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**Accelerating Regional Innovation and Entrepreneurship
In Biotech, Life Sciences, E-Commerce, and Hi-Tech
& Continuously Creating Rapidly Growing New Businesses
For Countries, Regional Consortiums, and Corporations**

Eight Essentials For Success
Lessons From Silicon Valley, Greater Boston, and Research Triangle

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Executive Summary

This report addresses the number one concern for leaders in business and government.

How to accelerate the growth and financial success of their organizations and regions by developing Silicon Valley - style networks that accelerate technology innovation and continuously create new businesses that grow rapidly and quickly become profitable.

There are three networks in the world that have excelled in hi-tech innovation and continuously created rapidly growing new businesses — Silicon Valley, Greater Boston, and Research Triangle. These Top 3 innovation networks are the ones that everyone envisions when thinking about starting a similar network within their corporation, consortium, or country.

However, it is worth noting that while more than 150 networks of hi-tech innovation have been started across the USA during the past 70 years, only three of them have become world leaders. Besides the Top 3, there are another eight networks that have achieved the next level of success, such as Austin, DC, and Seattle, but none of these matches the worldwide leadership and financial success of the Top 3. This report identifies the essential areas where effort needs to be focused for replicating the success of the super-successful and for avoiding the pitfalls of the others.

We have identified 14 critical factors that must be followed for a new innovation network to be successful. These factors have been divided into two groups: — (i) Six Structural Basics, and (ii) Nine Eight Organizational Essentials.

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Six Structural Basics

1. Availability Of World-Class Scientific Research, Testing, And Development
2. Organizational Champions In Government, Academia, And Corporations
3. Financial Access To Seed Funding, Venture Capital, And Capital Markets
4. Encouraging Specialized Infrastructure Allowing Scientists and Entrepreneurs To Meet
5. Ancillary Support Services (such as testing laboratories) Essential For Innovation
6. Life-Style Enhancing Geographic Location With Access To Leisure, Sports, And Cultural Activities

These factors provide the essential foundation upon which innovation and growth are built. They are the starting point, but on their own they are not sufficient for success. This report does not elaborate on these rather straightforward essentials, but focuses on the other factors that have been more difficult to achieve.

Eight Organizational Essentials

These are the “soft” factors which every new innovation network must develop to excel. Only 10 out of the 150 regions have been truly successful in these, and this report focuses in detail on these eight essentials.

1. Distinct And Unique Strategy – Many Different Paths To Success
2. Strong Leadership, Careful Preparation, And Planning
3. Long-Term Commitment
4. Commitment To Develop Benefits For The Whole Community
5. Culture Compatibility Between Region & Innovation Strategy
6. Commitment To Continuously Coordinate And Collaborate
7. Innovation In Regional Organization
8. Ongoing Candid And Pragmatic Evaluation & Adaptation

The report concludes with specific recommendations for business and government leaders on how to create new networks that excel in innovation.

This report is part of our CEO Action Insights that are prepared periodically to help CEOs address their most difficult challenges. Today, the key challenge is to develop new ways to accelerate growth and earnings.

These recommendations are based on 25 years of experience in commercializing new technologies and from having lead new ventures in all three of the world's leading innovation centers — Silicon Valley, Greater Boston, and Research Triangle. Our findings are presented in an action-item format which is

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typical for CEOs at leading *Fortune* 500 corporations, while the underlying evaluations are based on the demanding standards of research at two leading institutions of business and technology — Wharton and MIT.

Eight Organizational Essentials For Developing Technology Innovation and Business Creating Networks

These are the areas in which the creativity of the leadership of a new innovation network can truly have an impact. They are difficult to develop and challenging to sustain. They are most completely achieved only in the Silicon Valley, Greater Boston, and Research Triangle where they have been a major factor in their success.

1. Distinct And Unique Strategy – Many Different Paths To Success

From their inceptions, each of the three super-successful regions had very different drivers and priorities and followed different approaches.

Silicon Valley focused on commercializing new research and starting new businesses. Its driver was to overcome severe financial difficulties at Stanford University. Today, it continues to be the leader in starting entrepreneurial ventures.

Research Triangle focused from the start to increase collaborative research. Even today, 76% of the businesses located in the triangle focus on university scientific research.

