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Organizational Ambidexterity:  
IBM and Emerging Business Opportunities

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# Organizational Ambidexterity: IBM AND EMERGING BUSINESS OPPORTUNITIES

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"It is not the strongest of the species that survive, nor the most intelligent, but the one that is most responsive to change."—Charles Darwin

**A**lthough Darwin was writing about biological species 150 years ago, his logic applies to organizations today. In 1959, *Fortune* magazine ranked General Motors as the largest, and arguably the strongest, manufacturing firm in the United States. Fifty years later it has filed for bankruptcy. In his 2000 book entitled *Leading the Revolution*, Gary Hamel praised Enron as one of the smartest companies in the world.<sup>1</sup> By 2001, it was out of business and the subject of a book with the ironic title of *The Smartest Guys in the Room*.<sup>2</sup> The hedge firm Long Term Capital management included two Nobel Laureates among its founders but collapsed in 1998, almost bringing the U.S. financial markets to ruin.<sup>3</sup> Darwin was right, neither strength nor intelligence guarantees survival. Only adaptation can do that, whether for firms or flora and fauna.

In a comprehensive study of the more than six million U.S. firms, Stubbart and Knight note that only a tiny fraction of firms live to age 40, probably less than 0.1%.<sup>4</sup> For example, for firms founded in 1976, only 10% survived 10 years later, leading them to conclude that "Despite their size, their vast financial and human resources, average large firms do not 'live' as long as ordinary Americans."<sup>5</sup> Underscoring the fragility of organizational life, Foster and Kaplan followed the performance of 1000 large firms across 4 decades; only 160 of 1008 survived from 1962 to 1998.<sup>6</sup> One-third of the firms in the *Fortune* 500 in 1970 no longer existed in 1983. Studies of organizational mortality have estimated that large firms have an estimated residual life expectancy from 5.8 to 14.6 years.<sup>7</sup> Faced with these sobering figures, Stubbart and Knight conclude their

survey on a plaintive note, posing the question: “Given large firms’ experience, their financial muscle, their vast core competencies, giant strategic assets, and so forth—why aren’t large firms more successful.”<sup>8</sup>

Of course, some firms do survive. GKN is today a \$5 billion 250-year old aerospace and automotive firm that began mining coal. Goodrich, another aerospace company began in 1870 as a maker of fire hose. Johnson & Johnson was founded in 1886 as a maker of sterile bandages and today is a global firm with a product portfolio that includes pharmaceuticals, medical devices, and consumer goods. Toyota began making looms in 1867, Nokia as a lumber company in 1867, Nucor in automobiles in 1897, and W.R. Grace in 1854 mining and shipping bat guano. What separates these companies from the thousands that fail? Luck has to be a part of it, but so does management and the ability of the firm to adapt.

Underlying the question of organizational evolution and adaptation is a rich and interesting debate among organizational scholars. On one side of the dispute are the organizational ecologists who argue that individual organizations are largely inert, like bacteria or birds, and change occurs in the population as a whole as old forms are replaced by new ones that better fit the changed context.<sup>9</sup> On the other side are adaptationists of a variety of flavors who argue that organizations can and do change—and that it is the role of senior management to anticipate changes and reconfigure organizational assets to help the firm survive.<sup>10</sup> What makes this debate particularly interesting is that both sides invoke the same underlying theoretical arguments (evolutionary theory) for their explanations and both present empirical evidence to support their position.

In this article, we suggest how both sides may be right. First, we provide a brief overview of some recent advances in evolutionary thinking (multi-level selection) that have not yet been applied to organizations. We then illustrate how these ideas can enrich current thinking about organizational ambidexterity and dynamic capabilities and help explain organizational adaptation.<sup>11</sup> Finally, using these ideas we illustrate how IBM has been able to compete in mature businesses and technologies through exploitation and to enter new, emerging businesses and technologies through exploration using the IBM Emerging Business Organization (EBO) process.<sup>12</sup> This process corresponds to the evolutionary ideas of multi-level selection and permits IBM to adapt to changing environments. We conclude with some suggestions for how multi-level selection may be used to increase the likelihood of organizational adaptation and survival.

## Evolutionary Thinking—An Overview

Figure 1 provides a framework for organizing evolutionary research. Earlier formulations of evolutionary theories focused on individual selection as the process by which evolution operated. In this view, individual organisms (or organizations) do not adapt. Rather, natural selection works against those that do not fit the current environment. Change occurred over generations as new organisms evolved to better fit the environment. In the case of organisms,

**FIGURE I.** A Framework for Organizing Evolutionary Research

		Level of Analysis	
		Individual	Organization
Mechanism of Action	Selection	Individual selection based on genotype	Population ecology based on form
	Adaptation	X	Multi-level selection based on competencies

selection occurred at the level of the genotype while at the organizational level, selection was based on “form.”<sup>13</sup> Although organizational research has focused largely on evolution through selection, Darwinian thinking also acknowledges that change can occur through adaptation as well, although this mechanism has been largely discounted until recently.<sup>14</sup> Recent advances in theories of evolution have begun to illustrate how adaptation and development can foster change—especially in more complex organisms like groups and organizations. However, as Wilson and Sober observe, “The most recent developments in biology have not yet reached the human behavioral sciences, which still know group selection as the bogey man of the 60’s and 70’s.”<sup>15</sup>

At its heart, evolution refers to change or transformation over time. “Natural selection is based on the relationship between an organism and its environment, regardless of its taxonomic identity” and is based on relative fitness within and across groups.<sup>16</sup> Thus, it can readily apply to organizations as well as birds, insects, slime mold, and humans. The three underpinnings of evolutionary theory are *variation* (organisms of a species differ on traits), *selection* (these differences sometimes make a difference in the organisms ability to survive), and *retention* (traits can be passed from one generation to another). Over time, as environments change, the variation in traits can make organisms more or less fit such that the former are more likely to survive.

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This winnowing process occurs in two fundamental ways—natural selection and adaptation. Natural selection refers to the process where, over succeeding generations, favorable traits (or traits that are useful for survival and reproduction) that are heritable become more common and unfavorable traits become less prevalent. This selection process acts on phenotypes, or the observable characteristics of an organism. This process selects not so much for favorable traits but against those that are disadvantageous. Less fit organisms die.

For example, in pre-industrial Great Britain, Gypsy Moths were predominantly light gray in color, which helped them blend in with their forest habitat. Over time, industrial pollution from factories killed the lichen on tree trunks and trees became darker from the pollution. In this changed environment, light gray moths were more visible to predators and dark gray moths survived at higher rates. By 1895, 95 percent of the moths near Manchester England were mostly black. In recent times, as pollution has decreased and the lichen has grown back, the population of moths has become light colored again.

