

READERS' GUIDE

**NATURAL
CORPORATE
MANAGEMENT**
FROM THE BIG BANG
TO WALL STREET



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This Readers' Guide has been prepared by the author for use in conjunction with:

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From the Big Bang to Wall Street*

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**Readers' Guide, Management Applications, and Research
Update for Introduction to *Natural Corporate Management*
WILLIAM C. FREDERICK®**

INTRODUCTION'S BIG IDEAS:

- **Business behavior is generated and shaped by the ten natural phases of the EVOLUTIONARY CASCADE: Energy, Life, Darwin, Gene, *Homo*, Brain, Symbol, Organization, Market, and Corporation**
- **Natural processes permeate all aspects of corporate operations, including motives, decision making, goals, strategy, and the firm's long-term purpose, requiring managers to adopt a new approach called NATURAL CORPORATE MANAGEMENT**

Readers' Guide, Management Applications, and Research Update for *Natural Corporate Management* Chapter 1: The Big E ~ ENERGY

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CHAPTER 1's BIG IDEAS:

- **Energy created at the Big Bang origin of the Universe drives all organic and non-organic activity on Earth, including human and business behavior**
- **All forms of energy evolve from high levels toward lower levels called entropy**

HOW MANAGERS CAN APPLY CHAPTER 1's BIG IDEAS:

- **Accept the corporation's primary economic function as an energy processor**
- **Promote efficient energy uses for the business firm, and for organic life, that avoid or minimize entropy**

NEW RESEARCH UPDATE FOR CHAPTER 1:

Big Bang Theory and Energy Evolution. (See *Natural Corporate Management (NCM)*, pages 9-13.)

- **The Universe is 13.8 billion years old**, which is 100 million years older than previously thought, according to the European Space Agency's Planck space telescope. Amina Khan, *Los Angeles Times* [Reprinted in *Pittsburgh Post-Gazette*, 3-22-13, A-3.]
- **Dark energy and expansion of the Universe.** "Immediately after the Big Bang, the universe ballooned rapidly in a split-second era called inflation ... [but] the gravitational attraction of all the matter in the universe was ... slowing down the expansion. But as the universe got larger and matter got more diluted, scientists believe something caused expansion to accelerate once more. ... they call it dark energy. Eleven billion years ago, dark energy made up less than 10 percent of the total content of the universe; today it makes up almost three-quarters. ... [D]ark energy is a natural property of empty space: The more the universe expands, the stronger dark energy becomes." Andrew Grant, "Growth of early universe gauged," *Science News* 12-29-12, 9.
- **The long-term future of life in the Universe.** "A universe dominated by the energy of empty space is the worst of all universes for the future of life. Any civilization is guaranteed to ultimately disappear in such a universe, starved of energy to survive. After an unfathomably long time, some quantum fluctuation or some thermal agitation may produce a local region where once again life can evolve and thrive. But that too will be ephemeral. The future will be dominated by a universe with nothing in it to appreciate its vast mystery. ... Far, far into the future, protons and neutrons will decay, matter will disappear, and the universe will [be] devoid of substance. ... [A] universe like ours, with a positive energy in empty space, *cannot* be stable. Eventually, it must decay to a state in which the energy associated with space

will be negative. Our universe will then recollapse inward to a point, returning to the quantum haze from which our own existence may have begun. If these arguments are correct, our universe will then disappear as abruptly as it probably began.” Lawrence M. Krauss, *A Universe from Nothing: Why There is Something Rather than Nothing*, 179-180 (New York: Free Press, 2013).

An Example of a Practical Energy Problem Facing Corporate Managers. (See *NCM*, pages 20-22.)

- **Protecting Earth’s electric grids from solar storms.** “In a solar storm, [electrically] charged particles flare from the sun and hurtle into space. When they collide with Earth, the electricity-transmission system acts like a jumbo antenna, picking up currents created when the particles interact with the planet’s magnetic field. Those currents can cause wild voltage fluctuations, overheating and permanent damage to transformers, which zip electricity around the grid. The transformers weigh hundreds of tons each and aren’t easily repaired or replaced. Sunstorms can also force airlines to reroute flights and can disrupt the operation of commercial satellites and interfere with or damage their power and navigation systems.” Ryan Tracy, “Here Comes the Sunstorm,” *Wall Street Journal*, 5-15-12, A3.

New Energy Opportunities for Companies. (See *NCM*, pp. 20-22.)

- “From big-box retailers to high-tech manufacturers, more companies across the country are producing their own power [from wind turbines, biogas from organic wastes, solar panels, fuel cells]. ... Apple Inc. now gets 16% of its electricity from solar panels and fuel cells that run on biogas. BMW’s assembly plant in South Carolina . . . get half its electricity from an on-site energy center that burns methane from a nearby garbage dump. ... [However], On-site generation still accounts for less than 5% of U.S. electricity production.” Rebecca Smith & Cassandra Sweet, “Companies Unplug From Grid, Delivering a Jolt to Utilities,” *Wall Street Journal*, 9-18-13, A1.
- “The U.S. is overtaking Russia as the world’s largest producer of oil and natural gas ... U.S. energy output has been surging in recent years ... fueled by shale-rock formations of oil and natural gas ... ‘This is a remarkable turn of events,’ said the U.S. Energy Information Administration, ‘that you wouldn’t in a million years have dreamed about.’” Russell Gold & Daniel Gilbert, “U.S. Rises to No. 1 Energy Producer,” *Wall Street Journal*, 10-3-13, A1.

Readers' Guide, Management Applications, and Research Update for *Natural Corporate Management* Chapter 2: The Big L ~ LIFE

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CHAPTER 2's BIG IDEAS:

- **Earthly life—human and non-human—is a form of energy generated by the Big Bang**
- **Earthly life—ancient and modern, simple and complex—exists only within ecosystems**
- **The business corporation is one of nature's major energy processors supporting human life**

HOW MANAGERS CAN APPLY CHAPTER 2's BIG IDEAS:

- **Recognize that the corporation's primary function as an energy processor affects life forms and ecosystems either positively or negatively**
- **Balance corporate policies, decisions, and strategies to promote the firm's economic functions (economizing) and the firm's impact on life-supporting ecosystems (ecologizing)**

NEW RESEARCH UPDATE FOR CHAPTER 2:

Examples of how LIFE processes affect Natural Corporate Management. (See *NCM*, pages 42-43)

