

BBVA

Creating Abundance through the application of a discipline of innovation

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I. THE INNOVATION ECONOMY

Innovation is the creation and delivery of new customer value into the marketplace.¹ It is the only path to growth, prosperity, environmental sustainability, and security (Carlson and Wilmot, 2006). Developed countries can no longer compete on the basis of low-cost labor or access to capital, which flows freely around the globe. They must provide an environment that promotes continuous and efficient innovation. This is the only way for developed countries to remain productive and competitive, with increasing personal incomes and high levels of employment.

Today, many companies are doing poorly at innovation. To thrive, companies need new innovation perspectives and skills. They must embrace a broader, more comprehensive understanding of their opportunities for creating customer value. This broader understanding emphasizes the importance of continuous value creation throughout all parts of the enterprise to remain competitive. With such skills, the future can be seen correctly as a period of abundance (Carlson and Wilmot, 2006: 22). Without them, the future may be seen correctly as a period of scarcity.

Of course, innovation has always been the driving force for progress and improved productivity (Ridley, 2010). What is different today is the intensity of the innovative processes needed to sustain enterprises and national competitiveness. Specifically, the innovation economy is characterized by three main attributes (Carlson and Wilmot, 2006: 26; parts of this article were abstracted from Carlson and Schaufeld, 2011).

Abundance of Opportunities: This is a time of unprecedented opportunity. Almost every major field is undergoing increasingly rapid technological development. Progress is often at exponential rates, with improvements of 100% at the same cost every 12 to 48 months (Kurzweil, 2005). The Moore-Engelbart Law² for computers is the most famous example of this property. However, rapid, exponential improvement is now seen in many other fields too, as they become increasingly based on ideas and bits, not just atoms and muscle. New ideas are the currency of the innovation economy, and they are an abundant, unlimited resource.

These continuous, rapid improvements open up one major opportunity after another. Whether in finance, medicine, media,

¹ A more comprehensive and inclusive definition is: "Innovation is the creation and delivery of new customer value in the marketplace. Innovations are sustainable only if they provide sufficient enterprise value to allow for their continued production."

² J. Markoff (2005) tells how Moore heard a talk by Douglas Engelbart about why, because of basic scaling principles, computers would improve at these rates. Moore then plotted the data and created the concept that now carries his name.

energy, consumer electronics, computing, or communications, there has never been a better time for creating major new innovations. It is potentially a time of great prosperity—but only if we seize and address the innovation challenge.

Consider, for example, access to financial services. For most consumers, the knowledge needed to understand and access the wide range of options available is daunting. But increasingly there will be computer “assistants” to help customers with these options. There are primitive versions of these computer assistants available now on smart phones. But they will quickly become impressively more “intelligent” and allow for a host of convenient, instantaneous banking transactions.

Creation and Destruction of Companies: While rapid, exponential progress creates great opportunities, it also creates great challenges. A company that does not innovate at the speed of its market and does not adapt to technological change will decline. The decreasing life span of S&P 500 companies indicates that fewer of them are keeping pace with change (Foster and Kaplan, 2001). “Lifetime employment” has become a distant, quaint idea in many parts of the world.³ If history is a guide, new players will arise who understand these opportunities and move rapidly to displace today’s leaders. One example is what is happening to bookstore retailers. Online retailers, such as Amazon.com and Kindle-like digital readers, are replacing them. A similar fate awaits video rental companies such as Blockbuster, which is now contemplating bankruptcy, as their brick-and-mortar store advantage almost literally turns to dust before their eyes. Will this happen to conventional banking too? There are already many companies, such as PayPal,

working to remove conventional banks from transactional processes.⁴

At the same time, the opportunity to create world-leading companies has never been greater. Google was started little more than 10 years ago by two students with an idea. At this point it is a \$144B company that dominates its industry. AOL, Yahoo, eBay, and Amazon all had similar origins. In fact, it can reasonably be said that the “old” industries of media, banking, pharmaceuticals, education, energy, and many others, are all destined to follow the well-known path of creative destruction and then re-emerge as new, major industries.

Intense Global Competition: The world is now deeply integrated, and competition is increasing at an unprecedented rate. Almost every significant business must now think and act globally in our “flat world,” where ideas and money travel at the speed of light (Friedman, 2005). Countries like India and China are rapidly moving past low-cost labor alone as a competitive advantage, because they can leverage the entire world’s knowledge. They can bring proven business ideas and technologies into their countries and adapt them for regional markets. It is possible to argue that China is now the leading innovation country in the world. China is taking established businesses from the West, modifying them to fit the Chinese ecosystem and, at the same time, developing new products, services, and models of production. In 2010 China passed Japan in GDP (Hosaka, 2010) and it is now the world’s largest and fastest growing automotive market.⁵

Consider also that based on its population alone, China has the potential for more “honor students” than America has students.⁶ It is perhaps not surprising that China and India together annually produce more than

³ Note: The *velocity* of technological improvement at rapid, exponential rates also implies the *acceleration* of technological improvement at rapid, exponential rates. This is a sobering realization, the consequences of which for individuals, businesses, and nations are surely impossible to fully appreciate.

⁴ Wikipedia, <http://en.wikipedia.org/wiki/PayPal>

⁵ How China will Change the Cars America Drives, Motor Trend, April 25, 2010, <http://mt.kargo.com/v/News/HowChinaWillChange/?KSID=3189d3546687c862a6eebeb2eaf0ef7b>

⁶ See for population statistics the *CIA Fact Book* at <https://www.cia.gov/library/publications/the-world-factbook/>

10 times as many science and engineering graduates as the United States. Although the quality of America's graduates still puts the United States ahead, this advantage may not last long (Wadhwa, 2005). In India and China, a fervent desire for education along with prodigious work ethics and cultures of entrepreneurship create a strong basis for rapid progress.