In its early form, evolutionary theory was dominated by a form of what Wilson characterizes as “naïve group selectionism” in which changes were thought to evolve for the good of the individual or species.<sup>17</sup> This perspective emphasized that organisms were designed to maximize their own fitness and insensitive to group welfare—the so-called “selfish gene.”<sup>18</sup> More recently, however, this view has been broadened to see groups as adaptive in their own right, such that across groups, some may have more relative fitness and be selected accordingly. This newer view acknowledges that social organizations may evolve by both genetic and cultural group selection, with more cooperative groups better able to compete against groups that are less cooperative.<sup>19</sup> Group-level adaptation emphasizes the importance of cultural selection—the passing of ideas from person to person. “The primary human adaptation, however, is for our behaviors to be acquired less and less directly from our genes and more and more from other people.”<sup>20</sup> This is not the blind variation-selection-retention of genes but a more regulated set of social actions that pass information across generations. This is about group-level adaptation—not individual-level—and is likely to be more important in the study of organizations than the earlier theories and reflects more accurately the behavioral flexibility of humans.

While Darwin believed that evolution was a glacially slow process, more recent research suggests that this is not always the case. In the earlier view, the cumulative heritable consequences of relative fitness on differences in survival and reproduction could be seen only after many generations. However, under some circumstances evolution may occur rapidly, especially human adaptation where “a fast mental process may accomplish the same thing as the slow generational process of natural selection.”<sup>21</sup> The growing recognition of the importance of group-level adaptation may help reconcile the debate among organizational theorists over whether organizations are largely inert or can adapt and change over time.

### ***Organizational Inertia or Organizational Adaptation?***

In support of the “organizations don’t change” position are data showing that the majority of firms founded in an industry do not survive over long periods.<sup>22</sup> While it is empirically the case that the majority of organizations founded do not survive for very long, it is also the case that these are mainly very small firms. From a management perspective, this is neither surprising nor very interesting. “Small size is almost always correlated with high failure rates . . . A vast majority of small firms . . . operate at undersized, inefficient scale—and they fail (exit) at a prodigious rate.”<sup>23</sup> Taken uncritically, these high mortality rates have led some researchers to question the efficacy of management. Dew, Goldfarb, and Sarasvarthy conclude that “the strategic manager’s job is in fact futile in the face of environmental disruptions.”<sup>24</sup> Evolution, in this view, is about the replacement of existing forms by those more suited to the changed environment.

The adaptationists, however, note that some firms do survive and prosper over long periods of time. DeGeus describes a sizeable number of firms that are more than 200 years old.<sup>25</sup> Tripsas recounts the history of Mergenthaler Linotype, a firm founded in 1886 that has survived three technological revolutions.<sup>26</sup> As mentioned earlier, GKN is a 250 year-old company that has morphed from iron ore to steel to automotive parts to aerospace and today is an industrial services company for firms like Boeing. In this optimistic view, evolution occurs as organizations that are out of kilter with their environment reallocate and reconfigure resources to allow the firm to simultaneously exploit existing markets and technologies and explore new ones.<sup>27</sup> Evolution, in this view, operates not as blind variation-selection-retention but with what March refers to as “evolutionary engineering” in which organizational experience and memory are used to strengthen exploitation and exploration processes and adapt to changed environmental conditions.<sup>28</sup> Unlike the organizational ecologist’s approach, which focuses primarily on individual-level selection and structural inertia or on the inability of firms to change, the adaptationist view focuses on large organizations and emphasizes group-level selection in which changes in relative fitness help organizations survive.

How can the same theory lead two groups of interested scholars to justify opposing positions? Both views accept the Darwinian principles of variation, selection, and retention. Both embrace the idea of evolution as natural selection or “descent with modification”—that is, in Darwin’s words, “any variation in the least degree injurious would be rigidly destroyed. This preservation of favorable variations and the rejection of injurious variations, I call Natural Selection.”<sup>29</sup> Both views emphasize the importance of the environment in shaping the organism. To understand how evolutionary theory can be used to support seemingly contradictory positions requires a brief digression into the evolution of evolutionary thinking—and how recent advances can reconcile the two perspectives.

### ***Multi-Level Selection and Adaptation***

The important difference between the two positions stems from an emphasis by each side on different parts of the evolutionary story. As shown in

Figure 1, evolutionary change can occur in two ways and at two levels. It occurs through natural selection in which organisms that don't fit the environment are selected against (e.g., eaten by predators or driven into bankruptcy) or through adaptation (e.g., the newts' ability to adjust coloration to blend into an environment or a firm's ability to explore and exploit). Wilson and Sober note: "Human adaptations can evolve along two major pathways: a) by increasing fitness of individuals relative to others within the same social group, and b) by increasing the fitness of social groups as collectives relative to other groups."<sup>30</sup> Therefore, change can occur at two levels: at the individual level (typically the genotype or organizational form) on which selection acts; and at the group level where adaptation may occur through cultural learning.<sup>31</sup>

Much of the standard research in evolutionary biology and organizational ecology is predicated on selection occurring within populations at the individual organism (or organization) level. The central focus in these studies is on structural inertia. Because of this, ecologists have not devoted much attention to whether evolution operates through replacement or through mutation of one organizational form into another.<sup>32</sup> Organisms, or organizations, that lack the characteristics needed to survive in a particular environment are selected against. The creation of new forms is seen as resulting from a slow multi-generational process in which unfavorable traits are selected against. "The conceptual underpinnings of organizational ecology (inertia and the population perspective) direct the attention of researchers away from organization-level changes because they are judged to be infrequent events of secondary importance."<sup>33</sup> In this view, population change occurs as new forms enter, not as existing firms transform themselves. Differences in fitness at the organizational level are not central in studies of organizational ecology. Amburgey and Rao call attention to this overemphasis on selection, "There is a dearth of research on how organization- and population-level learning processes facilitate learning and diminish mortality."<sup>34</sup>

From this perspective, studies of evolution have been dominated by a form of individualism that sees groups as little more than collections of self-interested individuals. This methodological individualism dominates economics and sociology and has led to an interpretation of evolution predicated on assumptions that "people are innately self-interested, that the concept of self-interest can be reduced to something like the utility maximization of economic theory, and that self-interest robustly leads to well-functioning societies."<sup>35</sup> In this view, social organization emerges as a by-product of self-interest and social groups are seen as having no ontological reality and are seen simply as convenient summaries of individual behavior. Although this rational choice argument may be true in some cases, it need not be true in all instances—especially where the costs are concentrated in some individuals and the benefits in others.