- Honeybee deaths threaten “over \$20 billion in harvests each year.” [Bill Tomson & Ryan Tracy, “Bee Die-Off Threatens Crops, *Wall Street Journal*, 5-8-13, A3.]
- Bacterial disease damages Florida citrus industry. [Arian Campo-Flores, “Disease Rips Through Florida Citrus,” *Wall Street Journal*, 1-2-13, A3.]
- Deforestation of tropical rainforests lowers the amount of flowing river water used to generate power-plant energy for human needs. [Felicity Barringer, “Fewer Rain Forests Mean Less Energy for Developing Nations, Study Finds,” *New York Times* (online), 5-13-13.]
- Migrating sockeye salmon are directed into their migration routes by the Earth's magnetic fields, thereby yielding an annual catch of about \$1 billion. Slight shifts in the magnetic fields in NW US and Canada have steered the salmon flows northward to Canada and away from the US. [Robert Lee Hotz, “For Salmon, Magnetic Fields Point the Way,” *Wall Street Journal*, 2-8-13, A6.]
- The company (Transocean Ltd.) that owned the BP oil rig that exploded, collapsed, and spewed oil into the Gulf of Mexico in 2010 is required to pay \$1.4 billion to settle Federal civil and criminal claims related to the Deepwater Horizon disaster. BP Ltd., which leased the oil platform, paid \$4.5 billion to settle similar claims for damages. [Tom Fowler, “Transocean Is Set to Pay \$1.4 Billion in Gulf Spill,” *Wall Street Journal*, 1-4-13, A3.]
- Tropical diseases are a function of ecological diversity, loss of predator-hosts, and competition. The world's extremely poor people live in tropical areas prone to disease-bearing organisms. Biodiversity enhances the life chances of

such human populations. (Kenneth R. Weiss, “Biodiversity, poverty and disease entwined”, *Los Angeles Times*, reprinted in *Pittsburgh Post-Gazette*, 12-30-12, A-2.)

- Harvard University researchers created a lithium-ion battery the size of a grain of sand, with potential for implanting them into the human body and for industrial uses. (“Batteries on the Head of a Pin,” *Wall Street Journal*, 6/22-23/13, C4.)
- Meteorological research in the UK reveals a dilemma for pollution control advocates: unwelcome hurricanes. Reducing air pollutants from industry and vehicles in Europe and America warms the Atlantic Ocean, thereby generating more hurricanes. [“Hurricane Suppression,” *Earthweek: A Diary of the Planet*, 6-28-13. Reprinted in *Pittsburgh Post-Gazette*, 6-29-13, A-2.]
- Corporations in Japan, Germany, and the United States have mimicked nature to bioengineer a thread similar to natural organic spider webs, long recognized as one of nature’s strongest materials. Potential uses include lighter but stronger auto parts, surgical materials, bulletproof vests, tires, bumpers, electronic parts, and various healthcare products. While spiders produce only about 7 different types of thread, the bioengineered versions add up to 250. (Mayumi Negishi, “Stronger Than Steel: The Amazing Spider Web,” *Wall Street Journal*, 7-9-13, B4.)

Global warming. (See *NCM*, pp. 42-43.)

- “A United Nations report ... reaffirmed the growing belief that human activity is the dominant cause behind a rise in global temperatures and reiterated that a long-term planetary warming trend is expected to continue. ... Of all the carbon dioxide emitted so far, two-thirds comes from burning fossil fuels and one-third from land-use change and deforestation, says the report.” Gautam Naik & Johannes Ledel, “U.N. Affirms Human Role in Global Warming,” *Wall Street Journal*, 9/27-29/13, A9.

New discoveries of basic LIFE processes. (See *NCM*, pages 26-30)

- Bacterial microbes are found alive in the Earth’s deepest ocean area. Called “extremophiles” by scientists, tiny organisms have also been discovered in deep-water high-temperature ocean vents, under Antarctic ice sheets, inside rocks in Yellowstone National Park’s hot springs, and now 7 miles below sea level in the Pacific Ocean’s Mariana Trench. [Jonathan D. Rockoff, “Life Discovered in the Deepest Ocean,” *Wall Street Journal*, 3-18-13, A5.]

New theoretical/conceptual models of the evolution of Earthly LIFE. (See *NCM*, Chapters 1 and 2)

- Eugene V. Koonin, *The Logic of Chance: The Nature and Origin of Biological Evolution* (Upper Saddle River, NJ: Pearson Education, Inc., 2012).
This is the best, up-to-date, comprehensive account of biological evolution, beginning with the origin of Earthly life and including the most recent theories of cosmic evolution. An Appendix B summarizes ideas about what is called the MWO (“many worlds in one”) model and the related concept of “inflationary cosmology” which, according to Koonin, by “the end of the twentieth century it had replaced the classical Big Bang model of the evolution of the universe.” Also described is the concept of multiverses: “In the most

plausible, self-consistent inflationary models, inflation is eternal, with an infinite number of island (pocket) universes ... comprising the infinite multiverse. ... Thus, although the model of eternal inflation cannot be considered proved, this is the strongly preferred current scenario of cosmic evolution.”

Koonin also points out that “the *fight against entropy is one of the crucial aspects of evolution*. The selection for entropy control and decrease is universal.”

- John F. Padgett & Walter W. Powell, *The Emergence of Organizations and Markets* (Princeton & Oxford: Princeton University Press, 2012).

This book proposes a *chemical definition* of life, life’s origin, and the evolution of life that explains the evolutionary emergence of human organizations and market systems. Regarding life: “From the chemical perspective, life itself can be defined as an interacting ensemble of chemicals that reproduces itself.” Regarding life’s origin: “The origin-of-life problem is finding prebiotic . . . conditions under which an initial random set of chemicals can self-organize and reproduce itself.” Regarding the evolution of life: “Autocatalysis [i.e., self-organization] is our version of Darwinian selection—namely, successful reproduction that keeps networks alive, resilient, and maintaining themselves through perilous time.”

The authors also recognize the role of Energy in evolution: “Throughput of energy is required not just as fuel for chemical reactions but also for self-organization of any kind, defined thermodynamically as a decrease in entropy.”

Readers' Guide, Management Applications, and Research Update for *Natural Corporate Management* Chapter 3: The Big D ~ DARWIN

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CHAPTER 3's BIG IDEAS:

- **Earthly organic life forms evolve from earlier ancestors by adapting to the ecological environment through a process of Darwinian natural selection**
- **Adaptation occurs when organic life forms achieve survivable levels of sustenance (energy), sex (reproduction of offspring), and security (a safe niche)**
- **Organic evolution is an outcome and an expression of the more ancient energy evolutionary process**

HOW MANAGERS CAN APPLY CHAPTER 3's BIG IDEAS:

- **Recognize that the behavior and motives of a corporation's workforce are driven by Darwinian natural selection pressures to achieve a living income (sustenance), formation of a family (reproductive sex), and safe living quarters (security)**
- **Encourage and support employees' evolved drives to acquire, bond, learn, and defend, plus their emotional appetites for cooperation, competence, skill-use, innovation, and self-protection**

NEW RESEARCH UPDATE FOR CHAPTER 3:

Expanding the evolutionary Tree of Life. (See *NCM*, pages 51-53)

- Evolutionary tree of life. David Templeton, "Scientists draw tree to trace mammal evolution," *Pittsburgh Post-Gazette*, 2-8-13, A-1. A new "data base funded by the National Science Foundation's Assembling the Tree of Life Program ... not only describes the hypothetical common ancestor of all placental mammals, humans included, but provides a method of placing each species at its most appropriate place on the tree." The data base is at www.MorphoBank.org, and see an article in *Science*, 2-8-13. The posited common ancestor of humans and other primates is "an insect-eating shrew-like animal, larger than a mouse, with an extended snout, many conical teeth, brown fur and white-fur underbelly, and an unusually long, thick, furry tail." Placement on the tree consists of tracing phenotypic and genotypic features backward in time, and ideally, finding a fossil of such an organism. No fossil of the common ancestor has yet been found.