At the same time, we should be cautious about predicting China's long-term prospects, since we have neither full access to information about their economy nor the ability to predict the future path of their political system (Friedman, 2009). India, with all its promise, must address daunting infrastructure, environmental, and governance issues (Kapor, 2010). But clearly, increased levels of global competition have emerged. Imagine what global competition would be like if the nearly four billion people now living in poverty across India, China, and the other developing countries fully join the world's economy and add their ideas, energy, and innovative genius.

Other Issues: The innovation economy has other special challenges. Environmental costs are increasing. Additionally, the cost of fighting terrorism is unabated, taking resources away from other activities. It is impossible to anticipate what future terrorist events might do to open societies, from the loss of personal freedoms to restrictions on business interactions. In 2010, the world is emerging from a period of financial chaos, but it is still not clear whether institutional changes made in response to the crisis will help or hinder future growth.⁷

Finally, there are major demographic shifts occurring around the world whose consequences are not fully understood. For example, in Germany, France, Italy, Japan, Korea, Singapore, and many other developed

countries, indigenous populations are declining by 25% to 50% in each successive generation.⁸ This is also true in China because of their one-child policy. In the future, without effective immigration policies, there may be many fewer workers in these countries to support the costly social services required for increasingly older populations.

For all these reasons, to thrive we must significantly improve our success rate in all forms of innovation. It is the *only* factor that significantly counteracts these rapidly increasing costs and other complex challenges. For executives in companies, the innovation economy forces management to increasingly shift its focus from gradual improvement of current assets to the creation of new, high-value products and services. The daunting rate of change of both technologies and markets demands this shift in emphasis.

II. THE OPPORTUNITY TO IMPROVE PERFORMANCE

Considerable attention is being given to the topic of innovation. A Google search query on "innovation" produces more than 100 million results. The concept has become a source of theory, research, scholarly writing, and endless discussion in the press. There is a litany of consultants, publications, and public conversation about the virtues of innovation as a strategy. In the U.S., the government has established a new National Council on Innovation and Entrepreneurship.⁹

But something is still missing. Michael Mandel, chief economist at *Bloomberg Business Week*, wonders why, with our wide array of nanotechnology, biotechnology, robotics, artificial intelligence, and other technologies, we are not seeing more marketplace impact (Mandel, 2009). He further asks why we don't have better tools for quantifying progress. We have output

⁷ In addition, we are rapidly going from 1.5 billion Internet users today to a time, only years from now, when a large percentage of the world's population of seven billion people will be connected. Individual connections are only one important development, however. Additional computer applications will be connected via the Internet and run at many millions of times today's computer speeds. Systems of all types — financial trading, consumer services, production design systems, etc. — will be orders of magnitude more plentiful and complicated when compared to those available today. No person or enterprise will be capable of understanding all of them. Indeed, the behavior of these systems will be non-linear, and they will interact in ways that can neither be tested nor anticipated. Given this complexity, the large number of computer hackers, and the criminals supported by nation states working to destroy or extract value, we should expect that "Black Swans" will be even more common (Taleb, 2007).

⁸ "Population Decline," *Wikipedia*, http://en.wikipedia.org/wiki/Population_decline

⁹ The author of this article, Curtis R. Carlson, is a member of this council. See <http://www.commerce.gov/news/press-releases/2010/07/13/locke-announces-national-advisory-council-innovation-and-entrepreneur>

measures, such as the number of initial public offerings (IPOs), stock price, corporate growth, and market share. He argues that these measures fall short because they do not measure either innovative capacity or efficiency. Measuring the number of patents or publications has not proven to be particularly effective.

Marketplace output is the only true measure of innovative effectiveness. However, innovative progress, capacity, and efficiency can be measured using the “artifacts” of innovation, such as the core concepts and processes to be described shortly. Innovation will be faster and more successful once these core concepts are widely understood and applied.

Poor Innovative Performance: The lifetimes of the largest companies in America are decreasing rapidly. At the turn of the 20th century, a large company would continue to be included in the S&P 500 index of large-cap American stocks for more than 75 years before it was bought or went away. Today, the lifespan of this elite group of companies is, on the average, down to less than 20 years (Foster and Kaplan, 2001; Carlson and Wilmot, 2006: 34). These companies, with all their advantages, are not keeping pace. They are like dinosaurs whose bulk, once an advantage, has become a disadvantage since it fatally slows down their ability to adapt. Today, it takes different processes and corporate architectures to survive.

Consider also the success rate of new products in the retail grocery industry, which is only 20 to 30% (Stone, 2008). Do they fail because of bad technology or from lack of clever ideas? No. They fail because customers do not want them. Even in Silicon Valley, by far the world’s leading new venture creation region, only one out of seven or ten new companies has real success. In what

other activity would this be seen as good performance?

Example after example can be given for innovative failure. This quote is indicative of the problem: “If you ask a CEO whether the world is moving faster and whether they need to innovate faster, they will say yes. But if you ask an employee in that company to describe their innovation system, you get blank looks. They have none” (Carlson and Wilmot, 2006). My organization, SRI International, has worked with hundreds of companies and organizations, and that is also our observation. Most organizations do not have comprehensive innovation systems or processes. If the professionals in a company cannot describe the company’s innovation processes, there clearly are none.

University technology transfer programs are also often considered to be disappointing in generating value from their intellectual property (Mitchell). Much of it lies fallow. Universities are, of course, not designed to create innovations. Their mission is education and the generation of new knowledge. Nevertheless, universities have built into their technology transfer programs an important flaw. If there is one thing we know about innovation, it is that “technology push” does not work. Rather, the goal should always be “market pull.” University technology transfer initiatives are mostly technology push. If these programs are to be improved, they must reverse this approach and create incubators that focus on “value creation”—that is, formally and systematically connecting market needs with new solutions.

The amount of waste these failures represent is enormous. Today’s low output of innovations is analogous to the low quality and high cost of products in the 1950s. Imagine if we performed just a few percent better every year in our innovative ability.

Over time, the positive impact of these improvements on companies and national economies would be enormous.

