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AGENTS OF CHANGE
Creating a Business World
Forever Changed and Changing

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By Carol L. Fatuzzo and Ennio Fatuzzo

It is no longer business as usual and it never will be. In today's chaotic environment, only one thing is certain: CHANGE, and more CHANGE, and CHANGE at an unprecedented, ever increasing pace. Already too much has changed to allow business leaders to rely on business practices from the past, even the recent past. So what should leaders do differently as they attempt to navigate the treacherous path to business survival and success in the 21st century? The answer to that question is not simple, and many leaders are even ignoring the question itself. They are acting as if the key forces driving radical change are no more than background noise. Therefore, in this article, we attempt to change that mindset by increasing awareness and understanding of what we consider the most important "Agents of Change" and then exploring their impact on today's business. By taking a step back to provide a different perspective and clearer view on what is happening we hope to create the knowledge and attitude needed to kick-start a revolution in business management.

INTRODUCTION

More than 65 million years ago a meteor crashed to earth and catalyzed a drastic climate change that resulted in the mass extinction of the dinosaurs and the beginnings of life as we know it. Today, digital technology has made a crash landing onto the business landscape, leaving opportunities for innovation and new businesses, and bringing economic chaos and mass extinction for existing businesses of all kinds and sizes. But it has happened before. First the Industrial Revolution. Then the Age of Electronics. Now the Digital Age with its rapid explosion of technology and knowledge. The combined impact of these economic "meteors" is a world forever changed and changing, a world where many businesses are struggling to survive. How do leaders find the path to business success in such a dramatically altered and uncharted new frontier?

To answer this question it is important that leaders be more aware of and really understand how today's business landscape is dramatically different from that of even just 10 years ago. Step back for a minute and reflect on the new environment.

Almost "instant" communication and global "interconnectivity" are real. Their coupling is creating global market dynamics that increase not only the size and types of new business opportunities, but also the scope, speed of reaction, and intensity of competition. As a result, business risk in general, the negative consequences of wrong or slow management decisions, and the importance of intellectual property have dramatically increased.

At the same time, new science-based methodologies and tools for accessing and analyzing information and for business management are being developed. All of these factors, which we call "agents of change," are combining to make many common business practices obsolete. But they also offer new management capabilities and are providing new ways to achieve business success.

To sum it up, today numerous "agents of change" are creating an increasingly chaotic global economy and technology-dependent future. This is continually, irreversibly, and ever more rapidly changing the business environment. To be able "harness" these forces for business success, it is important first to understand the impacts that they already are having on the practice of business. Therefore, those "agents of change" that we consider the most important for business management are examined in more detail in the following sections of this article.

Agents of Change are creating a technology dependent future.

DIGITAL TECHNOLOGY: AN EXPLOSION OF DISRUPTIVE FORCES

Is digital technology (or at least micro-electronics based technology) THE agent of change in the early part of the 21st century? Does it give birth to all other agents of change? Has it become a part of the DNA of current and future agents of change? It doesn't matter how you look at it. Today, digital technology is pervasive and rapidly changing the world as we know it. But its technology-induced changes are not just rapid. The advances are being made at *exponentially increasing rates*. The doubling of microprocessor capabilities roughly every two years for the past several decades (Moore's Law[1]) is a good example. The rapidly shrinking size and the increased number of these tiny devices fitting on smaller and smaller chips has resulted in dramatic increases in computer processing speeds, hard disk capacities, the number of megapixels in digital cameras, and more.

But the impact is much greater than that. The radical improvements in digital electronics related to decreased size coupled with increased capacity have irreversibly changed nearly every segment of the global economy. Large mainframe computers have been supplanted by small but highly powerful tablets. The Internet, coupled with high speed Wi-Fi and expanding cellular networks, has enabled the rapid shift from landlines to smartphones, from magazines and newspapers to online news and social media, from simple spreadsheets to big data and analytics, from device computing to cloud computing. The world has rapidly converted from all analog to digital almost everything.

And there is more to come. As is described in a recent Wall Street Journal article, we are "heading toward a kind of digital 'perfect storm' where mobile, cloud, social, and Big Data technologies are amplifying the power of one another and making all kinds of new innovations possible."[2]

But digital technology is just one kind of technology explosion. There are others on the horizon. Consider the fields of medicine and biological sciences. They are being bombarded with technology-induced disruptive changes that

are leading to ever increasing capabilities. The buzz words are all around: DNA sequencing, gene manipulation, stem cell therapy, designer drugs, etc. Just imagine the not very distant future when biotechnology comes of age.

However, although there are many factors contributing to these emerging technological explosions, digital technology is often the enabler. It provides more immediate access to more complete data, allows rapid analysis of those data, and makes more researchers available through global interconnectivity. And this is likely to be the face of the future as we know it: digital technology enabling new technology that enables the development of even newer technology.