Some practical lessons and warnings for business corporations. (See *NCM*, pages 56-58.)

- John N. Thompson, *Relentless Evolution*. Chicago: University of Chicago Press, 2013. "... evolution is as much an ecological process as it is a genetic process. ... The pacemakers of day-to-day evolution seem to be at least as much, and maybe more, ecological rather than genetic." "... evolution continues to reshape the web of life itself at a time when we [humans] are

altering biodiversity worldwide. ... we are undoubtedly underestimating the relentlessness of evolutionary change. ... we are changing the earth so quickly and in so many ways that we are imposing strong [natural] selection on a large proportion of the earth's biodiversity all at once ... We still have much to learn about how we are altering evolution in the increasingly human-dominated communities worldwide, and how we can use our developing knowledge of the relentlessness of evolution to maintain the diverse web of life and our place within that web" (page 387).

Readers' Guide, Management Applications, and Research Update for *Natural Corporate Management* Chapter 4: The Big G ~ GENE

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CHAPTER 4's BIG IDEAS:

- **Genes (DNA) are inherited cellular components that activate and shape an organism's bodily functions and behaviors**
- **Genes can influence human behavior that is self-centered, competitive, collaborative/cooperative or some combination of such traits**
- **A special form of DNA (mitochondrial DNA) generates and processes the amount of energy necessary to sustain an organism's life**

HOW MANAGERS CAN APPLY CHAPTER 4's BIG IDEAS:

- **Accept the active presence of genetically determined behaviors in the members of a company's workforce, including managers and employees**
- **Use genetic engineering to modify, influence, and improve the expression of genetic impulses present in organic products and services**

NEW RESEARCH UPDATE FOR CHAPTER 4's BIG IDEAS:

Genetic engineering. (See *NCM*, pages 69-70, 86, 89-90.)

- The genetically engineered AquaBounty salmon was approved by the U.S. Food and Drug Administration to enter the nation's food supply chain. The FDA said the salmon would have "no significant impact" on the environment, and that it was "as safe as food from conventional Atlantic salmon." The new salmon was created by inserting a growth hormone from the Chinook salmon and a genetic switch from an ocean pout, thereby causing more rapid growth in a shorter time period. (Andrew Pollack, "Engineered Fish Moves a Step Closer to Approval," *New York Times*, 12-21-12).
- Genetically modified crops cause expensive tire repairs for farm equipment. The stubble and stalks left in the ground from the previous year's crop are much tougher and harder than traditional farm crops, puncturing tractor tires and raising farmers' costs. In response, tire manufacturers have begun producing puncture-proof, but far more expensive, tires for farm vehicles. (Bob Tita, "Genetically Modified Tires," *Wall Street Journal*, 8-1-12, B1).
- DNA's potential to solve the digital-data storage problem. Researchers at Harvard University translated the English-language text of a book into the genetic language of DNA, demonstrating a vast storage space for an exploding amount of data generated by modern technology. "A device the size of your thumb could store as much information as the whole Internet," said the molecular geneticist heading the research team. (Robert Lee Hotz, "Future of Data: Encoded in DNA," *Wall Street Journal*, 8-17-12, A1.)

Domestic violence in the workplace. (See *NCM*, pages 70, 89-90.)

- Additional evidence of domestic violence negatively impacting the corporate workplace. About one in five employees knew a co-worker who was being abused at home, and 5 percent actually knew a co-worker who was an active

abuser. Workplace productivity was negatively affected. (Ann Beiser, “Co-workers say they see domestic violence here,” *Pittsburgh Post-Gazette*, 5-14-13, A-8.)

Nature, including genes (DNA), cannot be patented. (See *NCM*, pages 71-73.)

- The U.S. Supreme Court ruled that genes (DNA) cannot be patented, saying that “Laws of nature, natural phenomena, and abstract ideas are not patentable.” Because genes are a function or an outcome of natural law and are themselves a natural phenomenon, they do not qualify for patent rights. Simply finding the location of a gene that causes breast cancer, or identifying the mutations that may lead to cancer, does not modify the gene itself, so does not justify a patent. However, altering a gene’s structure, or deleting some of a gene’s components, to produce a treatment regimen is potentially patentable. The Supreme Court’s decision was unanimous in *Association for Molecular Pathology et al. v Myriad Genetics, Inc. et al.*, June 13, 2013. (Jess Bravin & Ann Brent Kendall, “Justices Strike Down Gene Patents,” *Wall Street Journal*, 6-14-13, B1.)

Updating the Human Genome Project. (See *NCM*, pages 71-73.)

- “The human genetic instruction book just got a lot more readable. Nearly a decade after the Human Genome Project assembled the genome’s 3 billion chemical units, an international consortium has revealed new aspects of genetic grammar. ‘The questions we can now ask are more sophisticated and will yield better answers than the ones we were asking nine years ago,’ says the director of the National Human Genome Research Institute. ... At least 80 percent of the genome may serve some purpose. Within that 80 percent is a complex network of regulatory switches that control how cells interpret the genetic instructions contained in DNA.” Tine Hesman Saey, “Sequel to human genome released,” *Science News*, 10-6-12.

Readers' Guide, Management Applications, and Research Update for *Natural Corporate Management* Chapter 5: The Big H ~ *HOMO*

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CHAPTER 5's BIG IDEAS:

- Modern human beings—scientifically called *Homo sapiens*—evolved from earlier pre-human ancestors by a process of natural selection
- Human behavioral traits favored by natural selection included aggressiveness to survive, sexual selection of mates, and formation of nuclear families, kinship groups, clans, and tribes
- Modern business behavior—being competitive, practical, short-term, domineering, defensive, and entrepreneurial—mirrors the ancestral behavior of early humans
- As an organic life form, *Homo sapiens* has been remarkably successful in meeting the challenges of natural selection, acquiring and using Energy, and populating the entire Earth

HOW MANAGERS CAN APPLY CHAPTER 5's BIG IDEAS:

- Identify, and put to practical use in the workplace, the naturally evolved behavioral traits of today's *Homo sapiens*, including managerial skill-sets, emotional impulses, and technological innovation

NEW RESEARCH UPDATE FOR CHAPTER 5:

HOMO origins. (See *NCM*, pages 92-98.)