III. VALUE—NOT ONLY COST AND QUALITY

Given these dynamics of the innovation economy, are companies and their workforces fully preparing to compete? Enterprises that do not strengthen and broaden their innovation processes will fail. On the other hand, individuals who master such skills will be uniquely valuable. To gain a perspective on the potential of the innovation economy for improvement, it is useful to look at an example from a previous economic period that illustrates the enormous improvements possible when people work in more productive ways.

In the 1960s and 1970s, America lost its lead as producer of quality products to Japan. After World War II, a “Made in Japan” label implied cheaply made goods. Japanese companies were determined to eliminate that perception. They accomplished this by embracing the Total Quality Management (TQM) movement, as pioneered by W. Edwards Deming (1986) and Toyota’s Taiichi Ohno (1988). These innovators proved that by working in a new, more productive way based on fundamental improvement principles, companies could dramatically increase quality *and* dramatically reduce costs. Using Ohno’s lean manufacturing innovations, Toyota became the world’s leader in automotive quality and eventually the world’s number one car company.¹⁰

At first, the US and other developed countries ignored Japan’s revolutionary new way of working, believing that high quality came at a high cost. The idea that the rigorous application of a small number of fundamental, continuous-improvement concepts would dramatically improve both

quality and cost seemed unreasonable. As a result, over the ensuing years many American companies and hundreds of thousands of jobs disappeared. Many books and articles were written during this period about the end of the “American era” (Dowd, 2007; Vogel, 1979). After suffering substantial commercial and social pain, America eventually adopted these profoundly more productive ways of working, as did the rest of the world. Now, every significant manufacturing company uses some version of TQM continuous-improvement principles.

This approach has been so effective that today, low cost and high quality are the entrance requirements for most new products. Now companies must increasingly move to a broader definition of customer value. The innovation economy demands high quality and low cost, but it also requires that we deliver new products and services with more convenience, features, personalization, design, and user control, among many other ways to create additional customer value. It also demands that we take the same approach to the other aspects of the enterprise: manufacturing, distribution, marketing, human resources, financial systems, legal services, and information technology.

IV. THE WAY WE WORK IS THE MOST IMPORTANT INNOVATION¹¹

Can we, like Deming and Ohno, achieve dramatically better results by developing and using more productive ways of working? At SRI we strongly believe this is possible through the comprehensive application of the fundamentals of innovation, which are not widely known or applied today. Although interest in the topic of innovation is great, the field of innovation concepts and best practices is still in its infancy. It is like the

¹⁰ “Toyota Motor Corporation,” *New York Times*, July 15, 2010 http://topics.nytimes.com/top/news/business/companies/toyota_motor_corporation/index.html

¹¹ From C. R. Carlson, who says about SRI’s innovation practices, “The way we work is our most important innovation.”

discipline of TQM before Deming and Ohno codified and popularized the core ideas (Shewhart, 1931).

To test the maturity of innovation understanding, ask seasoned executives for the definition of innovation. You will typically be told that it is about creativity, teamwork, intellectual property, novel ideas, or entrepreneurship. These definitions are incomplete and lead to confusion and inefficiency. Every enterprise requires a comprehensive “innovation playbook,” and few have one today.

A complete definition for innovation is: “The creation and delivery of new customer value in the marketplace. Innovations are sustainable only if they provide sufficient enterprise value to allow for their continued production.”¹² A product or service may be clever or creative, but unless customers in the marketplace use it, it is not an innovation. As a dramatic example, consider that the US Patent Office has so far issued more than 4,000 patents for mousetraps (Hope, 1996). Yet only about 20 of those thousands of patents have ever made money.¹³ The others may represent clever, creative ideas but they are not innovations. Unless an enterprise obtains sufficient value for producing the product or service, it rapidly disappears and ceases to be an innovation.¹⁴

Innovations can be small and transitory, like Motorola’s flat RAZR phone, or large and long-lasting, like Thomas Edison’s light bulb, or the computer mouse with interactive computing developed by Douglas Engelbart (Nielson, 2006)¹⁵ or the Internet. Whatever the size of an innovation, individually or cumulatively, it is possible that over time the accumulation of innovations can create enormous new customer value.

Consider Ford’s Model-T compared to today’s automobiles. Both are still means

of transportation, but today’s automobiles include a tremendous number of both small and large innovations. It took many tens of thousands of small innovations to achieve the remarkable quality, durability, and reliability of today’s automobiles. In addition, today’s automobiles can include many major innovations, such as air conditioning, AM-FM-satellite radio, airbags, seatbelts, GPS-guided navigation systems, communication systems,¹⁶ and pollution controls. And, unlike the Model-T, which came only in black, the choices now include a rainbow of colors.

Outputs, Not Just Inputs: It is important to focus efforts on outputs—innovations—and not confuse them with inputs. Concepts like entrepreneurship, creativity, collaboration, intellectual property, and business skills are all inputs that can lead to new innovations. The goal is not entrepreneurship per se (the set of skills, attitudes, and behaviors that can help a person be more successful at innovation), it is innovation itself.

Using the wrong words to describe innovation can cause confusion, limit success, and discourage people from participating fully. For example, after I gave a talk on innovation to a large group of academics, a department head of mechanical engineering said to me, “That talk changed my life ” (Carlson, 2008). When asked why, he said, “Because I have been asked to teach entrepreneurship, and I don’t feel like an entrepreneur—that is not who I am; it is not my identity. Teaching entrepreneurship has always made me feel uncomfortable. But I am passionate about innovation. That is why I obtained my Ph.D., became a professor, and agreed to be a department head. It is also why I love teaching students, so that they can become innovators and make positive contributions too. Now I realize that I can teach these

¹² This definition is slightly different from the one given in Carlson and Wilmot, 2006: 6, but the meaning is essentially the same.