How well does this perspective, built as it is on genetic evolution, describe organizational evolution? More recent studies of human adaptation have observed that humans have a capacity for thought exceeding that of other species. Humans are clearly capable of transmitting vast quantities of information by imitation, instruction, and verbal communication. Much of our extraordinary

behavioral variation stems not from genetic variation but from differences in cultural traditions. Indeed, there is little evidence of specific behaviors having a genetic origin, but there is wide variation in behavior across cultures. Culture, in this sense, may be both causal and adaptive because populations of human minds can store the best efforts of previous generations of minds. Richerson and Boyd argue that “Humans can live in a wider range of environments than other primates because culture allows the relatively rapid accumulation of better strategies for exploiting local environments compared with genetic inheritance.”<sup>36</sup>

The combination of cognition, cooperation, and culture that characterize human evolution has speeded up the evolutionary process. In this view, the emphasis is on adaptation with behaviors acquired less directly from genes and more from other people.<sup>37</sup> A fast mental process may accomplish the same thing as a slow generational process. For instance, in his Pulitzer Prize winning book, Jared Diamond illustrates how the slow wisdom of natural selection followed by the fast wisdom of human intelligence made the difference in cultures that tended livestock.<sup>38</sup> The impact of social learning or cultural transmission becomes particularly important if selection occurs at the group as well as the individual level. An experiment in chicken breeding offers a nice illustration of group-level selection.<sup>39</sup>

In commercial egg production, 9-12 chickens are placed in cages. In an attempt to increase egg production, two methods were compared. In the first, the most productive individual hens were identified to breed and placed in a common cage. In the second, all the hens from the most productive cage were chosen to breed. Since it is the individual hen that lays eggs, the expectation was that the first condition should be more productive. After six generations, it was discovered that with the first method (individual selection) egg production plummeted. Even though the most productive hens had been chosen, the most productive individuals had achieved their success by suppressing the productivity of the others in their cage. This had produced the chicken equivalent of psychopaths. The second method (group selection), however, increased egg production by 160 percent and created a harmonious group.

Building on this insight, Wilson observes that multi-level selection can work when “Groups can evolve into adaptive units that are designed to maximize their contribution to the total gene pool to the extent that selection among groups prevails against selection within groups.”<sup>40</sup> When selection within groups is suppressed (for example, through the provision of rewards and punishments promoting cooperation), selection between groups becomes the primary evolutionary force. The group is egalitarian, not because everyone is virtuous, but because they collectively have the means to detect and punish would-be cheaters and free-riders. If punishment is effective, then cooperation will pay. It is social control, rather than sacrificial altruism that makes group-level adaptation possible and gives rise to culturally transmitted group-oriented norms and systems of rewards and punishments to ensure that such norms are obeyed. In social environments in which pro-social norms are enforced, individual selection should favor psychological predispositions that make individuals more likely to

gain social rewards, avoid social sanctions, and predispose individuals to cooperate and identify with the larger social grouping.

Cultural evolution involves the passing of ideas from person to person—or group to group. Culture is adaptive because it can do things that genes cannot do for themselves. Simple forms of social learning cut the cost of individual learning by allowing individuals to use environmental cues selectively. Without social learning, everybody would have to learn everything for themselves.<sup>41</sup> When environments are variable and learning is difficult or costly, such a system can be a big advantage. However, to a large extent, the creation, retention, and selection of behaviors take place beneath conscious awareness. Many current behaviors exist not because someone decided that they were useful but because they out-survived competing behaviors. Cumulative cultural evolution gives rise to complex adaptations much more rapidly than natural selection. In Wilson's view, "Human mentality is fundamentally predicated on sharing."<sup>42</sup> This has become so genetically inculcated that we don't recognize it as sharing until we study it scientifically. Think of teamwork as the hallmark of human evolution rather than some kind of generic intelligence.

Such a process characterizes human evolution. At the individual level of selection (within group selection), it is the case that selection will favor defectors, because defectors will always do better than the others in the group. However, at the group level, selection will favor those groups with more helpers, since each additional helper increases the fitness of the group. It follows that larger, more cooperative groups should be able to out-compete smaller and less-cooperative groups.<sup>43</sup> For this reason, many evolutionary scientists believe that evolution would not favor a psychological system that led to the spread of selfish cultural variants.<sup>44</sup> Wilson argues this strongly, claiming that individual, utility maximizing logics are "deeply flawed on the basis of elementary evolutionary principles that are very unlikely to be wrong."<sup>45</sup>

With multi-level selection, evolutionary biologists have moved from the earlier view that implied an inability of organisms to change, and the futility of environmental intervention, to one in which evolution is seen as a set of if-then rules that can promote change. "Far from denying the potential for change, evolutionary theory can provide a detailed recipe for change."<sup>46</sup> Studies of multi-level selection from experimental genetics have demonstrated that group selection has resulted in lasting evolutionary change.<sup>47</sup>

### ***Multi-Level Selection and Organizational Adaptation***

Darwin argued that three conditions are necessary for adaptation by natural selection:

- there must be a struggle for existence so that not all individuals survive;
- there must be variation such that some types are more likely to survive than others; and
- the variation must be heritable so that the advantage can be passed on.<sup>48</sup>

Although Darwin was focused on individual organisms, these same postulates apply to any entity that reproduces over time. Organizations compete and struggle for existence. They clearly vary in ways that make some more competitive than others; and, as they set up new businesses and divisions, they pass on these attributes to the new units. Fitness in this case is not reproductive success but the ability to attract resources (physical, financial, and intellectual). However, what is heritable in organizations? What organizational characteristics would be fitness enhancing or decreasing? If the logic of evolution is to be useful in explaining organizational adaptation, the first step is to specify the heritable characteristics on which organizations vary; that is, what characteristics of an organization would be likely to make it more or less adaptable to its environment?

Two criteria need to be fulfilled for multi-level selection to occur. First, the various organizational sub-units (or genes) need to share a common fate. Second, the group must be, in some sense, superior to what can be accomplished by the individuals when they are left to pursue their own interests. This is trivially true in the case of humans. Clearly our bodies and genes share a common fate and no separate gene could do better without the whole. It is also true for eusocial insect colonies like ants and honeybees. It is, under many conditions, also true for organizations. For most organizations, the members share a common fate and would not be better off pursuing their own interests, otherwise they would have left. Organizations, like other organisms, are also designed in ways to make pro-social behavior advantageous. They do this through shared value systems, selection, socialization, and reward systems—all calculated to make it difficult to benefit oneself at the expense of others. When successful, these processes help individuals subsume their own interests and identify with the organism itself. Conceptually, organizations fit the definition and criteria for multi-level selection to operate.