- A 55-million-year-old fossil skeleton of an ancestral primate, *Archicebus achilles*, found in China is thought to be the evolutionary forerunner of monkeys, apes, and humans. (Bruce Bower, "Fossil sheds light on early primates," *Science News*, 6-29-13, 14.)
- An ancient fossil skeleton discovered in 2008 in South Africa may be an ancestor of all members of the *HOMO* genus. *Australopithecus sediba* lived about 2 million years ago and had both ape-like and human-like features. (Robert Lee Hotz, "Puzzling Hominid Had Human Traits," *Wall Street Journal*, 4-12-13, A2.) (Bruce Bower, "*Sediba* may be human forebear," *Science News*, 5-18-13, 12.)
- The precise African locale where modern-day humans (*Homo sapiens*) originated eludes researchers using genetic tracers, due to the diverse tribal and genetic complexity of groups who might have been the origin point. ("No home for *Homo sapiens*," *Science News*, 10-20-12, 9.)
- New research about new-found human-like fossils, inbreeding among *HOMO* types (e.g., *H. Neanderthalensis* and *H. sapiens*), and ancient population movements across Europe, Asia, and Africa raise questions about human origins and how to draw an accurate picture of the *HOMO* tree of life. (Bruce Bower, "Tangled Roots," *Science News*, 8-25-12, 22-26; and Bruce Bower, "Kissing, and missing, human cousins," *Science News*, 12-29-12, 26.)

Stone Age Trekking. (See *NCM*, pages 98-100, and 106-108.)

- Long-distance walking by ancient *HOMO* species—far greater than hunter-gatherer people or modern athletes—was made possible by their exceptionally strong leg bones and muscles. (Bruce Bower, “Stone Age prime time for trekking,” *Science News*, 4-20-13, 9.)
- Walking, tracking game prey over long distances, and general physical activity in ancient human ancestors paid off in both physical survival as well as increased brain growth. (Gretchen Reynolds, “Humans have history of running, big brains,” *New York Times*, reprinted in *Pittsburgh Post-Gazette*, 1-7-13, C-1.)

Violence, Longevity, and Evolution. (See *NCM*, pages 111-112 and 108-113.)

- Up to 25 per cent of fossilized human skulls found among 6,000-year-old Egyptians, Babylonians, and Assyrians had suffered severe wounds caused by clubs, swords, and knives. (Bruce Bower, “Mideast violence goes way back,” *Science News*, 8-25-12, 16.)
- Men in a hunter-gatherer society in South America who killed people in other villages had three times as many offspring as non-killers, thus displaying a genetic advantage for themselves and their children. (Charles C. Mann, “Fierce Controversies,” *Wall Street Journal*, 2/16-17/13, C3.)
- Human longevity has more than doubled—from 30 years to 72 years—from pre-1900s to the present. Modern humans far outlive primitive hunter-gatherers and chimpanzees. (Rachel Ehrenberg, “Modern living vastly extends life,” *Science News*, 11-17-12, 10.)

Readers' Guide, Management Applications, and Research Update for *Natural Corporate Management* Chapter 6: The Big B ~ BRAIN

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CHAPTER 6's BIG IDEAS:

- **The organic human brain—a complex group of neuron cells that evolved from ancient ancestors over a 2.5-million-year period—generates, directs, and coordinates human adaptive behavior**
- **The human brain's gene-based prefrontal neocortex enables adaptive coordination of neural signals originating internally from bodily functions and externally from ecosystem interactions**
- **The human cognotype is one of nature's most effective energy processors, generating human cognition, consciousness, and ecosystem awareness**

HOW MANAGERS CAN APPLY CHAPTER 6's BIG IDEAS:

- **Recognize that the manager's neocortex is the source and generator of a corporation's economizing and ecologizing activities**
- **Understand that a corporation's organizational design, leadership qualities, and employee motives are shaped by neural signals originating in the human brain**
- **Encourage employees to develop and use their brain's skill-sets and to express emotional appetites that support workplace goals**
- **Use knowledge of brain functions to understand, motivate, and reward employee behavior in the workplace**

NEW RESEARCH UPDATE FOR CHAPTER 6:

Building the Human Brain. (See *NCM*, pages 121-123.)

- **Got Meat?** The diet of 2-million-year-old human ancestors included small animals and scavenged remnants of larger animals. Meat-eating is thought to have increased the size of human brains, according to other researchers. (Bruce Bower, "Meat on human ancestors' menu," *Science News*, 6-1-13, 13.)
- **Got Vegan?** Fossilized teeth from ancient to more recent human ancestors reveal a shift toward eating grasses and grass-eating animals. (Rachel Ehrenberg, "Hominid diet trended to grass," *Science News*, 6-29-13, 14.)
- **Got Tools?** Around 71,000 years ago—at the beginning of the *Homo* 'big bang'—new, more complex stone tools appeared in South Africa and they persisted for 11,000 more years with "stylistic changes." This long-lasting technology is believed to be evidence of an expanding human cognitive ability, perhaps even the beginning of the modern mind. (Gautam Naik, "Tool Clue to Early Man's Mind," *Wall Street Journal*, 11-8-12, A3.)

Understanding the Human Brain. (See *NCM*, pages 119-120, 121-126, 134-135.)

- The U.S. government will fund the creation of the Brain Activity Map to reveal the complex actions of the human brain. Similar to the earlier Human Genome Project that deciphered the human genetic code, the Brain Activity Map will "see the inner workings of the mind for the first time." The goal is to

identify more clearly the brain's normal functions, as well as neurological disorders such as Alzheimer's and Parkinson's diseases. (John Markoff, "Obama wants effort to map brain function," *New York Times*, reprinted in *Pittsburgh Post-Gazette*, 2-18-13, A-1. Gautam Naik and Colleen McCain Nelson, "Government Embarks on Brain Map," *Wall Street Journal*, 2-19-13, A6).

- Tiny human-like "mini brains" were created by Austrian scientists from an embryo's stem cells. "The neural cells organized themselves into tiny structures [which] had defined brain regions [and] the neurons were active and fired [electrical impulses]. ... But within the structures, ... the organization didn't fully match that of a real brain [and] some key pieces ... were missing." The 'mini brains'—about 4 millimeters in diameter—"allow researchers to investigate human brain disease in a lab." (Gautam Naik, "Stem Cells Turned Into 'Mini Brains'," *Wall Street Journal*, 8-29-13, A3).