¹³ See <http://uh.edu/engines/epi1163.htm>

¹⁴ “Sufficient value” means that the producers can either recoup their ongoing investments or they can find a way to have the endeavor subsidized. The airline business is an industry that, cumulatively, has generated negative financial returns over its history. It survives only because of government subsidies and because individuals continue to invest in it. Wikipedia is another interesting case. Here, the subsidy comes from people’s time, which they provide to make a subject they are interested in available to the world. Open-source software is still another. There are many ways an innovation can be sustainable other than through financial profit for a company. Obviously, most innovations are transitory but some, like the wheel, can last a very long time. An innovation’s significance is clearly a function of its longevity, the number of people for whom it delivers value, and the total financial value it creates. That is why the wheel is often thought of as one of the world’s greatest innovations, along with language and cooking. In modern times, many believe that the Internet is the most important innovation. See http://en.wikipedia.org/wiki/Timeline_of_historic_inventions for an interesting list of the world’s greatest innovations.

¹⁵ See also http://www.sri.com/about/history/nielson_book.html

¹⁶ Like *OnStar* by General Motors

“A complete definition for innovation is: The creation and delivery of new customer value in the marketplace. Innovations are sustainable only if they provide sufficient enterprise value to allow for their continued production”

courses with enthusiasm using the new understanding you gave us today.” This attitude is very common among technical professionals, whether in a university, a company, or government.

Innovative Understanding: Many thousands of executives, technical managers, academics, and government officials from around the world have come to SRI International’s headquarters in Menlo Park, California, to participate in a program called the *SRI Five Disciplines of Innovation™*.¹⁷ The program begins by asking participants to write answers to a series of questions, including “What are the definitions of innovation, customer value, and a value proposition?” These are among *the* most basic concepts in any business. Remarkably, only about 20% of the participants can reasonably answer these questions when the program begins. By not having a common, accurate language for the most basic concepts of innovation, their strategic decisions and day-to-day interactions are

often confused and inefficient. Clearly, these basic ideas are not widely taught or understood.¹⁸

Fundamentals of Innovation: Many authors have contributed excellent ideas about how to think about and improve innovative success (Drucker, 1993; Christiansen, 1997; Moore, 2002, and Porter, 1998). Important concepts include “crossing the chasm,” “open innovation”, “industrial clusters”, and many more. These concepts, however, are best applied after the fundamentals of innovation are in place. In the book, *Innovation: The Five Disciplines for Creating What Customers Want*, a family of fundamental “disciplines” are described, which are used by SRI and many of its partners (Carlson and Wilmot, 2006: 20). SRI’s five disciplines are:

1. Important customer and market needs
2. Value creation
3. Innovation champions
4. Innovation teams
5. Organizational alignment

Each of these disciplines describes a set of concepts and best practices that increase the probability of innovative success. These disciplines have proven to work through extensive application and experimentation over many decades.¹⁹ They provide a focus on customers’ needs, both internal and external, and they offer a common language, concepts, tools, and processes for rapidly amplifying the process of value creation. SRI believes that these five disciplines are effectively multiplicative. If an enterprise rates a “zero” in any one, the probability of success is also effectively zero. If several are implemented poorly, then the enterprise’s innovative potential is significantly reduced.

Value Creation: It is not possible to describe all five disciplines here. Rather, this section describes elements of “value creation” to illustrate several basic

¹⁷ SRI International <http://www.sri.com>

¹⁸ The innovation economy requires changes in the educational curriculum too, such as a more comprehensive understanding of innovation. This includes fundamental business concepts and a global perspective. Today’s graduates must be able to write clearly and give compelling presentations, which have become even more important. Finally, they must have the human skills and values needed for productive, multidisciplinary collaboration.

¹⁹ One of the most thoughtful contributors to our understanding of the process of knowledge creation is Douglas Engelbart, the inventor of the computer mouse and the foundations of personal computing at SRI in 1967. (Carlson and Wilmot, 2006: 169, and <http://dougengelbart.org/>)

principles. The section entitled “Case Study—SRI’s Journey” will briefly describe the other four disciplines and their application.

Developing a new innovation is not an event; it is a *process* that requires the creation of new knowledge—*value creation*. It is a process, as illustrated in Figure 1, where new knowledge at A is applied to address a customer need at B to create a new product or service. From B to C the enterprise generates profit, but eventually the product or service becomes obsolete and the value creation process must be repeated.

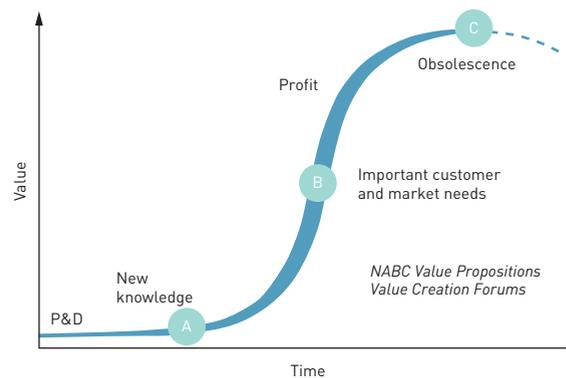
All innovations require connecting A to B. This process is very hard and it takes great skill, effort, and considerable time to develop a compelling, high-value solution. Often this process is called the “Valley of Death” because it is so difficult to understand and navigate (Taylor et al., 2008). At every step, the most efficient and effective practices should be used.

Because connecting A to B is common to *all* innovations, any advance that makes the process faster and more successful is itself a major innovation—a meta-innovation. It is for this reason that we say, “*The way we work is the most important innovation.*” Below are several examples of concepts, tools, and processes that greatly increase innovative efficiency and the likelihood of success.

Value Propositions: Developing a new innovation starts by answering four fundamental questions, which define the proposed innovation’s *value proposition*:

1. What is the important customer and market *Need*, not one that is just interesting to you?
2. What is the unique, compelling new *Approach* to address this need?
3. What are the specific, quantitative *Benefits per cost* (i.e., customer value²⁰) of that approach?

Figure 1. Value creation is a process where new knowledge at A and an important customer and market need at B converge to create an innovation, which generates enterprise profit from B to C. At some point the product lifecycle is complete, the product is obsolete, and it is necessary to create a new, higher-value product or service. The role of R&D is to provide new knowledge to address important customer and market needs. Innovation tools and processes help facilitate value creation, such as NABC Value Propositions and Value Creation Forums.