Greater Boston focused originally on federal grants and later on large corporations. This led Massachusetts to become one of the Top 5 states receiving federal research resources by 1990. It also encouraged companies such as DEC, Raytheon, and Lotus to produce a disproportionate share of the region's income. The region's high reliance on a few large corporations led to its decline in the 1980s, as those corporations slipped. A radical shift in approach led to the subsequent Boston Biotech Boom.

Implication For Starting New Innovation Networks: A good approach for a new innovation region is one that focuses on the unique strengths of the area and its network, as well as one that is appropriate to today's market conditions. In practice, for most places this will mean an approach that combines elements of each of the above three approaches. Whatever approach is selected, fundamental innovation in strategy is essential. It is important to focus on replicating the factors that propelled the Top 3 regions to become successful, and not to replicate their systems.

2. Strong Leadership, Careful Preparation, And Planning

Combining professional expertise with personal passion has been critical in the success of each region. In Research Triangle, inspired government leadership was critical. In Silicon Valley, which was developed to bail out Stanford University, the university took the lead. In Boston, the foresight of a few professors played the pivotal role. In all cases, inspired leadership of dedicated professionals was

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critical to the success of each endeavor. The preparation and planning, though never exhaustive, was constantly evolving and relevant to the stage of development.

Implication For Starting New Innovation Networks: The choice of an experienced and committed leader, someone well-versed in accelerating technology innovation and rapidly creating new business, is important. The support of government, business, academic, and political leaders is extremely valuable. While success requires developing profitable long-term partnerships among leaders in government corporations, academia, and the community, the biggest impact is created by the network leader's commitment and goals.

3. Long-Term Commitment

Each of the Top 3 innovation networks took longer than 30 years to become super-successful.

Implication For Starting New Innovation Networks: Developing a hi-tech innovation network is a slow process. This is a long-term solution for accelerating economic development; although if it is well managed, there can be short-term benefits, but those will be realized only when the infrastructure is developed for long-term success. A long-term government-corporate-academic-community partnership is essential.

4. Commitment To Develop Benefits For The Whole Community – The Essential Genesis and Mission Of Each Super-Successful Innovation Region

From their inception, the Top 3 innovation regions focused on benefits to the whole community rather than the self interests of any one group.

Silicon Valley was initiated in the 1930s by Dr. Frederick Terman to create employment for Stanford engineering graduates in the San Jose area as an alternative to their moving to the East Coast. He funded William Hewlett and David Packard to start a venture in their garage that grew to become Hewlett Packard.

Research Triangle was begun in the 1950s by Dr. Howard Odum and others to increase research cooperation among the area universities (Duke, University of North Carolina, and North Carolina State) and to increase the prosperity of the entire region. The state government later joined this corporate-academic-government partnership.

Greater Boston was initiated in the early 1940s when Dr. Vannevar Bush of MIT became the director of the Federal Office of Scientific Research and Development and directed federal research dollars to the area's universities and corporations. The first entrepreneurial funding was for Ken Olsen and Harlan Anderson, whose startup venture grew to become Digital Equipment Corp.

Implication For Starting New Innovation Networks: Any new innovation program must be based on delivering benefits for the whole community, which is something that each of the Top 3 innovation regions has done very well. Regions that maximize benefits to only a few insiders (individuals, businesses, organizations, and politicians) and not the greater community, have not achieved success. Strict standards in selecting starting partners are essential.

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5. Culture Compatibility Between Region & Innovation Strategy

The culture — the unwritten rules and expectations about the manner in which individuals and organizations interact with one another within the workplace and outside — that has been consciously developed in each of the leading regions of innovation has been an extremely important factor in their success. Although each of the regions has a completely different culture, what they have is consistent with their goals and strategy. Issues relating to culture are the most difficult to define and manage because they are “fuzzy issues” and, therefore, often ignored. That has been a huge mistake.

The importance of culture is brought out by looking at two experiences — in 1980, initially disregarding the importance of culture, and focusing primarily on extensiveness of university-based research, government contracts, and corporate access, there was a prediction by a leading expert from MIT, AnnaLee Saxenian, that Silicon Valley would stop growing. Yet, from 1991 to 2001, venture capital investments in the valley increased from \$0.61 billion to \$49.92 billion! By 1994, Silicon Valley had 20 technology companies with more than \$1 billion in sales compared to five in Boston.