SPECIAL NOTE TO READERS:

Chapter 7, **The Big S ~ SYMBOL**, is one of the most important chapters in the entire book. First, it identifies **Symbols** as a natural evolutionary step toward humanity. Second, it shows that **Tools** are more adaptive for human survival than **Symbols**. Third, it introduces a nature-based definition of human culture: a combination of **Tools, Symbols, and Sociality** called “neuro-organic culture.” Fourth, it “solves” the long-running Nature-Nurture controversy by showing that the “nurture” component of human neuro-organic culture is itself a product of natural evolution.

Readers’ Guide, Management Applications, and Research Update for *Natural Corporate Management* Chapter 7: The Big S ~ SYMBOL

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CHAPTER 7’s BIG IDEAS:

- **Symbols are cognitive meanings, generated in the human brain, and attached to objects or activities present in the ecosystem**
- **Symbols, tools, and sociality are the natural components of human neuro-organic culture**
- **Human behavior—both culturally learned and evolutionarily inherited—is generated by neural, organic processes occurring in the human brain, so both kinds of behavior are entirely natural and organic in origin**

HOW MANAGERS CAN APPLY CHAPTER 7’s BIG IDEAS:

- **Recognize that a company’s culture is a small-scale version of human neuro-organic culture, affecting the workplace behavior of managers and employees**
- **Train employees to apply their (Tool) skills, their (Symbolic) understanding of the company’s goals, and their (Sociality) teamwork cooperation to promote the company’s goals**

NEW RESEARCH UPDATE FOR CHAPTER 7:

Symbols and Sociality. (See *NCM*, pages 144-151.)

- Human sociality and social structure are rooted in long-term genetic evolution. “Primate species tended to have the same social structure as their [genetically] close relatives ... Sociality emerged about 52 million years ago [and] primate social behavior began to evolve some 16 million years ago ... [including] pair bonding by apes and humans ... and multi-male, multi-female groups of baboons and chimpanzees.” Nicholas Wade, “Genes Play Major Role in Primate Social Behavior,” *New York Times*.
- Human sociality and human culture evolved as genetically-driven survival techniques. “We [use] culture to favor survival of those like us at the expense of other groups, using religion, warfare, cooperation and social allegiance. ... The allegiance we feel to one tribe—religious, sporting, political, linguistic, even racial—is a peculiar mixture of altruism toward [our] group and hostility

to other groups.” Matt Ridley, “Why Our Culture Is in Our Genes,” *Wall Street Journal*, 3/3-4/13, C4.

- Tribalism—a form of sociality—is a human survival behavior. “When people feel that a group they value—be it racial, religious, regional or ideological—is under attack they rally to its defense, even at some cost to themselves. We evolved to be tribal, and politics is a competition among coalitions of tribes. The key to understanding tribal behavior is not money, it’s sacredness. . . . People who worship the same idol can trust one another, work as a team and prevail over less cohesive groups. . . . When sacred objects are threatened, we can expect a ferocious tribal response.” Jonathan Haidt, “Forget the Money, Follow the Sacredness,” *New York Times*, 3-18-12, 12.
- Sociality begins very early in today’s *Homo sapiens* children. “At age 3-4, the overwhelming majority of children behave selfishly, whereas most children at age 7-8 [develop] other-regarding preferences.” However, this “inequality aversion is strongly shaped by parochialism [or] a preference for favouring the members of one’s own social group.” In other words, altruism—caring about others—is limited by sociality membership. Ernst Fehr *et al.*, “Egalitarianism in young children,” *Nature*, 4-28-08, 1,079-83.
- “Around the world, in rich and poor countries alike, the structure of family life is undergoing profound changes. . . . ‘The idea that the family is a stable and cohesive unit in which father serves as economic provider and mother serves as emotional care giver is a myth’ said a researcher of the Population Council. . . . ‘marriages are dissolving with increasing frequency . . . unwed motherhood is increasingly common . . . mothers are carrying increasing economic responsibility for children . . . ‘The mainspring of the worldwide change probably has to do with the economic status of women and changes in the gender-based division of labor. The underlying question for the 21st century is how to create a system that allows all parents to invest in their children, both emotionally and financially’”. Tamar Lewin, “The Decay of Families Is Global, Study Says,” *New York Times*, 5-30-95, A5.
- “[A]rt is an aesthetic expression of something . . . fundamental: the cognitive ability to construct symbols that communicate meaning, whether they be the words that make up our language, the musical sounds that convey emotion, or the dramatic [cave] paintings . . . of 30,000 years ago. . . . Did symbols . . . serve as a social glue that helped tribes of early humans to survive and reproduce? . . . What selective advantages did using symbols confer on our ancestors? . . . Symbolic communication is what held groups of early humans together as they explored new environments and endured climatic shifts.” Michael Balter, “On the Origin of Art and Symbolism,” *Science*, 2-6-09, 709-711.

Tools and sociality. (See *NCM*, pages 151-154.)

- Facebook—operating on digital tools—had created a sociality group of one billion active members by 2012, four times larger than it was in 2009. If Facebook were a nation, it would rank just below China and India in population. Geoffrey A. Fowler, “Facebook: One Billion and Counting,” *Wall Street Journal*, 10-5-12, B1.

Time and the Rhythms of Nature. (See *NCM*, pages 143-144.)

- Neil Shubin, author of *The Universe Within: Discovering the Common History of Rocks, Planets, and People*, makes the following observations about time as one of nature's rhythmic patterns. "Our perception of time defines the ways we interact with the planet and with one another. ... Virtually every part of us—all our organs, tissues and cells—are set to a rhythm of day and night. ... Our cellular clocks reside in the molecular machinery of DNA ... Daily cycles are one of the most fundamental properties of life on earth. ... Our [internal] clocks tie us not only to other creatures, but also to the formation of the solar system itself. The spinning of the earth and rotation of the moon form a backbeat that thumps inside the chemistry of our cells. ... Written inside us is the birth of the solar system and workings of the planet itself." Neil Shubin, "January is the Cruellest Month," *New York Times*, 1-27-13.
- "... [unlike digital technology] we humans and our culture evolved over millennia and are slower to adapt. The body is based on hundreds, perhaps thousands, of different clocks, syncing to everything from the sun and moon to levels of violence and available water." Douglas Rushkoff, "The Digital Trap: Working at Web Speed," *Wall Street Journal*, 3-14-13, B1.