4. Why are those benefits per cost superior to the *Competition* and alternatives?

These four questions define what SRI calls an “NABC Value Proposition” (i.e., Need, Approach, Benefits per costs, and Competition, Carlson and Wilmot, 2006: 85). *Every* new innovation must answer at least these four questions: they are the absolute minimum for any proposed new innovation. Focusing on these four questions, rather than starting by trying to write a 300-page report, saves enormous amounts of time because in the beginning little is known about the customer or the market; seldom have the best ideas and partners for the approach been identified; and typically little is known about the competition and alternatives to the new idea. Thus, there can be little to no understanding of the possible benefits per costs.

Hypothesis-Driven Innovation: A value proposition is begun with an initial *hypothesis*.

²⁰ Customer value is defined two ways: Financial Value = Benefits – Costs and Perceptual Value = Benefits/Costs. See *ibid*, Carlson and Wilmot p. 79

This can be an observation about a market trend, or a paradigm shift in technology, or any number of other insights. This is the proverbial “light bulb” switching on. But no matter how clever a flash of insight, it must be expected that this first hypothesis will be wrong. Indeed, if it is a significant new innovation, the final product or service will be very different from what was imagined at the beginning.

SRI has found that *none* of its major innovations ended up where they started.²¹ If it is a major new innovation, the reason for this, as has just been stated, is that so little is known at the start. Rather, a hypothesis is made, data is gathered and synthesized, a new hypothesis is developed, and then more data is gathered and synthesized to create still another hypothesis. This iterative process continues until there are solid answers for all elements of the value proposition. It takes unrelenting iteration to get to a reasonably good, quantitative value proposition. In essence, would-be innovators should, “fail fast and fail often to succeed early.”²² New iterations should be daily or weekly at the start.

The NABC method focuses innovators on the most fundamental questions first, which are *very* hard to answer. It saves enormous time and effort that, unfortunately, is often spent by untrained, would-be innovators on useless activities. Once the NABC Value Proposition is developed, one can move forward, and efficiently create a more detailed innovation plan. The NABC approach applies to all functions in an enterprise, whether in R&D, finance, HR, branding, or new product development. That is because if you have customers, whether outside or inside the enterprise, you can always create more value for them. Even for the most basic research, one should be able to answer these four basic

questions.²³ Only after these four questions are answered can a more complete innovation plan be efficiently developed.

“Big-A” presentations: If you hear many presentations, you are probably frustrated by how difficult it is to understand whether they are describing anything of importance. Mostly they are focused on their “approach” with little useful information about the market, customers, and competition. They proclaim that the market is huge, people will love the product, and that there are no competitors or alternatives—ever. But there is *always* competition. We call these “Big-A” presentations, as in nAbc. They are all about the approach—i.e., the person’s great new idea. To a potential funder or partner, Big-A presentations have essentially no value. All four questions—NABC—must be compellingly, quantitatively answered to have a meaningful conversation about the potential value of a new idea. Big-A presentations create enormous confusion and inefficiency—waste.

Value Creation Forums: An important process for speeding up value creation and avoiding Big-A presentations is to tap into the “genius of the team”. At SRI, these meetings are called Value Creation Forums.²⁴ The objective is to rapidly improve innovative ideas and to create compelling Value Propositions. Two guiding principles make the meetings most productive. First, everyone stands up and presents: no bench-sitters allowed. Each person gives an NABC Value Proposition about their important project.²⁵ They present for five to ten minutes and, when time is up, they must stop. The presentations are short so that the presenters focus on the fundamentals, which are very hard to answer. Second, the presenter’s teammates then critique the presentation to reinforce what worked and suggest how it can be

²¹ Conversation with Norman Winarsky, vice president of ventures and licensing for SRI International and his colleague Vince Endres at the Sarnoff Corporation (a wholly owned subsidiary of SRI), 2010

²² There are many versions of this idea (Kelley, Littman and Peters, 2001).

²³ These four questions are almost identical to those asked by the United States investment agency DARPA (Defense Advanced Research Projects Agency) in their requests for proposals.

²⁴ Carlson and Wilmot, 2006: 101, where Value Creation Forums are called “Watering Holes,” a colorful term that does not fully translate into some languages. Value Creation Forums are used across SRI International to develop new innovations ranging from new cancer drugs to new Web-based software companies.

²⁵ A better format is an “Elevator Pitch,” which starts with a “Hook” to gain interest, the NABC Value Proposition, and ends with a “Close” to end the presentation and ask for a specific action, such as a date for a full meeting (Carlson and Wilmot, 2006: 128).

improved.²⁶ The presenter listens carefully without responding to the input: corrections can be made later to save the group's time.²⁷ This approach has proven effective in corporate, academic, and governmental settings because they all require that the fundamentals of an NABC Value Proposition be addressed for every new initiative.

Experience shows that after three or four Value Creation Forums, with a partner helping in between Value Creation Forums, the improvements made are impressive. Note, however, that if the innovation is significant, many dozens of meetings are required before the answers needed are obtained. Value Creation Forums allow for the rapid sharing of ideas while allowing each participant to be a role model for their teammates. In addition, these meetings tap into participant's natural competitiveness, which incentivizes them to rapidly improve each presentation.

Why a Playbook? Innovation concepts and best practices constitute a "playbook" for employees.²⁸ Without a playbook it is almost impossible to systematically succeed. Consider, as an analogy, football or soccer players and their playbooks. No professional team can win without them. They describe a set of specific plays, what each football player will do, and how each player will coordinate their efforts with their teammates as the play unfolds. These plays are practiced over and over until everyone fully understands them and they can be precisely executed. Professional coaches help the players understand the plays and apply "best practices" to speed up learning. Of course the playbook will change depending on the players available, the competition, and the environmental conditions. Once the game starts, the players must adapt and modify their plays in response to what

the competition does. In addition, there are broken plays and it is often necessary to improvise. But because they have practiced diligently over many years, players have a portfolio of possible "improvisations" that are understood by their teammates and that have a reasonable chance for success in different situations.