Surprised by these startling results that were completely contrary to expectations, in 1994, AnnaLee (of MIT) reassessed the developments in the two regions and concluded that in spite of similar physical assets, the two regions experienced dramatically different results. This was principally due to vastly different cultures in corporations, academic institutions, and professional networks. Culture is a key factor in hi-tech successes and a principal reason in hi-tech failures.

Implication For Starting New Innovation Networks: A frank assessment of the culture and needs of a region is critical to its success. Regions may need to adapt their businesses, corporations, academia, and professional organizations to become more collaborative, collegiate, and mutually supportive. As an example, Boston had to radically change its culture of reliance on large corporations before it could recover and become a biotech success.

6. Commitment To Continuously Coordinate And Collaborate

Close collaboration in all stages of innovation, from the development of new scientific ideas to the various phases of establishing new businesses, has been essential for the success of each of the three super-successful regions. Formal and informal teamwork is required at all levels, from laboratory assistants networking to find solutions to perplexing laboratory experiments ... all the way to CEOs collaborating to help each other solve organizational and financial challenges. This type of extensive collaborative support occurs only when it is consciously nurtured. Data from two of the highest business structures that require close teamwork — Strategic alliances — illustrates how difficult it is to achieve collaboration. Historically more than 70% of alliances fail!

Implication For Starting New Innovation Networks: Successful collaboration comes only from deliberate effort and by consciously reinforcing the expectations over time. Successful collaboration comes only from shared beliefs and vision and a clear understanding of the needs of all of the partners. It is difficult to achieve. Even in the Top 3 regions, it was brought about by the deliberate and constant actions of the leaders.

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7. Innovation In Regional Organization

Each of the three super-successful regions developed its own very distinctive approach to hi-tech growth. None of them imitated systems from other regions. For example, a professor financing a student to start a business was the beginning of Silicon Valley; while in another instance, three leading universities agreed to collaborate on research efforts which was the start of Research Triangle; and a few professors focused on increasing research funding for the region, which started the Massachusetts Miracle.

Implication For Starting New Innovation Networks: The ability to develop novel solutions based upon the needs of one's own region will be a key factor in the success of a new innovation network. This is one factor why only three of the 150 hi-tech regions have become super-successful. Each developed a unique approach that fulfilled the needs of its local business, academic, professional, and community groups. New regions need to develop their own solution that is consistent with their specific needs and not copy the approaches of other regions.

8. Ongoing Candid And Pragmatic Evaluation & Adaptation

Nurturing scientific innovation and entrepreneurial startup businesses will entail multiple phases. The leadership team should be committed to the continuing and honest evaluation of all aspects of past performance and future prospects. Developing new regions for accelerated innovation and new business creation is all about risks. Candid, honest evaluation of performance and willingness to adapt strategy is essential for success.

Implication For Starting New Innovation Networks: The best way to ensure that the evaluation and strategy for the new innovation region is candid and pragmatic is to select a leadership team that truly reflects these values. If the right individuals are chosen to lead the effort, then as obstacles arise, which they surely will, the collective creative ability of the team will surmount all challenges.

Conclusions and Next Steps

Analysis of the regions that have been super-successful at innovation, Silicon Valley, Greater Boston, and Research Triangle shows that all three realized the same fundamental facts about innovation. The eight organizational essentials identified above make it possible to achieve the objective of developing a structure that nurtures the unpredictable, random, and disorderly process of continuous innovation. By focusing on these eight factors, leaders in business and government can confidently develop new Silicon Valley style networks that will accelerate technology innovation. They will accomplish their primary objective of accelerating the growth and financial success of their organizations and regions by creating new businesses that quickly become profitable.

To establish new networks that accelerate hi-tech innovation and continuously create rapidly growing new businesses, the new leadership must develop detailed deliverables, action plans, and priorities. Items listed below provide a starting point of representative next steps that have worked well in other successful areas:

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- A. Establish a system that encourages businesses of all sizes – startup, small, and large. In the beginning, Boston failed in this and that was a major factor in its decline in the early 1980s. Silicon Valley's focus has always been on companies of all sizes, especially the smallest ones, and this has saved it from a similar setback.
- B. Develop an **Early-Seed-Stage Venture Financing Network** to facilitate collaborations among angels, independent and Corporate Venture Capital, Corporate RandD, and a dialog with government funding agencies.
- C. Develop a **Science and Technology Network**. Facilitate collaborations among researchers to achieve new discoveries faster and more efficiently.
- D. Form a **Business Development Network** to expand opportunities for rapidly commercializing the latest technologies.
- E. Develop a **Visiting Innovator Program** to foster collaborations of corporate scientists and engineers with leading academics. Have 20 participants in four years.
- F. Help region retain its brainpower by creating local opportunities.
- G. Develop an **Entrepreneur Nurturing Program** which is pragmatic, focused, action oriented, and fosters mentoring through courses and contacts.
- H. Develop a **Student Entrepreneur Program** in collaboration with corporate business development groups and leading university students and scholars.
- I. Develop a **Social Entrepreneur Program** in collaboration among entrepreneurs with a social mission and businesses, universities, private citizens, and nonprofit groups.
- J. Develop pre-seed-stage venture evaluation details that combine the technology nurturing aspects of corporate RandD and the rigorous business/financial evaluation of Venture Capital.
- K. Establish close relationships with other networks/regions of innovation and initiate systems for regular interactions.
- L. Assist region in becoming among the top areas/states in government RandD funding.
- M. Aim to be among top states in government startup business financing (e.g., SBIR/STTR financing).
- N. Assist region in becoming an area where foreign companies open new business (RandD facilities or marketing).



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Executive Backgrounds

Ravi C. Gupta is the Managing Principal of Momentum Business Development. He is a 25-year specialist in helping CEOs to increase revenues and profits at companies of all sizes, from the most prestigious Fortune 500 corporations of USA and Europe, such as Johnson and Johnson and Hoechst, to venture capital startups, such as DynaGen, which grew to be ranked No.5 in the annual survey of fastest growing technology companies in Boston. He has led new ventures to commercialize latest research in all three of the most successful innovation regions of the world - Research Triangle, Route 128, and Silicon Valley. In addition, he has led business development in all regions of the USA and Canada, as well as in Europe, Latin America, Asia, and Africa. Ravi's education includes an MBA from The Wharton School, and he graduated with a distinction in the Ph.D. Seminar in Corporate Strategy.

In 2003, Columbia Business School prepared a case study on Mr. Gupta in recognition of his expertise in starting new technology ventures that grow rapidly and quickly become profitable. The same year, The Global Businesses and Technology Conference selected him as "one of the world's foremost experts in accelerating innovation, and rapidly building new ventures that create exceptional and lasting value." In 1999, he was selected by the European Business Development Conference to serve on a panel of worldwide experts – that included executives from the world's most prestigious firms, McKinsey and Company, Booz Allen and Hamilton, and Wall Street investment bank Lazard Freres – on accelerating RandD and starting rapidly growing new businesses.

Before Momentum, Mr. Gupta was the Worldwide Head of healthcare ventures at ATG, the corporate venture capital and RandD group of the \$30 billion Life Sciences Corporation HAG. Prior to that, he was the North American Head for Trespa, the \$100 million Dutch company, and was recognized by the board for "managing the most financially successful and fastest-growing startup venture in the company." Earlier he as Vice President at investment bank First Asian Securities, *The Wall Street Journal* wrote about their successful strategies.

Mr. Gupta is invited to address CEOs and senior executives at conferences around the world. He has been Seminar Chairman at both the Annual World Business Development Congress, and the Internet Marketing Conference. Ravi is a mentor-advisor at both the Lang Entrepreneurial Center of Columbia University Business School, and the Goldman Sachs sponsored National Social Ventures Competition. He is also a member of the Board of Directors of Business Marketing Association in New Jersey. In 2002, at the Bio-Defense and National Security Conference, he was volunteer chair of the session on developing alliances among different government agencies (police, fire, EMS, and public health) and the public to maximize safety.

In 1994, he was inducted into Who's Who In Finance and Industry; and in 1986, *Forbes* magazine featured him in an article on the "Best and Brightest in America."

Jana Volavka is the Principal of Info-Company, a firm that specializes in providing highly focused information on new markets, emerging technologies, the latest scientific discoveries, and corporate competitive information. Her clients include leading corporate venture capital companies, New York management consulting firms, and *Fortune* 500 corporations. Ms. Volavka was previously the head of information services at ATG, the corporate ventures group of Hoechst. Her previous experience includes being a researcher in Silicon Valley. Ms. Volavka has an MS from the University of Prague and is the past chairperson of the American Information Society, New Jersey Chapter.