Since adaptation can occur at any level of the biological hierarchy, the question then becomes “what traits evolve through within-group selection and what traits might evolve through across-group selection?” To survive, organizations need to be able to compete for resources across a variety of economic and technical landscapes.<sup>49</sup> This requires that firms be able to exploit existing resources and capabilities under stable economic conditions and, in the face of environmental change, are able to explore into new spaces by reconfiguring existing resources and developing new capabilities. This suggests that the proximal or phenotypic characteristic for selection is a firm’s relative competitiveness against others, but the genotypic basis for success is the firm’s underlying capabilities that permit it to explore and exploit.

Across business units, there is variance in competencies and capabilities. Some units are better adapted to exploitation and emphasize efficiency, control, and the reduction in variance (e.g., businesses focused on mature products and technologies). Others are focused on exploration and excel at adaptability, innovation, and are variance increasing (e.g., in new technologies and markets). As environments shift, the relative fitness of the subunits rises and falls and

resources are reallocated by senior managers to reconfigure the organization to adapt to these changes. If this is the case, then the unit of selection becomes the business unit within the larger organization.

This approach, referred to as *dynamic capabilities*, emphasizes the key role of strategic leadership in appropriately adapting, integrating, and reconfiguring organizational skills and resources to match changing environments.<sup>50</sup> Dynamic capabilities are reflected in the organization's ability to maintain ecological fitness and, when necessary, to reconfigure existing assets and develop the new skills needed to address emerging threats and opportunities

O'Reilly and Tushman extend this logic and argue that the ability of senior leaders to reconfigure assets to compete in emerging and mature businesses, to be *ambidextrous*, is a critical element in sustainable competitive advantage.<sup>51</sup> Central to the adaptive process are the notions of a firm's ability to exploit existing assets and positions in a profit-producing way and simultaneously to explore new technologies and markets—to configure and reconfigure organizational resources to capture existing as well as new opportunities. In March's terms, this is the fundamental tension at the heart of an enterprise's long-run survival. "The basic problem confronting an organization is to engage in sufficient exploitation to ensure its current viability and, at the same time, devote enough energy to exploration to ensure its future viability."<sup>52</sup>

Thus, adaptation at the organizational level is a function of the variation-selection-retention process occurring across business units—and the ability of senior management to regulate this process in a way that maintains the ecological fitness of the organization with its environment. While selection is based on phenotypic (or observable) characteristics (i.e., business units), these are, in turn, a reflection of the organization's capabilities—or the underlying organizational genotype.<sup>53</sup> This process does not imply random variation but a deliberate approach to variation-selection-retention that uses existing firm assets and capabilities and reconfigures them to address new opportunities. When done explicitly, this involves deliberate investments and promotes organizational learning that results in a repeatable process that has been characterized as the firm's ability "to learn how to learn."<sup>54</sup> It embodies a complex set of routines including decentralization, differentiation, targeted integration, and the ability of senior leadership to orchestrate the complex trade-offs that ambidexterity requires.

The processes of variation-selection-retention and multi-level selection have been explicitly designed and implemented by IBM to develop new businesses. This is a deliberate, repeatable process that the company uses to ensure ecological fitness in changing markets and technologies. New businesses are designed to maximize their contribution to the organization's gene pool by developing and extending dynamic capabilities.

## Emerging Business Opportunities at IBM

In September of 1999, Lou Gerstner, then CEO of IBM, was reading a monthly report that indicated that current financial pressures had forced a

business unit to discontinue funding of a promising new initiative. Gerstner was incensed and demanded to know “Why do we consistently miss the emergence of new industries?” Underscoring this question were the results of a study by the IBM strategy group documenting how the company had failed to capture value from 29 separate technologies and businesses that the company had developed but failed to commercialize. For example, IBM developed the first commercial router but Cisco dominated that market. As early as 1996, IBM had developed technologies to accelerate the performance of the web, but Akamai, a second-mover, had the product vision to capture this market. Early on, IBM developed speech recognition software but was eclipsed by Nuance. Technologies in RFID, Business Intelligence, e-Sourcing, and Pervasive Computing all represented disturbing examples of missed opportunities for the company. In each instance, the conclusion was that IBM had the potential to win in these markets but had failed to take advantage of the opportunity. The question was “why” this happened?

A detailed internal analysis of why the company missed these markets revealed six major reasons IBM routinely missed new technology and market opportunities. These included:

- *The existing management system rewards execution directed at short-term results and does not value strategic business building.* IBM is driven by process. The dominant leadership style rewarded within the company was to execute flawlessly on immediate opportunities, not to pioneer into new area. “Breakthrough thinking” was not a valued leadership capability.
- *The company is preoccupied with current served markets and existing offerings.* Processes were designed to listen intently to existing customers and to focus on traditional markets. This makes IBM slow to recognize disruptive technologies and to recognize new markets.
- *The business model emphasizes sustained profit and EPS improvement rather than actions oriented towards higher price/earnings.* The emphasis was on improving profitability of a stable portfolio of businesses rather than accelerating innovation. The unrealistic expectation was that new businesses needed to break even within a year or two.
- *The firm’s approach to gathering and using market insight is inadequate for embryonic markets.* The insistence on “fact-based financial analysis” hinders IBM’s ability to generate market intelligence for new and ambiguous markets. Market insights that lack this analysis are often ignored or dismissed.
- *The company lacks established disciplines for selecting, experimenting, funding, and terminating new growth businesses.* Even when new growth business opportunities are identified, IBM’s existing management systems fail to provide funding or restrict its ability to develop creative new businesses. Worse, the company applies its mature business processes to growth opportunities with the result that it often starves these new ventures.
- *Once selected, many new ventures fail in execution.* IBM lacks the entrepreneurial leadership skills for designing new business models and building

growth businesses. It also lacks the patience and persistence that new start-ups require.

Interestingly, the first three root causes were directly related to much of IBM's success in mature markets—that is, the maniacal focus on short-term results, careful attention to major customers and markets, and an emphasis on improving profitability all contributed to the firm's ability to exploit mature markets—and made it difficult to explore into new spaces. The alignment that made the company a “disciplined machine” when competing in mature businesses was directly opposite to that needed to be successful in emerging markets and technologies.