Most people do not think about innovation this way, but having a playbook focuses everyone's efforts, keeps the team moving in the right direction, and coordinates the team's efforts. Innovation is very much a "contact" team sport, where players must execute their roles professionally and efficiently. And, yes, every new innovation's competition is on the move too, and an innovation team must continuously adapt and improvise. But if the team is prepared and open to adaptation, it is much more likely that the changes needed to succeed will occur. Very few organizations use a comprehensive playbook of innovation concepts and best practices, but the ones that do are often impressive.²⁹ These practices represent a major source of competitive advantage for such companies.

An Innovation Laboratory: With its industry, academic, and government partners, SRI has been responsible for numerous world-changing innovations, which have created many tens of billions of dollars of new economic value.³⁰ SRI has been studying the best innovators around the world, teaming with them on projects, and inventing new innovation concepts and best practices.

SRI is unique in that it is both a major innovation practitioner and an "innovation best practices laboratory", where the concepts listed above have been developed and tested with thousands of colleagues, both inside and outside of SRI. SRI has discarded practices that are ineffective and kept those

²⁶ An additional option is to have each presenter share one new "innovation best practice" of value to the team, so that the team can learn additional concepts about innovation.

²⁷ It is best to have someone taking notes for the presenter as the feedback is given.

²⁸ This concept also comes from personal discussions with Pallab Chatterjee and the author.

²⁹ For example, examples include SRI International, Medtronic, IDEO, Toyota, and P&G.

³⁰ SRI's innovations with its partners include the computer mouse and modern human-computer interface; electronic banking; the United States high-definition TV standard; treatments for cancer and infectious disease; minimally invasive robotic-assisted surgery; computerized speech recognition; the world's first virtual personal assistant (e.g., *Siri Inc.*); and much more.

“Very few organizations use a comprehensive playbook of innovation concepts and best practices, but the ones that do are often impressive”

that work. Most of the ideas tried were not effective because they were either too complex or not valuable to staff. They may have sounded good in an academic setting, but when applied by professionals working to solve real-world problems, they were not. Over and over, SRI has learned that it is the core, fundamental concepts that make the biggest difference in terms of sustained innovative success. SRI has also discovered, by working with dozens of leading companies around the world, that few enterprises even try to seriously apply them. The concepts seem easy to understand, but that does not mean they are; they are not. They can *only* be understood through thoughtful, vigorous, and steadfast application.

Changing Role of Management: The innovation economy requires that management redefine elements of their jobs. Consider first, as an extreme case, Henry Ford. His initial management approach was severely top-down. He wanted to make essentially all significant decisions about his company. He even had detectives monitoring his managers; and if any of them deviated from his orders, they were fired.³¹ Consider as another extreme example, academic management, which is in many ways still all bottom-up, controlled

by tenured faculty (Garrett and Davies, 2010). Academic management is rightly acknowledged to be an extremely difficult, often frustrating task.³²

The advantage of top-down management is that decisions can be made quickly. The advantage of bottom-up management is that it allows for a multiplicity of new ideas. But neither is ideal. In the innovation economy all top-down is increasingly uninformed and all bottom-up is increasingly irrelevant. Finding the “sweet spot”—the right balance between top-down and bottom-up—has always been a difficult task (Brafman and Beckstrom, 2006). But, as a rule, the sweet spot for management influence has been moving down in the organization because of the rapidly changing dynamics of the innovation economy.³³ Only front-line employees are in daily contact with customers, markets, and technologies and are able to rapidly make accurate decisions. By contrast, senior managers who have worked their way up the corporate ladder are mostly familiar with a previous time’s customer needs, market dynamics, competitors, and technologies. Consider that only 20 years ago, the World Wide Web was just beginning as was 2G mobile communications. Over this 20-year period, computing power has improved by roughly ten thousand times at the same price. Applications like Google, Facebook, and Craigslist were almost unimaginable just a few short decades ago.

In the innovation economy Henry Ford’s style of management is increasingly archaic because one person cannot possibly learn enough, fast enough about customers, markets, competition, and technology. It is not smart enough.

Just as top-down alone is increasingly out of date, so is all bottom-up. There are exceptions, but many of the most important

³¹ See <http://www.whatsbestnext.com/2010/02/an-example-of-bad-management/>

³² Garrett and Davies, 2010: 70, “The management of creative professionals starts and ends with encouraging, supporting, and incentivizing achievement”. This quote was given to Garrett and Davies by C. R Carlson in 2010.

³³ This also makes it harder for some more traditional managers, who want control.

opportunities today require multidisciplinary teams to create meaningful solutions. The apparent paradox for many managers is how to create an enterprise where there is sufficient freedom for invention, yet enough structure to capture the ideas generated and turn them into valuable innovations. Letting staff go off in a hundred different directions does not produce value; it produces organizational chaos. Programs that emphasize “inspiration rooms”³⁴ or “innovation centers,” or the trappings of creativity, such as pool tables, funny hats, play dough, and LEGO blocks, are often, by themselves, misguided.

At the other extreme, in the innovation economy, academia’s style of management is also increasingly archaic because it does not support collaboration within a disciplined innovation structure. It is not smart enough either.

What is required is an organizational architecture, like the one described below, for the disciplined incubation of new high-value innovations. It requires new organizational structures that better exploit the best features of top-down and bottom-up. These new innovation structures complement the more traditional structures, such as TQM and stage-gate management systems, which remain effective for incremental innovations.³⁵ But TQM or stage-gate structures alone are inadequate.

Benefits for Employees: Innovation skills are important to a company’s staff. People with the ability to innovate are among the rarest people in the world: they are always in demand. Experience shows that when professionals gain these innovative skills, they become more successful while helping their enterprises to be more successful. The quality of their R&D and innovation initiatives improves; their ability for

productive collaboration with colleagues and partners increases; and a conceptual framework is created for more rapid learning and continuous improvement. Having these skills allows for greater career achievement and professional growth, which means that enterprises supporting this kind of environment are preferred by the best employees.