However, advances in technology do not need to be giant tidal waves of change to have a significant impact on business. Technology evolution (small, incremental technology changes) occurring at a faster and faster rate, again often enabled by digital technology, also can change a business

> *Technology evolution can change a business environment dramatically.*

environment dramatically. This frequently catches business leaders by surprise. These are the leaders who are used to planning competitive moves and forecasting the timing of incremental changes to their businesses based on the assumption that the current rate and type of technology change will continue. In other words, they are basing their forecasting on linear extrapolations of a past that no longer exists. Soon they will find themselves swallowed by a swelling wave of change rather than *riding* that wave. They have forgotten that the *rate of change itself* is rapidly increasing!

How real is the effect of rapid technology evolution? Just think about Toyota, a company that came from nowhere to become a dominant force in the global automotive market. They did this, not by making major technology innovations, but by incorporating many incremental improvements into their products and operations resulting in cars with world class quality, reliability, and performance as well as manufacturing cost effectiveness and drastically reduced cycle times. Competitors were left behind.[3]

Bottom line, at least today, digital technology is driving an explosion of disruptions that are continually impacting our world (in general) and business (specifically) at an ever increasing pace. In the remaining sections of this article we explore in more depth selected digital technology-enabled "agents of change" and their impact on business.

THE PACE OF BUSINESS: FASTER AND FASTER

Wouldn't it be simple to conduct business at the pace and rhythm of previous times when progress was gradual, and where only simple changes in business practices were necessary to keep pace with the sedately evolving business world? A world without computers or smartphones. A world where everything, from using human resources to making critical decisions, was deliberate, straightforward, and forgiving. A world where the skills required of workers and leaders did not change much with the times.

Remember what the business environment was like in this not-too-distant past? Communication consisted of face-to-face meetings or documents written or typed one at a time and delivered by surface mail or messages sent by telegraph. Goods and people could be transported only by ship if the destination involved crossing an ocean. Collecting and analyzing data, including competitive intelligence was a time-consuming, labor

intensive process. As a result, markets and competitors tended to be "local" and competitive reactions were slow. For example, "yesterday" there were neighborhood grocery stores, not today's giant supermarkets. And people ordered products by phone or mail from the Sears catalogue instead of by Internet from Amazon. In this world of the past there was plenty of time to develop business plans, make decisions, and commercialize new products and services. The flow of the river of business was "slow" and forgiving of mistakes.

Today, fueled by new discoveries and driven by an exponential wave of digital technology advances, there are two key differences in the business environment: 1) the pace of change is accelerating and 2) the impact of change is global. In his book *Chaotics*[4] Kotler details the increasingly rapid and pervasive changes impacting business in the past few years and concludes that this increased pace of change is here to stay, becoming an integral part of everyday life, causing chaos but also creating new opportunities.

> *The pace of change is accelerating and will continue to increase.*

We have already highlighted several of these pervasive changes based on digital technologies. What are some of the others that are having or will soon have major impacts on business?

Today, using satellite transmission, communication is almost instantaneous, whether it is through television, Internet or mobile technologies. Rapid and relatively low-cost transportation is available for both goods and people using jumbo jets. Personal computers, tablets, and smartphones are pervasive. Combined, these technology-driven advances result in immediate access to global information and the ability to reach quickly (physically or electronically) almost any part of the world, and even influence it, as is shown by the rise of social media (the next agent of change that we consider) and its rapidly increasing power. The results?

These advances are catalysts for creating entire societies where the pace of life is becoming faster and faster, expectations for immediate actions are increasing, and needs and wants are changing frequently. And for business, these advances are fostering the development of dynamic global markets and providing rapid access to up-to-date customer information and competitive intelligence. Thus rapid and effective competitive responses anywhere in the world are possible. All of this has created a business environment where speed is a significant competitive advantage and often is the key to business survival and success. But that is not all. In this faster paced world, the entire lifecycle of businesses also is speeding up. Lifespans of "great" companies are getting shorter and shorter while the creation and growth of new enterprises are faster and faster.[5]

How real is this? Just think about the intense battles in the smartphone arena among Apple, Samsung, and Blackberry. In this war Apple often has been first with new capabilities, but Samsung has followed quickly. Blackberry, however, has been slow to respond. And the consequences? Apple is a leader and growth superstar, Samsung is a healthy rival, Blackberry is on a downward spiral and resorting to desperate measures.[6]

Digital technology advances also provide numerous opportunities (and the capabilities) for businesses to tap expertise from around the world. This is allowing them to give life to new products and services much more rapidly and cost effectively than in the past by drawing on truly the best skills and resources available and by incorporating the least expensive materials, solutions and processes. Because of its far-reaching implications, we treat this kind of

product-related "global interconnectivity" as a separate agent of change and consider it in more detail in a later section.