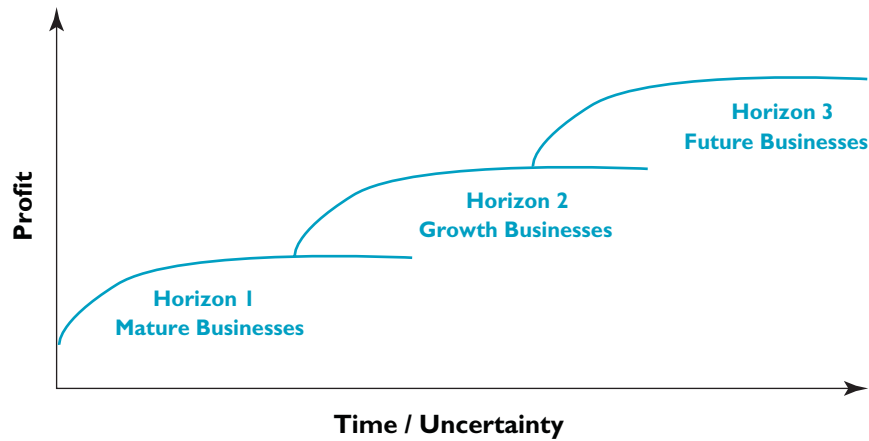
As a result of this analysis and the discussions it generated among senior management, a series of recommendations were made to permit the company to succeed at both exploitation in mature markets and exploration in growth areas. These decisions resulted in the development of the Emerging Business Organization (EBO) initiative in 2000. Between 2000 and 2005, EBOs added \$15.2B to IBM's top line. While acquisitions over this period added 9 percent to IBM's top line, EBOs added 19 percent. This process has enabled the company to explore and exploit—to both enter new businesses and to remain competitive in mature ones.

### ***Organizational Evolution and Adaptation: The EBO Process***

Rooted in the company's failure to meet its revenue growth goals, the EBO project team was formed to explicitly address IBM's chronic failure to rapidly and successfully pursue new market opportunities. A foundational insight of the team was the recognition that a company's portfolio of businesses could be divided into three horizons: current core businesses; growth businesses; and future growth businesses—with each type of business having unique challenges and requiring a different organizational architecture (see Figure 2).<sup>55</sup> IBM's mistake had been an unwitting focus on Horizon 1 and 2 businesses to the exclusion of Horizon 3. Interviews with senior managers reinforced this conclusion, with comments about how corporate staff had become “an army of bureaucrats” who inhibited rather than facilitated new growth.

Armed with this understanding, the team realized that what was needed was an explicit system that provided for the founding, development, and leadership of new growth businesses. This process needed to acknowledge that the primary business model that made IBM's mature businesses successful was stifling the formation of new growth opportunities. Instead, what was needed was an explicit, replicable process with clear senior executive ownership for generating new businesses and processes that would permit the company to systematically explore new growth opportunities. In July of 2000, CEO Lou Gerstner announced the appointment of John Thompson, then head of the software group, as Vice Chairman and head of the new EBO initiative. Thompson, a 34-year veteran of the company, was widely respected throughout the company for his skills as an operating manager and a strategist.

**FIGURE 2.** The EBO Model



<b>Focus</b>	Defend and increase the profitability of existing businesses	Resources to expand and build new businesses	Discover options and place selected bets on emerging opportunities
<b>Outputs</b>	Annual budgets and operating plans	Investments, business plans for growth	Market insight data, initial project plans
<b>Key Success Factors</b>	Cost, efficiency, customer intimacy, incremental innovation	Customer acquisition, speed, execution, flexibility	Learning, adaptation, risk taking, business model innovation
<b>Metrics</b>	Profit, margins, costs	Market share, growth	Milestones

With a limited staff, Thompson began by working with groups to develop an EBO management and funding process and disciplined mechanisms for cross-company alignment. To be a candidate for an EBO, each potential business must meet the following clear selection criteria:

- *Strategic Alignment* with the IBM corporate strategy—As Gary Cohen, VP of Strategy says, “Often we get ideas that are very promising, but we can’t find a way to turn them into a business with revenues and profits.” Other ideas may be great business opportunities but don’t fit within the company’s strategic direction, so these are offered to venture capitalists.
- *Cross-IBM Leverage*—The EBO corporate process is focused on generating new businesses that cut across the IBM organization. For instance, the opportunity in the Life Sciences EBO was to sell hardware, software, and consulting to businesses affected by the need to deal with the information-intensive demands resulting from personalized medicine. Although a similar process can and does work to stimulate new businesses within

lines-of-business, the corporate effort is explicitly aimed at cross-business opportunities.

- *New Source of Customer Value*—An explicit goal of the use of EBOs is to explore and scale new business models and capabilities. Ideas that allow the company to move into new domains and test new business models are preferred over better understood models.
- *\$1 Billion plus revenue potential*—Since an explicit goal of the EBO initiative is top line growth, ideas need to hold out the potential of growing into a billion dollar market within three to five years.
- *Market Leadership*—New business ideas must also provide the opportunity for IBM to emerge as the market leader. For instance, in deciding to enter the Life Sciences market, there was a recognition that early success could result in the establishment of industry standards and protocols that could offer network externalities.
- *Sustained Profit*—Some ideas hold out the promise of rapid revenue growth but also the likelihood that new competitors will rapidly commoditize the business. Therefore, new ideas are screened to ensure that there is a good chance for the business to sustain profitability.

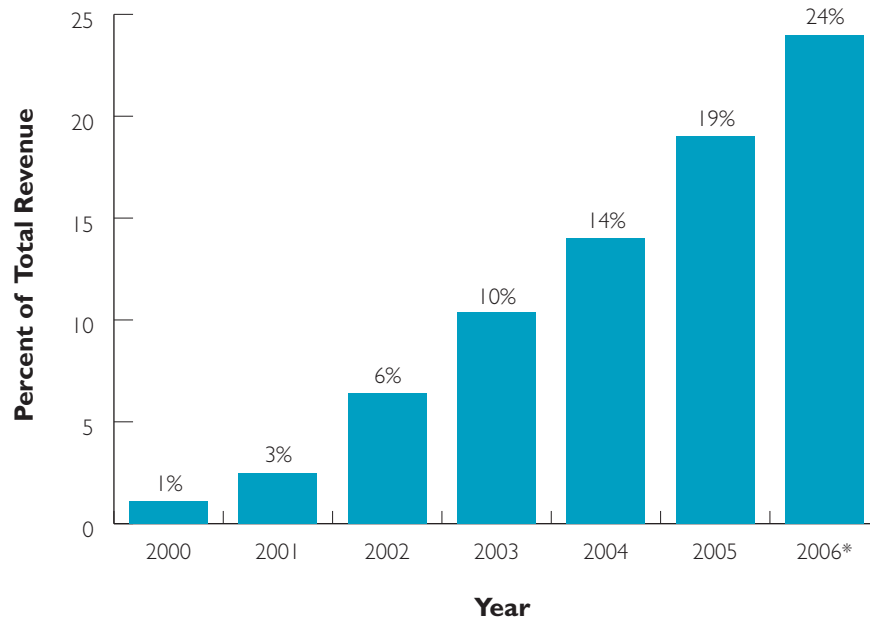
Bruce Harreld, SVP of strategy who replaced Thompson as head of the EBO effort, makes clear that “these aren’t product upgrades or just technical opportunities; they’re business opportunities [that] we believe that we can commercialize and turn into revenue-producing businesses . . . they are emerging because they are somehow changing the dynamics in the marketplace.”