V. CASE STUDY—THE SRI JOURNEY

The ideas described above have had a transformational effect on SRI, which has had a storied history in Silicon Valley. Stanford University’s creation of SRI 65 years ago was one of the seminal events in the early formation of Silicon Valley, along with Hewlett-Packard. Most professionals probably use several SRI innovations every day, whether it is the computer mouse, multiple computer windows, high-definition television, electronic banking, computerized speech recognition (through Nuance Communications), automated mail sorting, and minimally invasive surgery (through Intuitive Surgical).

SRI is an innovation enterprise: that’s all it does. SRI has worked in nearly half the countries in the world and in all major technological areas. SRI has pioneered management concepts now invoked widely, such as “SWOT” analysis and “open innovation”. Since its founding, all of SRI’s major initiatives have been based on open innovation, because they were all completed with great partners. In spite of these enormous achievements, by 2000 SRI had stopped growing. The innovation concepts and best practices SRI had pioneered up to that point were no longer enough. With the emergence of the innovation economy around that same year, a more comprehensive innovative approach

³⁴ See, for example, <http://www.theinspirationroom.com.au/who-is>

³⁵ Note, other innovation management approaches are often called “Stage-Gate” and “Funnels.” See Wikipedia, *Stage-Gate*, http://en.wikipedia.org/wiki/Stage-Gate_model. From SRI’s experience with many international companies, these approaches often have limited to no success in creating major new innovations.

was required. That was the year SRI began to rigorously apply the *Five Disciplines of Innovation*.³⁶

Since 2000, SRI has had a dramatic turnaround with double-digit growth, a cadre of staff doing R&D to solve more important problems, and a much more valuable venture and licensing pipeline. In 2010 alone, SRI had a major cancer drug approved by the US Food and Drug Administration for T-cell lymphoma, a terrible cancer for which there was previously no good therapeutic. In addition, one of SRI's spin-off companies, Siri, was bought at a premium by Apple Computer,³⁷ even though it was only 18 months old at the time. Siri is the world's first practical computer assistant, a major advance in personal computing. In the future it may be seen as rivaling in significance the development of the computer mouse more than 40 years ago.

SRI's Innovation Architecture: SRI applies the *Five Disciplines of Innovation* to all aspects of its business: R&D, new product development, venture formation, and all corporate functions. Use of a common language based on customer value has elevated cross-divisional communication to a new level. It allows incremental innovations to be developed more efficiently, and puts a more productive focus on larger, multidisciplinary initiatives, which are required to solve important problems.

SRI uses a family of Value Creation Forums to create new innovations. Across SRI are market-focused forums, which match SRI's strategic focus areas, such as cyber security, infectious disease, intelligent computer systems, education technology, and clean energy. These Value Creation Forums are focused on generating compelling Value Propositions; they do not fund new R&D. Until a good Value Proposition is developed,

it is a waste of resources to spend money on technology.

SRI's market-focused forums are each organized and facilitated by an expert in the specific market area. The forums are given limited resources each year³⁸ to be spent on consultants, market studies and reports, customer and partner visits, and product designs and simulations. These forums come and go depending on market conditions and SRI's ability to contribute. SRI has two other ongoing Value Creation Forums, one for R&D investments and one for commercialization activities. These forums have much larger investment resources and there are senior managers who run the meetings, act as mentors to new potential innovators, and negotiate major transactions.

SRI is a transparent enterprise where anyone can talk to anyone else without permission. For example, Value Creation Forums are posted on SRI's internal website. All staff can come to a forum, but it is understood that these are value creation meetings where everyone is expected to contribute. Just sitting and watching is not enough. With freedom comes responsibility.

Comprehensive Application: SRI uses its common innovation language wherever possible. For example, there is an "SRI Card," a wallet-sized plastic up card that describes the company's mission, vision, values, and many of its innovation practices. SRI aspires to be the "premier independent source of high-value innovations". The *Five Disciplines of Innovation* are described during the hiring process and they are on SRI's website. New employees are more formally introduced to the disciplines of innovation at orientation. SRI's professional development focus is on how staff can use the *Five Disciplines of Innovation* effectively, along with how they support SRI's vision and business objectives.

³⁶ C. R. Carlson became CEO of SRI in 1999. Previously he was a vice president of business development and ventures at SRI's wholly owned subsidiary, the Sarnoff Corporation.

³⁷ Interestingly, at the start of Apple Computer, Steve Jobs licensed the computer mouse from SRI.

³⁸ Value Creation Forums are given tens of thousands of dollars annually.

The CEO personally holds an innovation workshop for all new employees to indicate the importance of these practices. He often has lunch with members of the staff and asks them about issues needing improvement, their work, and their Value Propositions.

SRI promotes an “abundance” mentality, not one based on scarcity. But it makes it clear that it is only a world of abundance if staff have the required innovative skills and are able to apply them effectively. Appropriate incentives are in place to focus outwardly on customer and market needs—that is, on value created.

All business presentations at SRI use the NABC format. They drive investments, speed up iteration, and minimize the need to compare “apples with oranges.” SRI works hard to keep presentations short: one-page proposals, 15-slide presentations, etc. SRI is focused on outcomes—real value to its customers. Because of its common language, concepts, and tools, staff members understand each other more quickly, input is more consistent, and new insights can be incorporated more easily. There is much less confusion about what staff and management are agreeing to do and why.

Important Market and Customer Needs: In the innovation economy, we must aspire to work on important customer and market needs, not just those that are interesting to us. Interesting problems are quickly overrun by others in the innovation economy. Important customer and market needs allow for the creation of significant customer value and they also motivate and attract the best staff.

As described, Value Creation Forums at SRI are all run using the same basic language, concepts and tools. Beyond the basics, the expectations and presentations required for specific tasks are quite different.