Extrapolating into the future, one can see easily how the pace of change in business will *continue to increase*. This is partly due to new technology-assisted methods that are being created and refined to perform basic business operations. For example, suppose the right kind of global competitive and market information was available to make good business decisions at twice the speed of today's decision-making processes. Corporations could revise strategies more quickly and effectively. Then they could act rapidly to start essential research and development (R&D) programs, make major strategic investments, and implement focused marketing plans. This is one of the promises of analytics/big data.[7]

Next, suppose that the pace of R&D was increased by using artificial intelligence (AI) applied to analysis of large amounts of data, saving months or even years in the development of products—a capability already used by the pharmaceutical and biotech industries.[8] Now suppose that **global** networks of technical experts existed that could be easily accessed to rapidly augment a company's internal capabilities. Or suppose that new manufacturing equipment was delivered in half the time it takes today and was immediately operational because of advanced computer-assisted design and prototyping and even manufacturing using 3D printing—already more than a possibility.[9]

Technology-enabled data collection and analysis, rapid and effective decision-making, computer-aided design and manufacturing, 3D printing, and rapid global interconnectivity. All of these things and more are becoming possible today, and each advance increases the pace of business. This has made *speed* much more than

Speed has become the key to corporate survival.

just a strong competitive advantage. It is now a key to the survival of the corporate "species." The 21st century belongs to those companies that can adapt to this rapidly increasing pace of business and the chaos that surrounds it.

But why is the increasing pace of business accompanied by chaos? Business is like a river. When the "current" is slow, as it often was in the past, it creates a laminar flow that is predictable and orderly—a calm stretch of water where there is time to correct mistakes in action and direction. However, in today's river of business, the speed of the current is rapid and ever increasing, causing widespread turbulence and treacherous rapids. In these chaotic waters, business dynamics are governed by completely different and rapidly changing rules.

A message for business leaders who want to successfully "navigate" the turmoil in this raging torrent: Beware! Too much has changed to be able to rely on business practices and knowledge from the past. Only those businesses that are adaptable and keep up with the increasing pace of everything will survive.

SOCIAL MEDIA: AN EMBRYONIC BUSINESS GAME CHANGER

The world is not just moving at a faster and faster pace. It also is becoming more interconnected through digital technology. The Internet provides easy access to a wealth of information. Tablets and smartphones enable instant global communication and sharing of text, pictures, audio, and video. These capabilities have given rise to a new agent of change, the phenomena of "social media."

What is social media? Everyone is familiar with it to some extent, but we want to be clear about how we are using the term. There are many

definitions, but here is one that is brief, but clear: "Social media essentially is a category of online media where people are talking, participating, sharing, networking, and bookmarking online. Most social media services encourage discussion, feedback, voting, comments, and sharing of information from all interested parties. It's more of a two-way conversation, rather than a one-way broadcast like traditional media. Another unique aspect of social media is the idea of staying connected or linked to other sites, resources, and people."[10]

In other words, social media is a website service that allows the users to interact with both the website and other visitors to the site almost in real time. It provides new ways to communicate instantly and globally between organizations, communities, groups, and individuals; and its popularity is exploding. Literally millions of people are using today's most popular social media such as Facebook, Twitter, YouTube, Instagram, Pinterest, and more.

Social media is still embryonic in the business arena

Social media has become pervasive all over the world, and the effect has been earth-shaking in some areas. Consider, for example, the Arab Spring—the recent revolutions in the Middle East that began in Tunisia and toppled unpopular governments. The most publicized use of social media that spring was during the Egyptian Revolution where thousands of demonstrators took to the streets at the same time, assembled by and coordinated through messages on Twitter. Social media also was used extensively by these demonstrators to provide news and videos of the events to the rest of the world and to gain support for their movement.[11]

And there are new examples every day. Remember the impact of social media in Hurricane Sandy where it provided real-time reporting and support for those affected.[12] Or think about the murder of Michael Brown in Ferguson, MO and the role of social media in the visibility of that event and the protests that followed.[13]

These are just three examples of how social media can enable simultaneous, multi-way communication with thousands of people, all sharing the same goals, or the same interests, and do that with the speed of light (well, almost). With an agent of change this powerful, surely companies should be able to harness it in order to substantially strengthen their business, or create new businesses. But the results in the business arena so far have been unremarkable.

Yes, many businesses are using social media, but primarily as a basic marketing tool—a one-way promotional channel focused on increasing awareness and/or reputation of an organization or brand in a way that is less costly than traditional advertising. As one business leader states in a Harvard Business Review study: "Social media is a big ocean and we are pulling into a little bay where we are most protected."[14]

Why such a specific focus? In reality, it is not that surprising. Most break-through capabilities start with a core of "disruptive" innovations followed by a myriad of secondary innovations that build on the first and then are applied in different and often un-related arenas by visionary leaders.

As an example, consider the Internet. Many businesses and services have sprouted from this technology/capability, with more emerging every day. But it has taken years for entrepreneurs to couple developing needs with innovative new ideas and harvest the bonanza of business opportunities. Amazon.com, Inc. is an excellent example. In the relatively early days of the Internet (1994), it was only an online bookstore. Today, it is an international, multi-billion dollar, ecommerce company. The entrepreneur/visionary and driver from the beginning—Jeff Bezos.[15]

Now consider social media today. It is just as embryonic from the business perspective as the Internet was in 1994. So it's not unexpected that its promising future for business has not yet happened. However, companies have started to explore expanding their use of social media beyond the obvious avenues for advertising. Their first step often is focused on obtaining company and product feedback by connecting directly to customers (or potential customers) in two-way or multi-way dynamic dialogues. Longer-term benefits springing from these kinds of social media-enabled connections could range from designing and testing new products to crowd-inventing new products. And companies could move from monitoring trends to creating new trends and initiatives. There could be an avalanche of business applications as innovative new capabilities are developed.