Each EBO leader reports to a business unit head, such as hardware, software, or global services, but also reports to the senior executive responsible for new growth opportunities. This dual reporting provides corporate oversight to ensure that milestones are being met and resources allocated as well as provides for collaboration across businesses and the opportunity to quickly resolve issues as they arise.

In 2000 there were seven EBOs, including Linux, Life Sciences, Pervasive Computing, Digital Media, Network Processors, and e-Markets. Four of these have become successful businesses and “graduated” from their EBO status to become growth businesses and two failed. Figure 3 shows the growth and financial performance of EBOs between 2000 and 2005.

### ***Variation: Establishing a New EBO***

To identify new emerging business opportunities that warrant the attention of senior management, twice a year there is a formal process in which ideas are solicited from both within the company (IBM Fellows and Distinguished Engineers, R&D, Marketing, and Sales) and from others outside (e.g., customers, venture capitalists, and external experts). These suggestions help identify disruptive technologies, new business models, and attractive new markets. This effort typically results in more than 150 ideas.

**FIGURE 3.** EBO Revenue as a Percent of Total IBM Revenue

These are scrutinized and reduced to 20 or so and small teams are formed to do a more detailed strategic analysis. Based on these findings, Harreld then begins to socialize promising ideas among senior executives and customers to determine acceptance. Once ideas have passed this test, the strategy group then does a “deep dive” to properly vet the market opportunity. In evaluating ideas, Harreld is blunt, “I’m not interested in new technologies. I’m interested in building new billion dollar businesses. Betting on the right new business venture comes down to linking great ideas to real customer benefits—that is, to clear commercial opportunities” Of the 150 plus ideas generated each year, only a few are chosen as new EBOs.

### ***Selection: Running the Experiment***

Once formed, Harreld and the corporate strategy group act as the agent and partner for the EBO. They meet with them monthly to review progress, refine strategy, and help them get the right people and alignment to ensure execution. They also make sure that their funding is protected and going in the right places. However, Harreld is quick to point out that “we don’t run these ventures from corporate. They belong to the business units . . . Together we help the managers figure out what’s going well, what’s not, and what to try next.” The key principles established for the success of an EBO are:

*Active and Frequent Senior-Level Sponsorship*

One of the lessons learned in the strategy group study of IBM’s failures to enter new businesses was the lack of senior management attention paid to new ventures. Understandably, high-level executives are often preoccupied with ensuring the success of the large businesses that provide today’s profit and growth. However, without senior management support, new ventures can easily be overlooked or starved of resources. To solve this problem, all EBOs are required to have active sponsorship from a Senior Vice President in the line of business and with Harreld in the Strategy Group. Bruce meets monthly with both the EBO leader and the person in the line of business to whom the EBO reports. These 2-4 hour meetings with Harreld and his staff are to review milestones, ensure that there is clarity of strategy and organizational alignment, and provide the support needed when initiating new ventures. From the EBO leader’s perspective, these frequent meetings can be equivalent to a “root canal,” but they ensure active senior oversight and support.

*Dedicated A-Team Leadership*

Historically, when IBM chose leaders for new growth initiatives, the tendency was to select younger, less-experienced people to manage the projects. The logic was that younger leaders would be less imbued with the “IBM way”

and more likely to try new approaches. These leaders often failed. What the company learned was younger managers often lacked the networks needed to nurture an embryonic business within the larger company. “We were not putting the best and brightest” on these projects, says Harreld. Today, the approach is just the opposite. “We bring in very experienced people, who have built big businesses, have learned a lot along the way, who understand IBM, and are comfortable knowing what to change and what to test,” says Harreld. However, running emerging businesses is very different from mature ones, so new leaders are selected and trained in the skills needed for the emerging opportunities (see Figure 4). Harreld points out that “in established business it’s all about keeping things under control. These guys are so buttoned up. You bring them into a new business area, and it’s almost hilarious . . . With an EBO, there’s a lot you don’t know and you have to discover, learn, and adjust.” The challenge, unlike in

**FIGURE 4.** Leadership Principles for EBOs

- 
- Manage a portfolio of related experiments and projects
  - Initiate activities that are directionally correct
  - Play a major communication role inside and outside
  - Establish and communicate a clear vision
  - Create an extended team for advice and counsel
  - Balance opposing factors to imagine future possibilities that are currently unrecognized market needs
    - Market and technical sophistication
    - Sustain interest in as-yet unprofitable projects
    - Recognize when to continue and when to abandon an idea
    - Understand the organizational politics
    - Adopt an affiliative leadership style
    - Coach/mentor selected employees
    - Thoroughly understand customer’s business
-

mature businesses, is not to empire build and staff up quickly but to get strategic clarity.

For example, Rod Adkins was a star within the company who was running the thriving UNIX business with 35,000 employees and \$4 billion in sales. When he was chosen in 2000 to run the new pervasive computing EBO, a business with zero revenues, his first thought was that he had been fired. It was only after Sam Palmisano, the CEO, explained how important this new initiative was, and why Adkin's skills were critical, that he understood the importance of the business to the future of the company.<sup>56</sup> Over time, the success of the EBO effort has made running an EBO a desirable job, with people volunteering to run them.

#### *Disciplined Mechanisms for Cross-Company Alignment*

Since an explicit goal of the EBO process is to address business opportunities across the company, careful attention is paid to ensuring that the line businesses provide the requisite support, even when it may run counter to their short-term interests. For example, early in building one of the EBOs it became clear that it was necessary to build a consulting team to support clients. However, doing so would negatively impact the consulting group's utilization and profits. To overcome this short-term obstacle, the EBO team agreed to fund the staffing while the consulting group did the actual hiring and training. This assured timely building of the consulting team without compromising the longer-term integration of these consultants into the larger consulting group.