Readers' Guide, Management Applications, and Research Update for *Natural Corporate Management* Chapter 8: The Big O ~ ORGANIZATION

WILLIAM C. FREDERICK®

CHAPTER 8's BIG IDEAS:

- The modern business corporation is organized by three evolution-based natural processes: command-and-control hierarchy, technological coordination, and nonlinear complexity
- A company's management hierarchy conveys power to top-level executives; a company's technological systems require workplace teamwork; and a company's complex competitive markets can potentially create organizational chaos, disorder, and bankruptcy of the firm
- The natural evolutionary function of corporate organization—hierarchy, technology, and complexity—is to capture and use energy efficiently

HOW MANAGERS CAN APPLY CHAPTER 8's BIG IDEAS:

- Use managerial influence to motivate and reward—not punish—employees who occupy non-executive levels of the firm's organizational pyramid
- Design and promote coordinative teamwork activities that support the firm's productive technological systems
- Create departments and appoint experts to anticipate and formulate action plans for dealing with unexpected market complexities, new technologies, and public policies
- Adopt an energy policy that promotes corporate productivity

NEW RESEARCH UPDATE FOR CHAPTER 8:

Organizational Hierarchy. (See *NCM*, pages 169-174.)

- Compensation of top-level corporate executives is a key sign of hierarchical organization. In 2012, the top ten CEOs were paid from \$94.5 million (the highest-paid) to \$26.3 million (the 10th highest-paid). The median pay for 300 CEOs was \$10.1 million annually. Scott Thurm, "What's a CEO Worth? More Companies Answer \$10 Million," *Wall Street Journal*, 5-16-13, B1, B4.
- "Nine executives at private-equity firms that specialize in corporate buyouts together will take home more than \$1 billion in dividends and compensation from last year [2012] . . ." Ryan Dezember, "A Jumbo Payday for Deal Titans," *Wall Street Journal* 3/2-3/13, A1-A-2.
- "[The] chief executive of H. J. Heinz Co. could walk away from the ketchup giant with more than \$200 million if he leaves when its new owners take control. The total would consist of a \$56 million 'golden parachute' including bonus payments and other items, \$57 million in pension and deferred compensation and \$99.7 million of Heinz shares . . ." Julie Jargon & Scott Thurm, "Heinz CEO's Golden Exit Deal," *Wall Street Journal*, 3-5-13, B1.
- In 2012 Apple awarded its Chief Financial Officer "a pay package valued at \$68.6 million, the biggest in at least three years for any finance chief of a Standard & Poor's 500 company. . . . The second-highest-paid CFO was

Oracle Corp.'s president and CFO [whose] pay was valued at \$51.7 million." James Willhite, "Apple Takes Lead in CFO Pay," *Wall Street Journal*, 7-2-13, B6.

- Management hierarchy or worker autonomy? "Disdain for management sometimes seems as common as free snacks among startups and other small or young companies founded without layers of supervisors, fancy titles or a corporate ladder to climb. ... Management has traditionally been a worker's best way to get ahead and increase earnings, but at startups, where speed and autonomy are prized above all else, managers are often dismissed as archaic, or worse, dead weight." At one small software company, the co-founder said, "'I'm not saying that the work of a middle manager still has to get done ... but how do you solve that problem in a way that embraces freedom [for workers], as opposed to hierarchy?'" Rachel Emma Silverman, "Managers? Who Needs Those?", *Wall Street Journal*, 8-7-13, B1, B9.

Corporate hierarchy's dark side. (See *NCM*, pages 169-174.)

- Alpha males and Beta females. "Women earned 76.5 cents for every dollar that men did last year [2012], ... a gender gap that has barely budged in almost a decade. ... In 1980, women earned 60.2 cents for every \$1 men did; by 1990, that had climbed to 71.6 cents. ... Discrimination remains a factor..." Brenda Cronin, "Women's Wage Gap Stays Stuck in Place," *Wall Street Journal*, 9-18-13, A3.
- Alpha males fight to a tragic finish. "Long-simmering friction between the chairman and chief financial officer of [a Swiss insurance company] escalated this summer as the two tussled over how to explain the company's disappointing progress toward meeting certain business targets. ... Then, last week, [the CFO] committed suicide at his lakeside home outside Zurich. He left a typed note blaming [the Chairman] for creating an unbearable, pressure-cooker working environment, and for treating colleagues disrespectfully. ... [The Chairman] ... abruptly resigned." David Enrich & Andrew Morse, "Clash Preceded Zurich CFO Death," *Wall Street Journal*, 9-4-13, C1.

Two examples of the challenges involved in managing complexity organizations. (See *NCM*, pages 183-184.)

- Hewlett-Packard is a classic example. "Tablets aren't only eating into laptop sales, they are cutting demand for high-margin printer ink as fewer people print documents. Sharing via social networks is drying up sales of ink to print photos. Meanwhile, H-P's PC business is losing share and profits to cheaper Asian rivals. ... Add to these issues the fact that a spinoff would be distracting, costly and would eat into profit as reduced scale would harm its ability to secure components cheaply. So [the H-P CEO] is stuck with managing a firm that looks increasingly unmanageable." Rolfe Winkler, "H-P Faces a Long, Hard Grind," *Wall Street Journal*, 8-28-12, C10.
- "Regulators want big U.S. banks to simplify, but the process is proving to be complicated. Wells Fargo, the fourth-largest U.S. lender, has 3,675 subsidiaries ... In all, the six largest U.S. banks have 22,621 subsidiaries ... Complexity in the banking sector has vexed regulators since the financial crisis, prompting calls to break up those deemed 'too big to fail.' ... 'They're not just too complex to manage, they're too complicated and too interconnected to regulate,'" according to a U.S. senator seeking to simplify

the banking complexities. Dan Fitzpatrick & Michael R. Crittenden, “Banking Business: Complexity Cubed,” *Wall Street Journal*, 4-11-13, C1.

Human technological usage and organization were inherited from our Hominid ancestors. (See *NCM*, pages 101-104, and 175-178.)

- For examples of tool-use by non-human animals, including chimpanzees, monkeys, birds, and orangutans, consult a book by Crickette Sanz, Josep Call, & Christophe Boesch (eds.), *Tool Use in Animals: Cognition and Ecology*, Cambridge University Press, 2013. The authors describe the cognitive and cooperative basis of tool-use among these ancestral human relatives.

Readers' Guide, Management Applications, and Research Update for *Natural Corporate Management* Chapter 9: The Big M ~ MARKET

WILLIAM C. FREDERICK®

CHAPTER 9's BIG IDEAS:

- **Markets perform two ancient evolutionary functions, one economic—an exchange of goods and services—and one social—when an exchange considered to be fair and trustworthy**
- **Business corporations' market activities include firm-centered prudent Economizing; extreme one-sided Economizing; and ecosystem-centered Ecologizing**
- **Today's market economies are composed entirely of naturally-evolved features that support human life**

HOW MANAGERS CAN APPLY CHAPTER 9's BIG IDEAS:

- **Pursue a prudent economizing strategy, beware the risks of economizing, and embrace the cosmic responsibility of ecologizing**

NEW RESEARCH UPDATE FOR CHAPTER 9:

Is philanthropic giving by business a form of **social reciprocity, psychological reciprocity, or economic reciprocity**? (See *NCM*, pages 190-206.)