Bottom line, today social media is already changing business practices, but it is not yet a "game-changer" in the business arena. However, just like the Internet, as more and more innovations occur; social media is likely to become a major agent of change for business. And in a business world moving faster and faster, it shouldn't take long. Moreover, as social media is developed, those companies that lead the way will be the winners. Those that are sitting back and watching are likely to be the losers.

GLOBAL-SOURCING: ENABLING "DISRUPTIVE" BUSINESS PRACTICES

New products used to be developed/designed and completely manufactured/assembled by one company, usually in one location. Although this often was a lengthy and expensive process, it didn't matter. Those were the times when the business focus was domestic, the pace of business was slow, and competition frequently was embryonic. The early production of the Ford Motor Company's Model T automobile provides a good example of this "everything in-house" and "owning the whole supply chain" practice.[16]

But the world changed, and competition intensified. Low cost manufacturing became the driver for successful new products. This led to the first and still best-known embodiment of outsourcing—overall product design by one company that then farms out the manufacturing of parts or even its total products to another company, either domestic or foreign, which is a lower cost producer. Nike outsourcing the manufacturing of its clothing to Bangladesh[17] and Dell outsourcing production of components and sometimes entire computers[18] are just two of many examples of companies seeking low cost solutions.

For new products, speed, not cost, is in the driver's seat.

Now we turn to today's world, where the pace of everything is even faster, and the playing field is global. Although cost is still important, speed of commercialization is in the driver's seat for many products and services. For example, Apple designs its iPhones internally but outsources manufacturing all over the world to wherever the needed capacity exists.[19] But that is just the beginning. The promise of speed and increased capabilities through global interconnectivity is driving a revolution in the practice of outsourcing. Technology has created the capability for disruptive business practices that we call "global-sourcing." The following four examples illustrate the breadth and power of global-sourcing.

We turn to the construction arena for our first example of global-sourcing. There are a growing number of companies that construct/assemble complex building modules for installation in power plants, gas refineries, and more. These companies are located wherever the

cost structure and expertise is appropriate, and the finished modules are shipped worldwide for final assembly in major construction projects. All of this is possible due to global interconnectivity created by digitally-enabled, "instant" global information exchange and computer-aided design. An excellent article in Bloomberg Business Week gives specific descriptions of several such "construction global-sourcing" projects.[20]

Next, Airbus and Boeing provide good examples of "product global-sourcing" in their what-was-then trailblazing approaches to the design and manufacturing of their newest aircrafts. To illustrate the concept, following is a summary of Boeing's approach to its advanced-concept "Dreamliner."[21]

Boeing announced on December 16, 2003, that the "final assembly" of the 787 would be in its factory in Everett, WA. What did this mean? Instead of designing and then manufacturing (assembling) the complete aircraft from components in the traditional manner, this final assembly would employ only 800 to 1,200 people who would join completed subassemblies and then integrate systems. The revolutionary aspect of this approach was that Boeing had commissioned many of its numerous global subcontractors to actually co-design components and then not only to manufacture these components but also to combine them into subassemblies. It was these completed subassemblies that were to be delivered to Boeing for final assembly. Japanese industrial participation was very important for this approach, with Japanese companies co-designing and building 35% of the aircraft. But they weren't alone.

Revolutionary approaches to systems and products are likely to have teething problems.

The long list of global subcontractors includes companies from Korea, France, India, Sweden, Italy, and more. This was the first time that outside firms had been given a key role in the design of Boeing airliner wings, or for that matter, any important subassembly. Then, to speed up delivery of the 787's major components to its Washington factory, Boeing modified four used 747-400's into "Dreamlifters" to transport 787 wings, fuselage sections, and other smaller parts. This globally interconnected approach to outsourcing was intended to result in lower inventory and a leaner and simpler final assembly line that would reduce final assembly time from nine months to three days.

The results? There were delays after delays due to problems with subassemblies from different subcontractors not quite "fitting" and many other issues. And then, once production started, there were the performance issues such as the highly publicized battery and wing crack problems.[22] But today the Dreamliner, although not without problems, is flying high.[23] The conclusion? All revolutionary approaches to new systems and products have teething problems. But Boeing's (and Airbus') ambitious global-sourcing concepts based on global interconnectivity are likely to gain acceptance by companies in other industries as ways of achieving more rapid and cost-effective product commercialization.

The Indian company Infosys is one of the crown jewels of the Indian information technology industry and provides our third example—the global-sourcing of software and information technology services. What this comprises and how it came about is clearly described by Nandan Nilekani, one of the founders of Infosys, in the book *The World is Flat* by Thomas Friedman:[24]

"What happened over the last [few] years is that there was a massive investment in technology,

especially in the bubble era, when hundreds of millions of dollars were invested in putting broadband connectivity around the world, undersea cables, all those things." At the same time, he added, computers became cheaper and dispersed all over the world, and there was an explosion of software - e-mail, search engines like Google and proprietary software that can chop up any piece of work and send one part to Boston, one part to Bangalore and one part to Beijing, making it easy for anyone to do remote development. When all of these things suddenly came together around 2000, Nilekani said, they "created a platform where intellectual work, intellectual capital, could be delivered from anywhere. It could be disaggregated, delivered, distributed, produced and put back together again - and this gave a whole new degree of freedom to the way we do work, especially work of an intellectual nature...."