For example, the metrics for success from a new venture are dramatically different from those expected from R&D. If SRI is going to start a new venture, it must be worth at least several hundred million dollars to be of interest. This is not an arbitrary objective. Among other reasons, this threshold is required in Silicon Valley because, if it is not met, it is extremely hard to acquire the best management team and venture partners. Other activities have metrics that are appropriate to the task, such as those for new R&D centers. These metrics allow staff to decide more easily whether an initiative will have value for customers and SRI. It is surprisingly rare for management to have to say no. Rather, a team proposing a new idea soon realizes whether the threshold goal can be met and, if it cannot, the idea often goes away.

Innovation Champions: Without a person who is passionately committed to making a new innovation happen, it will fail. The first question SRI asks about any investment, proposal, or project is, “Does someone really want to do this?” Will someone commit to success, no excuses, and agree to follow the *Five Disciplines of Innovation*? SRI has a saying, “No champion; no project; no exception.” If the idea is a good one and SRI has no champion, they do not start serious work until one is found.

This is SRI’s approach throughout the organization, top to bottom. Champions are born with many of the traits needed for success, but they must also be nurtured and cultivated. Training in innovation begins in the technical divisions and progresses to corporate venues. High-value innovation is about achievement. That is what motivates people and gets them to work day and night. You can never force people to work this hard unless they are passionate about their work.

Every major innovative initiative must be built around that fundamental human need, which champions possess.

SRI focuses on its innovation playbook to help staff achieve their goals. SRI is in the highly competitive Silicon Valley—if the playbook does not work, the staff will not use it. Even so, it takes a great deal of management effort and time before new staff fully understand what SRI aspires to achieve with its innovation concepts and best practices, how to apply them, and why they will be valuable to their careers.

Innovation Teams: In the innovation economy, an enterprise must team with the best to maximize its chances for success. Even large companies rarely have all the best resources. Although almost every company will claim that it abstains from the “not invented here” (NIH) syndrome, the truth is that almost all suffer badly from the disease. Because they do not normally assemble the best teams, they are effectively hoping that their competition fails to do so as well. Obviously, if their competition does assemble a crackerjack team, they may be defeated in the marketplace.

Forming teams is hard. It is a project that must be actively managed. It takes training, support, encouragement, and appropriate rewards to have staff create powerful, productive teams. To overcome the frictional costs of team formation, major goals are required—e.g., important customer and market needs. The cost of putting together a high-powered team is otherwise not justified. An advantage of working on important customer and market needs is that there is an abundance of psychic rewards that can be distributed throughout the team.

Organizational Alignment: Organizational alignment starts with senior management making a commitment to ensure that the

enterprise will be a market leader and that they will achieve this by delivering the highest customer value in the minimum time and at the minimum cost. It means putting in place the structures, metrics, rewards, staff, and support to satisfy the *Five Disciplines of Innovation*. It means removing obstacles to innovation. A common example is barriers to staff. When they need to ask a vice president in a different division a question, they are required to get permission from several levels of management. In addition to slowing down the process of value creation, that sends exactly the wrong message to staff about the enterprise’s commitment to the rapid creation of high-value innovations.

Achieving the goal of becoming an innovation enterprise must be at least a five-year initiative. Progress is relatively slow at first but then momentum builds: you will not go back. Build forward motion through early adapters; focus on achievement and impact; demonstrate value; and create internal ambassadors. As the saying goes, “Lead with the best to push the rest.”³⁹ Involve everyone at the strategic level; but deeply involving everyone is not possible. Make receipt of funding contingent on using the *Five Disciplines of Innovation* to the extent possible—this shows seriousness. The innovation agenda will not be taken seriously if it is too marginal. Make Innovation concepts and best practices a core business process in as many venues as possible. Focus on the fundamentals: the greater the market and customer attention and connection, the better the results.

No organization can ever achieve perfection, but every organization can strive to get better through a serious commitment to continuous improvement. SRI strongly believes in asking every enterprise activity to improve some aspect of their function each

³⁹ This is a common saying of Dennis Beatrice, who is vice president of the Policy Division at SRI. He also contributed many ideas to this section.

year. SRI is not close to where it wants to be, but each year it gets better. Success takes substantial time, but even modest progress creates significant returns.

VI. CONCLUSIONS

We are in the innovation economy. There has never been a better time for creating major new innovations: it is potentially a time of abundance and unprecedented prosperity. But it is also the most challenging time in the history of innovation, with technological improvements in most fields occurring at rapid, exponential rates and with global competition increasing equally dramatically. This dynamism will not stop. These driving forces will accelerate as billions of people in the developing world move from poverty and low-cost manufacturing to prosperity and the creation of new, high-value innovations.

Our innovative performance today is, overall, poor. Few companies have comprehensive innovation playbooks for staff with an organizational architecture that drives innovative success. Both are essential for survival today. Creating an innovative enterprise starts with commitment by senior management and then by putting the fundamentals of innovation in place. Once these fundamentals are established, it is possible to add other innovation concepts to further develop the enterprise's innovative sophistication. The fundamentals are not hard to understand, but they are extremely hard to practice. The only way to really learn them is through repeated application. Few make the effort but those that do often excel.

Experience shows that large improvements in innovative performance are possible. Even a ten percent improvement would make a significant contribution to the profitability of most enterprises. In many cases, improvements have gone well

beyond that. Having a deep understanding of innovation is beneficial to staff too.

Professionals today need new skills based on a comprehensive understanding of the innovative processes that lead to success. Those who have these skills can prosper: those without them will increasingly fail. Enterprises that help their employees obtain these skills have an advantage in attracting and keeping the best talent.

The innovation economy gives us the opportunity to create abundance through the application of a discipline of innovation. To thrive we must use innovation concepts and best practices throughout our enterprises and more generally throughout industry, academia, and government. The way we work is *the* most important innovation. Even small improvements in our collective ability to innovate would, over time, have a huge positive effect on the world's prosperity, environmental sustainability, and security.

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