- In 2010, multi-billionaires Warren Buffett and Bill Gates, established the Giving Pledge, whose signers agreed to give away at least half of their fortunes to support various charitable causes. Three years later, 105 wealthy business executives had signed the Pledge, including Facebook founder Mark Zuckerberg, plus the first Russian tycoon and a handful of other non-U.S. signers. Other well-known pledgers were investor Carl Icahn, media mogul Ted Turner, and New York City mayor Michael Bloomberg. Critics of the Giving Pledge said it amounted to another way to hide fortunes from high taxes, while others questioned the power of the super-wealthy to shape public issues such as education through giving funds to private institutions. Geoffrey A. Fowler, "More Billionaires Vow to Give Money Away," *Wall Street Journal*, 9-19-12, A7; and Lucas L. Alpert, "Russian Tycoon Joins Gates Giving Pledge," *Wall Street Journal*, 2-20-13, B10.

Examples of **economizing** corporate behavior. (See *NCM*, pages 210-213.)

- Stock market value is one measure of a corporation's **economizing** activity. In August 2012, Apple Inc. became "the largest U.S. company ever, measured by stock-market value. Apple hit the new milestone--\$623.52 billion—at a time when its influence on the economy, on the stock market and on popular culture, rivals that of some of the most powerful companies in U.S. history: General Motors ...; Microsoft ...; and International Business Machines Corp. [IBM]. ... Apple's ... nearest U.S. rival [was] ExxonMobil, which stood at \$405.97. ... The bigger [Apple] gets in both sales and bureaucracy, the harder it is to keep increasing profits and revenues at the same speed, and to continue developing products and maintain a culture that inspires customers and rival

firms.” E.S. Browning, Steven Russolillo, & Jessica E. Vascellaro, “Apple Now History’s Richest Company,” *Wall Street Journal*, 8-21-12, A1.

- John Coates, a former Wall Street banker and now a senior research fellow at the University of Cambridge, explains over-the-top investment behavior of financial traders by tracking the levels of testosterone and cortisol in their bodies. “He found that when a trader’s testosterone levels were particularly high in the morning, he went on to make more money than on days when his morning testosterone level was low. [The different levels] would add up to around a million dollars in take-home pay. ... For losers, the effect is the opposite: The stress and worry of losing money cause the endocrine system to flood the body with cortisol, which makes people afraid to take even favorable bets.” See Coates’ book, *The Hour Between Dog and Wolf*. Drake Bennett, “When Animal Spirits Attack,” *Bloomberg Businessweek*, 6/4-10/12.

Update on the Bernard Madoff **economaxing** Ponzi scheme. (See *NCM*, pages 212-213.)

- “Peter Madoff, the chief compliance officer of the Madoff investment firm, told a Manhattan court that he faked documents, lied to regulators, and committed a litany of other crimes that allowed his older brother, Bernard Madoff, to perpetuate one of history’s biggest investment frauds. ... Bernard Madoff rewarded him handsomely including meals, travel-leased cars and household personnel, none of which were declared personal income, [and made] sham trades and fake loans in order to avoid gift taxes. ... All told, Peter Madoff received some \$40 million from the Madoff firm between 1998 and 2008 ... He pleaded guilty to criminal charges that will send him to prison for 10 years and require him to forfeit all his personal assets, including a Ferrari, and more than \$10 million in cash, and assets belonging to his wife and daughter.” Chad Bray & Michael Rothfeld, “Peter Madoff Pleads Guilty,” *Wall Street Journal*, 6-30/7-1/12, B1.
- “... a longtime former accountant to Bernard Madoff was indicted ... for allegedly keeping false books that helped the convicted Ponzi-scheme operator cover up the fraud for decades. ... ‘In order to keep his scheme hidden for so long, Madoff needed the assistance of certain willing outsiders that could be trusted to handle otherwise suspicious activity,’ the indictment said. [The accountant] pleaded not guilty ...” Reed Albergotti, “Accountant Linked to Madoff Is Indicted,” *Wall Street Journal*, 9-27-13, C3.
- The former chief financial officer for the Madoff firm “and seven other people have pleaded guilty in the scandal ... Prosecutors have more to prove, including that two portfolio managers, two computer programmers and the firm’s director of operations knew about the scheme—and worked to keep it going.” Ashby Jones, “Madoff Insider Is Ready to Testify,” *Wall Street Journal*, 10-7-13, C1.
- Some Madoff victims who lost their lifetime retirement funds had invested their savings in “feeder funds” that, unknown to them, then funneled money into the Madoff Ponzi scheme. “Only direct investors with Mr. Madoff’s firm are eligible for payments from Irving Picard, the court-appointed trustee winding down Mr. Madoff’s firm. Investors ... who invested through feeder funds haven’t received anything.” Dan Strumpf, “Madoff Scandal Still Haunts Victims,” *Wall Street Journal*, 12-11-12, C1-2. Even some big banks—J.P. Morgan Chase, UBS, HSBC Holdings, and Unicredit Bank Austria—escaped attempts to recover funds lost by victims of the Madoff Ponzi scheme. Reed

Albergotti, "Madoff Trustee's Clawbacks Blocked," *Wall Street Journal*, 6-21-13, C3.

- "Irving Picard, the U.S. trustee appointed to recover funds lost in the [Madoff] fraud, had recovered \$9.348 billion as of July 1 this year [2013]. Mr. Picard estimates that Madoff's 'unprecedented fraud' lost customers approximately \$20 billion in total." Richard Partington, "Madoff Brother Won't Answer in U.K. Court," *Wall Street Journal*, 7-5-13, C3.

Update on the MF Global **economaxing** financial debacle. (See *NCM*, pages 212-213.)