> Global-Sourcing is the business path to the future.

Interconnectivity enabled by digital technology has leveled and globalized the playing field for software-based development and services.

Our fourth example of global-sourcing goes a giant step beyond Nilekani's concept of outsourcing just intellectual capital to the outsourcing of Research and Development (R&D). The first movement in this direction was the outsourcing of non-strategic R&D operational activities such as product testing. This was primarily for cost savings or to meet regulatory requirements. Next, multi-national corporations started establishing R&D sites in strategic global locations to access local talent and expertise, to provide proximity to and knowledge of local markets, and to gain flexibility in resource allocation. Today this is common practice, but it isn't enough to be competitive. In our fast-paced economy, no single site and no single company alone can possess all the ideas, knowledge, and

capabilities required to bring new innovations to the market. Advances in digital technology, however, have made rapid and easy access to external sources of innovation and distributed R&D possible. It is no longer necessary for a project team to be co-located or to have actual contact to be effective, and it is no longer enough to rely only on internal idea generation. A company developing a new blood analyzer provides a good example—engineering done in Massachusetts, software created in Spain, micro fluidics design in Germany, chemistry work in Finland for a product that will be sold around the world.[25]

Whether it's through locating proprietary R&D activities in other countries or through arm's-length relationships with an array of customers, suppliers, governments, universities and other research organizations, a vast global network of R&D activities is becoming a key to business success. Global companies such as Pepsi, GE, and IBM recognize this and routinely work with other companies in different industries, in different places, and with different cultures to develop and commercialize complex and innovative new products. The obstacles, however, are significant so succeeding requires new approaches and leadership skills. Defining boundaries and crossing them, combining and separating activities, insourcing vs. outsourcing, onshoring vs. offshoring, shared information systems, and more are just a few of the challenges.[26] But global-sourcing of R&D (and everything else) is the business path to the future.

GLOBAL COMPETITION: THE "SNAKEHEAD" INVASION

Snakeheads are amazing and fearless fish, native to Asia, that can breathe air and teach their young

to do so by pushing them out of the water. In one episode of the TV series "River Monsters," Jeremy Wade shows a dramatization of a snakehead stalking an unsuspecting baby Chihuahua—a scene that catches your attention! And now these formidable predators are invading the waters of North America, aggressively destroying native species even though they are far from their home environment in the waters of another continent.[27] Sound familiar? Substitute some well-known foreign corporations for Snakeheads and you will have a picture of emerging and aggressive global competition.

Why is this happening? All of a sudden, enabled by new technology, a *global* corporate "ecosystem" and a *global* economy have become realities. Because of this globalization, many more companies are now in the same race for survival and/or dominance. And, as in the wild, competition among these "species" becomes more and more aggressive as they all chase after growth and profits in shorter and shorter time frames. They all are scrambling to outperform each other—to invent better products, to develop and produce them more quickly, to market them more efficiently, and to meet the higher and higher quality levels that customers have come to expect, and to invade and conquer each other's markets.

> *Enabled by new technology, a GLOBAL corporate ecosystem has become a reality.*

But each company, although now fighting on a global battlefield, originated and developed in its own unique ecosystem (country or region), giving rise to capabilities, business practices and goals that are different from one competitor to the next. So, when one of these "predators" attacks outside of its own ecosystem, its "victims" often do not have the defenses or the experience to protect themselves, and sometimes don't even recognize the danger until it is too late. Thus the attacker becomes dominant.

Consider Toyota. In the late 1950s, when Toyota first appeared in the United States, Elvis was king of rock n' roll, big American cars with big engines and tailfins were "in" and postage stamps were just 3 cents. Toyota's entry into that market was their "Toyopet" Crown Sedan. It was a high quality, reliable vehicle; but was woefully underpowered, under featured, and overpriced for the American market. However Toyota quickly adapted to the new environment and introduced the "Corona" in 1965. It wasn't big, but it met the American desires for power, automatic transmission, and special features. However Toyota didn't stop there. The company aggressively used their core competencies and values and in 1969, with the Corolla, introduced Americans to the previously undiscovered pleasures of high quality and reliability in a vehicle that had good performance and was reasonably priced. By continuing to build on their engineering strengths, manufacturing innovations such as kanban ("just-in-time"), dedication to quality and continuous improvement (kaizan), and ability to adapt, Toyota has become the leader in today's global automotive industry.[28]

But global competition is more than just a clash among diverse cultures. Globalization through a fast-paced, interconnected world has changed the overall competitive landscape forever. There are many more players involved, and they are quick to act and react. Consequently, staying ahead is more difficult than it has ever been. When Ford led the automobile revolution, there was no thought of Japan. However today, Japan and Korea are formidable forces shaping the automotive industry. And it used to be that when someone said television, you thought RCA. But RCA no longer exists as a company. It's only a trademark. Today you are more likely to think Sony or Samsung. And what about….? The list is

endless. Business competition has changed. It is global and aggressive.