#### *Resources Fenced—and Monitored—to Avoid Premature Cuts*

It is one thing to allocate funds for a new initiative and another to ensure that the funds are spent according to plan. Too often, mature businesses, in the face of competition, will "re-allocate" funds to existing businesses. For instance, H-P struggled for years to enter a new technology for scanning, but allocated funds were routinely siphoned off to fund the mature flat-bed business.<sup>57</sup> To prevent this, EBOs are funded through their line of business, but the process is carefully monitored to make sure that the new business receives its full funding—and, when needed, they can receive further injections of resources from corporate.

#### *Actions Linked to Critical Milestones*

Many companies have been unsuccessful in their attempts at internal ventures. One reason for this is that emerging businesses often limp along for years, never achieving success. A key lesson from the EBO experience has been the need to carefully define and monitor progress in meeting milestones. Businesses are measured against these milestones and not the financial metrics of their line of business. This protects embryonic ventures from being killed too early for a failure to achieve mature business targets. Milestones are reviewed in the monthly meeting with Bruce Harreld.

### *Quick Start, Quick Stop*

Harreld has learned that speed is often essential in establishing new ventures. Therefore, if the new business doesn't meet its milestones and connect with customers, it needs to be stopped or morphed into something else. The intent is to get into the market quickly with an experiment, learn from it, and adjust accordingly or stop the effort.

### ***Retention: Moving from a Horizon 3 to Horizon 2 Business***

By 2003, the original 7 EBOs had grown to 18. Since the routine was to meet monthly with each EBO and business unit leader, Harreld found himself spending more and more time managing existing EBOs. He realized that he was becoming a bottleneck to the EBO process. If IBM were to really leverage the EBO methodology, they would have to "graduate" businesses as they grew and the process would have to become more decentralized within the corporation. With CEO Palmisano's encouragement, Harreld created a set of criteria to ascertain when an EBO would be graduated to become a growth business and absorbed into the line of business. These include:

- a strong leadership team in place;
- a clearly articulated strategy for profit contribution;
- early market success; and
- a proven customer value proposition.

If the EBOs met these criteria, they would be large enough to be successful on their own and not to be undermined by the existing business. In 2003 15 of the EBOs graduated. Two of the original EBOs, Linux and Pervasive Computing, are now critical parts in growth business units. Since their inception in 2000, 25 EBOs have been launched. Three of these have failed and been closed, but the remaining 22 now produce well more than 15% of IBM's revenue. The EBO process has also been decentralized so that separate lines of business (e.g., software or hardware) now develop their own EBOs. Throughout the company, these are used to extend capabilities into new domains and to scale business models. Current corporate EBOs include Sensors and Actuators, Information-Based Medicine, Retail on Demand, WebFountain, and new business models for emerging economies. In Harreld's view, these corporate EBOs are often about the cannibalization of existing businesses—the very initiatives that are likely to be killed if not pushed by corporate leadership. Ginni Rometty, head of IBM's consulting business, echoes this sentiment, observing that "if you don't innovate you get commoditized" and acknowledging that new businesses that are a threat to the existing business model "are either dumbed down or starved" by the larger business.

### ***An Illustration: The Life Sciences EBO***

In 1999, Carol Kovac was running a 700-person business within IBM's research organization. In 2000, she was asked to start a new Life Sciences business with one person reporting to her. Market studies suggested there were

significant scientific and market opportunities in applying high-performance computing and information technology to the emerging areas of biotechnology and personalized medicine, but an earlier IBM effort in this area had recently failed. Carol, who had been agitating for the company to move into this domain, was asked to head the new Life Sciences EBO.

For Carol, the opportunity was to help customers in academia, government, pharmaceuticals, and hospitals integrate the massive amounts of information the new chemistry and biology generated. Harreld noted that the opportunities were enormous, so it was hard to figure out where to start. Although the initial instinct was to target a half dozen potential opportunities, the decision was made to focus on only a couple. “Otherwise,” Harreld said, “you end up chasing everything and you end up with nothing.” To succeed would require IBM not to sell existing products but to help customers develop integrated solutions. This required both thought leadership and integration across four major IBM silos. Worse, from the perspective of the head of each of these silos, any life science business would be seen as a small increment in sales—probably not worth the effort. However, from IBM’s perspective, this new market represented a potential \$1 billion market within 3-4 years.

Between April 2000 when she began and November 2006 when she left, the Life Science business grew to a \$5 billion business with hundreds of Ph.D.s in life sciences. In managing this process, Carol graduated some of her early businesses and has generated a new EBO in information-based medicine. To accomplish this required her to establish an organization with different people, systems, structures, rewards, and culture from the larger line of business through which she reported. This happened only because of the EBO process, which provided her with the support necessary to leverage across the four silos. For example, when she needed the server group to provide support for the high performance computing, John Thompson ensured that it happened. When she formed new partnerships and caused friction with the part of IBM in charge of developer relationships, senior support was critical. When she needed consulting and sales support from the consulting arm of the company, Thompson and Harreld brokered that. Carol Kovac pointed out that the short-term goals of mature (Horizon 1) businesses seldom align with those of horizon 3 businesses. They typically have little incentive to participate with what are seen as “dinky little businesses.” Worse, the H3 business may actually threaten the mature business, especially if it is exploring disruptive technologies and business models.

In reflecting on what the leadership challenges were, Carol noted that “One of the key jobs of the ambidextrous leader is to protect the EBO and take away some of the constraints. You need to protect the group so they can be mostly external in what they do.” Over time, she observed, discipline and a more internal focus becomes more necessary. However, if you graduate too early, you risk getting evaluated as a mature business. “It’s like becoming a teenager—old enough to function but facing a mess of rules you may not want to deal with.” It’s fundamentally a balancing act.

Although the market opportunity in Life Sciences was recognized in 1998, several early attempts to enter this market failed. Funding from the lines of business wasn't forthcoming, there was a lack of entrepreneurial leadership, and the IBM processes and metrics that helped mature businesses actively worked against the establishment of the new venture. It was only with the development of the EBO process that these barriers were removed. The combination of a clear strategic intent, guaranteed funding, senior-level sponsorship, entrepreneurial leaders, and an aligned organization were required for the venture to succeed.

Without the senior-level support and faced with the opposition Carol encountered, many entrepreneurial leaders might have quit and taken their ideas elsewhere. The same issues have led some firms to isolate their new ventures. However, upon reflection, this approach fails to leverage the capabilities and resources of the larger company. It ignores the critical issues of integration, sharing and leveraging of resources, and fails to infuse entrepreneurial leadership into the larger company. As Harreld says, "We want to integrate, not insulate" our new ventures. They belong to the business units and need to be close to the market. "Cross-IBM execution has to be a part of the basic fabric of the corporation if we are to succeed with our growth initiatives."