- "Jon S. Corzine ... as chief executive at MF Global Holdings, Ltd. deserves much of the blame for the firms' 2011 demise, according to a bankruptcy trustee's report ... [H]e and his management team engaged in 'negligent conduct' [and] failed to improve faulty controls in MF Global's risk and treasury departments even after being warned of their inadequacy. \$1.6 billion in customer funds was lost [but] distributions will restore at least 93 cents on the dollar to former MF Global customers [although] unsecured bondholders could recover just 12 to 42 cents on the dollar." Ironically, "Mr. Corzine accumulated hundreds of millions of dollars of wealth in the 1990s running Goldman Sachs [while his trade on shaky European banks that brought down the company] actually turned out to be a money maker. None of the European bonds he bet on defaulted through 2012." Aaron Lucchetti & Julie Steinberg, "Corzine Blasted in MF Global Autopsy," *Wall Street Journal*, 4-5-13, A1-A2.
- "[The Commodity Futures Trading Commission] filed civil charges against former MF Global Holdings, Ltd., Chief Executive Jon S. Corzine and a top lieutenant [Edith O'Brien, assistant treasurer] for overseeing the misuse of almost \$1 billion in customer funds." "Corzine Charged in MF Global Collapse," *Wall Street Journal*, 6-28-13, A-1, A-4.
- "Mr. Corzine today is being sued by the bankruptcy estate, by former customers of MF Global, by shareholders of MF Global, and by the company's regulator, the CFTC. The murmurs, however, are that he will escape criminal charges by the Justice Department. ... One big ... question may be answerable only when a complete picture of MF's last weeks and days is filled in. When the entire gestalt comes into focus, will it be possible to believe that Mr. Corzine didn't know Ms. O'Brien was misusing customer money, even if he never authorized such misuse?" Holman W. Jenkins, Jr., "Corzine's 'Chinatown'," *Wall Street Journal*, 7-3-13, A-13.
- "Former Federal Bureau of Investigation Director Louis J. Freeh wants a \$1 million fee for success securing creditor recoveries in the bankruptcy wind-down of **MF Global Holdings Ltd.**, the failed commodities firm led by former New Jersey Governor Jon S. Corzine. ... Mr. Freeh's lawyers asked for the \$1 million in addition to the more than \$20 million billed by Mr. Freeh and his legal teams for their hourly work on the case. Mr. Freeh's hourly rate is \$900. ... Mr. Freeh's lawyers said the bankruptcy code allows him to personally request nearly \$4 million for his work as MF Global's Chapter 11 trustee, based on how much creditors of the failed company are recovering in the case." Joseph Checkler, "Freeh Seeks \$1 Million MF Fee," *Wall Street Journal*, 8-7-13, C3.
- "The Commodity Futures Trading Commission (CFTC) is closing in on rules designed to make the futures market safer in the wake of implosions at **MF**

Global Holdings Ltd. ... [requiring] futures brokers to put aside twice as much collateral ... roughly \$100 billion more ... and a new requirement, dubbed the 'Corzine rule' for former MF Global Chief Executive Jon Corzine, which requires CEOs to sign off on any significant transfer of customer money. ... Most of the rules have garnered broad support from the industry..." Jamila Trindle, "CFTC Moves to Safeguard Customer Funds," *Wall Street Journal*, 9-5-13, C3.

Readers' Guide, Management Applications, and Research Update for *Natural Corporate Management* Chapter 10: The Big C ~ CORPORATION

WILLIAM C. FREDERICK®

CHAPTER 10's BIG IDEAS:

- Natural Corporate Management is a new natural perspective of what it means and requires to manage a business firm
- Each phase of the Evolutionary Cascade poses corporate challenges, opportunities, and management choices
- The four fundamental natural conundrums confronting today's business corporation are Entropy vs. Life, Genotype vs. Cognotype, Symbol vs. Tool, and Market Efficiency vs. Social Reciprocity
- Using standard business terminology, A NATURAL THEORY OF THE FIRM describes the natural evolutionary challenges to the modern corporation

HOW MANAGERS CAN APPLY CHAPTER 10's BIG IDEAS:

- Managers can choose to Ignore or to Accept, Reshape, and Integrate each phase of the Evolutionary Cascade into the firm's operations
- Managers can design corporate strategy, goal-setting, and long-term company purpose to confront and resolve the four fundamental natural conundrums facing their firms
- Managers can accept and implement A Natural Theory of the Firm

NEW RESEARCH UPDATE FOR CHAPTER 10:

NOTE TO READERS: Many practical examples of Natural Corporate Management in action appear every day in a wide range of daily newspapers, business magazines, and academic journals. You can find your own set of examples by checking *The Wall Street Journal*, *The New York Times*, *Businessweek* magazine, *Forbes* magazine, *Fortune* magazine, and academic e-journals and blogs. Look for stories and reports on new sources of Energy, threats to Life forms and ecosystems, Genetic disorders and health issues, new digital technologies, gender and racial Symbolic trends, Brain imaging studies, and Market conflicts between corporate economizing and ecosystem ecologizing.

Typical examples of the need for Natural Corporate Management decisions.

- "Floods Put Pipelines at Risk," *Wall Street Journal*, 12-4-12, A3. Oil pipelines buried beneath major rivers can be broken by raging floodwaters, causing polluted water and costly business losses.
- "Work Could Threaten Mississippi Traffic," Associated Press, *Pittsburgh Post-Gazette*, 11-24-12, A4. Record dry weather conditions reduce river levels, threatening vital shipments by barges on the Mississippi River.
- "Power Plant Operations Tied to Water Challenged by Changes in Climate," *Washington Post/Pittsburgh Post-Gazette*, 9-10-12, A-5. Lower river water levels caused by climate warming and less snowpack means less water to cool

nuclear and fossil-fuel power plants. Hoover Dam's reservoir on the Colorado River is 103 feet below its storage capacity.

- "Farmers Watching Their Water Use," *Wall Street Journal*, 10-19-12, A9. Underground water aquifers are threatened by overuse from farmers irrigating their crops, plus reduced rainfall levels that normally replenish the water supplies.
See also a book by Wade Davis, *River Notes*, about the excessive demands for use of the Colorado River through population growth, climate change, drought, and agricultural production.
- "Dying for Coal," *Earthweek/Pittsburgh Post-Gazette*, 7-20-13, A-2. Chinese citizens living in the nation's northern areas lose more than 5 years of their lives due to polluted air caused by coal burning to warm homes and heavy industrial uses.
- "Answer in the Wind," *Earthweek/Pittsburgh Post-Gazette*, 9-15-12, A-2. The Earth provides enough wind energy to power all of the planet's electricity needs for years to come, according to a research study.

Two examples of new Tools/Technology to improve human life.

- "Doctors Closer to Creating Artificial Pancreas," Associated Press, *Pittsburgh Post-Gazette*, 6-23-13, A-12. "Doctors are reporting a major step toward an 'artificial pancreas,' a device that would constantly monitor blood sugar in people with diabetes and automatically supply insulin as needed."
- "Creating a Lung on a Chip To Test New Asthma Drugs," *Wall Street Journal*, 6-18-13, B5. Scientists are building 'organs on a chip' that are engineered to resemble a diseased lung in their hunt for a new asthma treatment.

NOTE: All of the above examples are just a few cases that are typical of the kinds of challenges confronting corporations, governments, and human populations across the globe. The principles of Natural Corporate Management can be a guide to help find resolutions to such problems and positive opportunities.