And there is another important difference. Foreign competitors often play the business "game" with different rules and different expectations. One good example of this is the drive for "immediate profits" by many US companies versus the focus on obtaining higher market shares by some foreign companies. This is one reason for the increased practice of "dumping"—foreign competitors charging a lower price for products in US markets than in their own country to obtain market share. And sometimes, although it is illegal in the U.S. and other countries, that price is even below the cost of producing or obtaining the product; so the foreign company makes no profit. There are numerous examples of "dumping" by foreign companies into the US—China and solar cells and steel, Korea and steel pipes and tubes, multiple countries and office paper, and more.[29] This is just one aspect of global competition where the players have different goals and their time horizon for winning is longer.

What are the consequences of all of this? Today, it is essential for businesses to recognize the possibility of alien corporate invasions from any part of the world and make plans accordingly. What does this mean? Let's return to the saga of Snakeheads. These strange fish are considered a delicacy in some countries, but not in the U.S. Here they are viewed only as a menace. The U.S. has been forced to acknowledge their presence but has not accepted it as desirable or permanent. Maybe it is time to reassess the situation and find ways not only to protect against "snakeheads" but also to accept what they have to offer and coexist.

INCREASED BUSINESS RISKS: THE CHALLENGES OF GLOBALIZATION

In spite of the chaotic world around us, the risks involved in playing some types of games haven't changed. For example, playing roulette, whether it is Russian roulette or the more civilized version in Monaco, is the same as it always has been. However, the game of business has become a much more dangerous venture. Developing a new business or expanding an existing one involves a whole new dimension of risk. Specifically, creating or entering new markets is a bigger and much more complex endeavor (hence much riskier) than in the past, partly due to the developing global economy and partly to the consequences of global competition.

On a positive note, globalization significantly increases potential market sizes, creating extremely attractive and visible business growth opportunities. Just think about the worldwide explosion of smartphones, or the rapid expansion of wine import and export businesses, or the huge potential for a new cancer drug. Even water is now a global opportunity, as the recent history of San Pellegrino shows. Twenty years ago it was a relatively unknown Italian mineral water. Today, it is distributed worldwide to more than 120 countries on five continents.[30]

In today's global economy, there are not likely to be many "lone pioneers."

However, on the risk side for individual companies, highly visible, big growth opportunities create new global competitors that were never before seen as threats—Korean car manufacturers, Indian software developers, Chinese computer and internet-based companies, European appliance manufacturers, and more. The bottom line: More companies around the world are likely to be pursuing the same specific growth opportunity at the same time. Therefore,

the risk of failure for any single company is high—significantly higher than in the past.

Conversely, a company's probability of winning is significantly lower than in the past when it had a reasonable possibility of being the only company pursuing a good new opportunity that was unrecognized by others. Yesterday there were many single company big successes: Kodak and silver halide film, IBM and the PC, Motorola and cell phones, RCA and consumer electronics. But in today's dynamic global economy, due to growing interconnectivity and the faster pace of everything, there will not be many "lone pioneers" such as these.

Also on the risk side, pursuing today's larger global opportunities requires greater resources than what were needed in the past to be successful in smaller, "local" opportunities. This results in the *financial* risk being much higher, sometimes high enough to place an entire company at risk. If a project fails, for whatever reason, that failure is costly. Kodak having to declare Chapter 11 bankruptcy as a result of its late and failed attempt to become a major player in digital photography is a good example of today's high cost of failure.[31]

And there is another kind of risk involving resources. In the past, under-resourcing a project or underestimating the amount of needed resources or using resources ineffectively did not matter as much as it does today. Today, any of these "mistakes" will slow down progress; and in a faster paced and more competitive business world, this decreased speed will almost certainly create a significant competitive disadvantage. This, in turn, greatly increases the probability of a costly failure in the marketplace.

On the other hand, not all companies want to create new businesses or enter new markets. Some are satisfied with their current business arena. That was the initial position of Kodak, when faced with the competition from digital photography. In such cases, it is easy for a company to become a slave of its past and continue to pursue business as it always did. But strategies and business methodologies and products that were once successful may not be applicable in a business environment that has changed significantly; and pursuing them unchanged may lead to disaster.

> *"Staying the course" is likely to result in corporate death.*

But that is not all. There is yet another dimension to the risk involved in managing to performance levels of the past. What once was good enough is no longer acceptable. In reaction to today's rapidly changing and more risky business world, stockholders are increasingly demanding *higher* and *more consistent* profits in *shorter* time frames. If companies do not produce these results, business leaders are likely to be replaced. This situation, along with the impact of globalization and the increasing pace of business has totally changed the business "game." Together, these factors significantly augment the risks of trying to maintain the business status quo. Today, "staying the course" instead of pursuing new opportunities is more likely to result in corporate death, and thus this may end up being the riskiest choice of all.

