for the control of complex systems," *Facets of systems science* (1991): 405–417.

⁶⁷ J. Goudreau, "Eight Leadership Lessons From The World's Most Powerful Women," *Forbes* (March 21, 2013), available at <https://www.forbes.com/sites/jennagoudreau/2013/03/21/eight-leadership-lessons-from-the-worlds-most-powerful-women/#391f96d24592>

⁶⁸ Diversity plays a key role in fostering outside-in perspectives; see Saadat Saeed et al., "Inside-out and outside-in orientations: A meta-analysis of orientation's effects on innovation and firm performance," *Industrial Marketing Management* 47 (2015): 121–133.

⁶⁹ The notions "minding and mining" are discussed further by John Seely Brown, "Minding and mining the periphery," *Long Range Planning* 37/2 (2004): 143–151.

⁷⁰ D. Ulrich and N. Smallwood, "Capitalizing your capabilities," *Harvard Business Review* (June 2004): 119–127.

⁷¹ D. Kahneman and D. Lovallo. "Timid Choices and Bold Forecasts: A Cognitive Perspective on Risk Taking," *Management Science* 39/1 (1993): 17–31.

⁷² I. Nonaka and H. Takeuchi, "The Big Idea: The Wise Leader," *Harvard Business Review* (May 2011): 58–67.