## Discussion

We began with an empirical puzzle: Why is it that many large, successful organizations fail, but some are able to adapt and survive? Unlike biological organisms in which cell senescence resulting from repeated cell division leads to damage to cells and subsequent death, organizations have no such obvious cause of death. To the contrary, large organizations typically have the resources needed to continue to prosper. To explain how some organizations are able to survive over long periods, we have described some recent advances in evolutionary theory (multi-level or group selection) to show how organizational adaptation might occur.<sup>58</sup> Unlike population ecology approaches that see organizational change as occurring through generational selection and replacement, we have argued that some organizations do adapt through a process of variation, selection, and retention at the group level. Organizational ambidexterity, or the dynamic capability of an organization to simultaneously explore and exploit, accounts for this ability to adapt. The EBO process at IBM in which new business units are systematically created, tested, and either grown or killed illustrates how multi-level selection can help an organization adapt to new markets.

The process of natural selection is based on the relationship between an organism and its environment regardless of its taxonomic identity. For multi-level selection to operate, the parts that make up the organism (e.g., the genes or sub-units) must share a common fate, be in competition with other organisms, have mechanisms that suppress within-group competition, and be in some sense superior to what can be accomplished by individuals pursuing their own self-interest.<sup>59</sup> Organizations fit this definition completely. If adaptations evolve

by differential survival, it makes sense that group-level adaptations evolve by the differential survival and reproduction of groups. Thus, organizations that are able to repeatably explore and exploit are more likely to survive than those organizations that do not. Long-lived organizations morph by adding new groups (or subunits).

The IBM EBO process is simply one illustrative example for how multi-level selection can operate to help an organization adapt over time. Other long-lived companies such as GKN, J&J, and Goodrich have accomplished similar feats using variants of multi-level selection. For example, Corning, founded in 1851, relies on its capabilities in glass and optical physics to provide it with a competitive advantage. Similar to the IBM EBO process, they use an “innovation recipe” to identify and develop new, profitable business opportunities. For Corning, a new business opportunity should have the potential of growing to \$500 million, be a key component in a larger system (e.g., automobile catalytic converters), have sufficient intellectual property to offer some strategic control, and be difficult to manufacture such that Corning has an edge over its competitors. The Ball Company was founded in 1880 as a maker of wooden buckets. Today they are a dominant player in metal and plastic containers for companies like Pepsi and Budweiser. Their history is one of exploration and exploitation as their leaders have moved from one technology to another, all the while focused on the container business. Multi-level selection through ambidexterity and acquisitions accounts for their survival.<sup>60</sup>

In a famous passage, Darwin underscored the importance of group selection observing that “it must not be forgotten that although a high standard of morality gives but a slight or no advantage to each individual man and his children over other men of the same tribe, yet that an increase in the number of well-endowed men and the advancement in the standard of morality will certainly give an immense advantage to one tribe over another.”<sup>61</sup> Selfish individuals out-compete altruists within a single group, but groups of altruists out-compete groups of selfish individuals. Importantly, evolutionary biologists have noted that even very small changes in a trait can lead to big differences in fitness. Again, in Darwin’s words, “What counted was not perfection but being better than one’s competitors.”<sup>62</sup>

What is heritable in organizations? We have argued that dynamic capabilities, defined as the ability of senior leaders to reconfigure assets to compete in emerging and mature businesses, to be *ambidextrous*, is the vehicle for selection—the organizational equivalent of the genome. To be useful, however, this capability must be repeatable; that is, the underlying processes are explicitly learned and managed by senior leaders. It is the set of routines and processes orchestrated by the senior team that defines ambidexterity as a dynamic capability.<sup>63</sup> Organizations that are able to both explore and exploit are more likely to adapt than organizations that can do only one or the other.

Interestingly, the size of an organization may itself be a group-level adaptation that provides a survival advantage. Burgelman builds a persuasive case that, when managed effectively, large organizations have the luxury of

internalizing the variation-selection-retention process of markets to create an internal selection environment that permits experimentation and exploration.<sup>64</sup> Unlike the harsh discipline of the market in which new firms must place a life-or-death bet on a single experiment, larger companies can run multiple experiments in which failure does not jeopardize the enterprise and may increase learning. As we noted earlier, the causes of death in small firms are myriad (e.g., undercapitalization, wrong technology, poor strategy, and predatory actions by larger firms) and relate to a general lack of resources. Large firms, when properly managed, do not face the same binding constraints.

In this sense, it is large firms with multiple business units that have the biggest opportunity to survive. Interestingly, population ecology research with its emphasis on vital rates (entrances and exits) has focused on changes in the entire populations of organizations and largely ignores the question of organizational success or efficiency.<sup>65</sup> The extent to which individual organizational change is adaptive or selective is a secondary question.

Our focus here has been the opposite, with an emphasis on adaptation among large firms. In 2004, the Bureau of the Census reported that there were roughly 6 million employer firms in the United States. Only 3,500 of these had more than 2,500 employees. Yet, firms with more than 1,000 employees account for approximately 50 percent of all paid employment.<sup>66</sup> Large firms, although statistically rare, are practically very important. In this sense, what we are proposing here is a theory of extreme cases; that is, although large firms, whether by revenues or numbers of employees, are statistically rare, they are practically important. Said differently, when large firms fail to adapt the economic consequences can be dire. Although there is some evidence that firm failure may generate positive externalities and reduce industry costs, this logic seems to apply to smaller firms and those that lack complementary assets that can be redeployed in efficient ways.<sup>67</sup>

A number of researchers have noted the dangers inherent in biased sampling. Denrell, for instance, has observed that most studies in organizational theory are retrospective and rely on historical data that can overemphasize successful practices and under-sample failure.<sup>68</sup> Older firms, like IBM, are the survivors of a selection process that has eliminated a large fraction of their competitors. Focusing on only successful firms (or survivors) can lead to potentially misleading conclusions. We are appreciative of this bias. However, if one wants to study old people or old organizations, one must of necessity focus on the survivors. In this sense, selective sampling may be less of a problem if the studies are representative on the phenomenon of interest. That said, we have simply proposed a potential theoretical explanation for how organizational adaptation can occur and provided a qualitative illustration for how this might work in practice.

In describing biological evolution, Richerson and Boyd note that “you don’t have to choose between simple abstract models and rich historical explanation—the modes of explanation are complementary, not competing . . . Evolutionary trajectories are so complicated that they rarely allow an exact elucidation

for how and why things happen.”<sup>69</sup> This is true of organizations as well. While the evidence suggests that the majority of organizations do not survive for long periods, some clearly do. Multi-level selection processes offer one way through which firms, especially large ones like IBM, are able to adapt to shifts in markets and technologies.

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