And finally, the need for speed is a common thread contributing to increased risks in all aspects of today's business. Failure not only is connected to making wrong or bad decisions but also frequently is the result of making good decisions too slowly or projects taking too long. Kodak's eventual management decision to pursue digital photography was a good one, but the delay in making that decision was a major contributor to the effort's failure. BlackBerry's major delays in introducing the BlackBerry 10 line of phones were a major contributor to that company's financial problems.

In a highly competitive, global business environment that is rapidly changing, *a slow decision will almost always be a wrong decision*; and being late to the market almost always assures failure. Just as in nature, a slow company will become prey for the faster, more aggressive one.

KNOWLEDGE: POWER IN THE AGE OF INFORMATION

Technology has radically altered the business landscape in another significant way. It has enabled the "age of information"—an age where knowledge is power and specialization is a necessity. Unparalleled and real-time access to vast quantities of data and the ability to rapidly analyze them in meaningful ways are already realities. What we are talking about is the rapidly growing capability of harnessing the vast potential that is hidden in multiple sources of massive data/information. Today many companies already are analyzing what is being called "big data" to achieve significant competitive advantages—to improve products and services, cut costs, attract repeat customers, and more. An IBM Global Business services report documents several big successes:[32]

"Companies like McLeod Russel India Limited completely eliminated systems downtime in the tea trade through more accurate tracking of the harvest, production and marketing of up to 100 million kilos of tea each year. Premier Healthcare Alliance used enhanced data sharing and analytics to improve patient outcomes while reducing spending by $2.85 billion. And Santam improved the customer experience by implementing predictive analytics to reduce fraud."

Still embryonic though, are advanced analytical methodologies that can be applied to big data to build useful models for predicting and optimizing outcomes. Such tools will enable leaders to make better strategic decisions and make them faster, and might even help scientists make fundamental discoveries.

This is the promise of the emerging field of data science—the marriage between "big data" and "advanced analytics," the former providing the information, the latter

> *Data Science. A path to significant competitive advantage.*

supplying the tools that can be applied to that information to develop insight and guide action.[33] Bottom line, companies that embrace data science to gain knowledge about "everything," from technology to competition to economic conditions, and use that knowledge wisely will gain significant competitive advantages as the age of information unfolds. However, there is one giant caution for business leaders. Big data and analytics, no matter how sophisticated and expertly used, won't replace or necessarily even predict disruptive innovations.

The information age also has other implications for business management. In the "good old days," the boss knew and understood all the details of the business better than any of his/her employees, and therefore could check on all of them and correct them when they made mistakes, or even could make decisions without them. But now, the boss holds only a small fraction of the total knowledge of the company or even the market, and can't possibly possess the full range of specialized expertise and sophisticated skills that are becoming basic business requirements.

Not yet a believer? Have you tried to correct the software of one of your computer programmers, or second-guess the formulae of

one of your chemists, or work on a production line to show the operators how they can do their job better? Good luck! In a complex high-tech operation, almost all employees know more than their bosses in their specific field of expertise. They hold the power of knowledge.

The only hope for a leader is to be more expert in overall business management, and use that leadership expertise to bring together everyone else's knowledge into one coherent business plan that is more than the sum of its pieces. From a business leadership perspective, YOUR knowledge is worthless unless you can rely on and use THEIR knowledge. And this requires a completely different style of and approach to management.

INTELLECTUAL PROPERTY: THE RISE OF THE GEEKS

As technology advances on many fronts, more and more businesses and services increasingly are turning into "high-tech" operations. In this new kind of business environment, intellectual property considerations have increased in corporate visibility and importance and must be factored into both product-related and total business decisions.

Intellectual Property. A powerful currency in a technology-driven world.

It's unlikely that companies like Intel and Apple would be as strong as they are today if they didn't have extensive portfolios of patents to protect their inventions against competition. And without a portfolio of patents covering inventions needed by others, companies like Samsung would be behind, struggling with the followers, not bargaining and playing with the leaders. It's clear. Sustainable business success in today's technology shaped world requires continuous product inventions as well as re-inventions of the

business itself. And these inventions need to be protectable.

What makes patents and other forms of intellectual property (e.g., copyrights, trademarks, design rights) so much more important in technologically rich environments? When rapidly evolving new technology is the basis for products and/or for basic business operations, a continuing flow of patents can nurture and protect the business, can help create and sustain new businesses, or can block others from rapidly capitalizing on disruptive innovations. Essentially, by preventing direct copying, patents force competitors to find alternatives. This decreases their efficiency and often increases the costs of their products and services. This always has been and continues to be the value of patents. However, there is more. In today's business environment where speed is a key to success, patents can be effective weapons for *slowing down* the competition. And sometimes, that makes all the difference.

There is yet another reason for the growing importance of patents in our fast-paced, technology driven world. It's a little like a card game. The winning players are those who have the right IP cards to play—to license and collect significant revenue, to cross-license for strategic gain, to negotiate, or even to sell.

Looking at it another way, patents are emerging as a new currency, and they are driving mergers and acquisitions. One good example is the Google purchase of Motorola Mobility: "The Google deal highlights the growing significance of patents in mobile and the steep prices that companies are willing to pay to keep them from rivals."[34]

Given the growing importance of patents, there is one additional important consideration. In order to have "good" patents (unless one

acquires them) one must be *first* in the race to develop new technology or make new inventions or recognize and acquire promising start-ups. This consideration forces businesses to look for ways to hasten technology and product development.

So, as the race for new technology and new patents intensifies, it causes an increase in the rate of technological advances that in turn increases the potential for disruptive change, an ever-increasing spiral into a chaotic and exciting future. Geeks of the world unite! Your time has come!

SCIENCE-BASED METHODOLOGIES: THE FUTURE OF BUSINESS MANAGEMENT

The final, but more future-focused "agent of change" we address is science-based business management (i.e., management using methodologies based on the scientific method). What does this mean? The *scientific method* is a logical, data-based approach to investigating phenomena and developing new knowledge. This method consists of the collection of data through observation and experimentation, followed by the formulation and testing of theories based on that data. If the quantitative experimental results are found to be reproducible and predicted by the theories, the theories are considered valid and then can be used to predict future results. How important is this?

The explosive advances of the past 200 years *in technology and science*, as well as in disciplines such as medicine and military strategy, have been made by applying this logical and quantitative method to what was once an empirical world. In the early stages, the *initial*

Business management needs to move from its empirical, intuitive world to one based on science and technology.

leaps forward were made when science started tackling relatively simple problems that could not be solved by the deterministic approach typical of the 19th century and earlier. Then, toward the end of the 20th century, probabilistic theories using newer computer-based technologies were applied to problems of greater complexity. It was shown that although one could not guarantee a direct connection between cause and effect for each individual event, one could show a connection for the statistical aggregate of many events. This break-through has provided the foundation for using scientific methods in areas that were previously thought to be inherently impervious to them, such as business management. Methodologies and tools based on this new understanding have the potential to change the business landscape irreversibly. The only question is when.

Today, many companies that are technically oriented already have embraced data-driven, scientific methodologies using computer-based modeling and computer-assisted data analysis in the operations arena (research and development, engineering, manufacturing, finance, and to some extent marketing). However, most are still using empirical or even intuitive approaches for *total* business management. This can be seen by perusing current best-selling business management books. Although this last-century approach to management may still be useful in a slowly evolving business arena, it is totally inadequate in a rapidly changing, often unpredictable, and highly competitive global environment.

So how can today's management use science to achieve better and more consistent results in a rapidly changing, increasingly inconsistent business world? One answer is data-driven decision-making.[35] Already, methodologies such

as Agent-Based Modeling and Simulation (ABMS)[36] and variations of Game Theory[37] have shown the ability to rapidly provide detailed and quantitative evaluations of alternative strategies and plans as well as thorough analyses of risk factors. Such capabilities ultimately will lead not only to quicker decisions, but also to better ones.

However, in their current forms methodologies such as these are too complex to be widely used. Further advances are needed before robust, science-based management methodologies are practical for leaders of businesses of all types and sizes. But when these breakthroughs happen (and they will), using science-based management methodologies will increase dramatically the probability that a company will survive and thrive when it finds itself in the path of growing tidal waves of change or facing rivals who still rely on obsolete business practices.

And not to be forgotten for the longer term are other embryonic disciplines such as complexity science. Today such science is a long way from being practical or useful for business management, but who can say for the future? Who knows how it might it affect global business organization, interactions, and transactions?[38] And what about other, as yet unmade scientific advances? There are lots of unknowns in the future, but one thing is clear. Good business management will be science-based.

However, there is one caution. Although new science-based methodologies hold much promise for business management in the 21st century, they have limits.[39] There will never be a substitute for strong and capable leadership.

CONCLUSION

It is no longer business as usual. No company is safe. Being good (or even great) in the past isn't good enough for today or in the future. As we have described, in today's digital age, powerful agents of disruptive change are irreversibly altering the business landscape, creating new frontiers where technology is pervasive and turbulence is the new normal. Nothing is stable, and the *rate* of change is accelerating.

But this isn't the end. There are many new technology-driven agents of change lurking on the horizon—biotechnology, advances in particle physics, new science and technology advances that we haven't even imagined yet. And who knows how all of this will affect business. The only certainty is that it will.

So what should leaders do differently as they attempt to navigate the treacherous business environment of the 21st century? The first step is recognizing that the current, slow evolution of common business practices is no longer adequate. The practice of business management is advancing linearly in an exponentially changing, technology driven world. It is being left behind, and the gap is widening. That must change. Business management needs to transition from being an "art" to being a "science".

This is not a specific answer, but does provide a direction for change. We strongly believe that today, business survival, turnaround, and growth all depend on leaders moving in this direction. They must learn to quickly adapt to our chaotic environment by understanding, embracing, and effectively using technology-driven agents of change.

Dr. Carol L. Fatuzzo
New Horizons Business Ventures, Inc. (NHBV)
nhbvinc.com

Dr. Ennio Fatuzzo
EF Management Associates, Inc. (EFMA)
efmainc.com

NHBV/EFMA
aboutcompanysurvival.com
fatuzzobooks.com

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