

Clusters of Creativity

Enduring Lessons on Innovation and
Entrepreneurship from Silicon Valley and
Europe's Silicon Fen

Rob Koepp



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To Pete Snetzinger
for encouraging visions

and to Mom and Dad
for helping to make them a reality

PROMETHEUS: Ay, man thro' me ceased to know his death.
CHORUS: What cure couldst thou discover for this curse?
PROMETHEUS: Blind hopes I sent to nestle in man's heart.
CHORUS: This was a goodly gift thou gavest them.
PROMETHEUS: Yet more I gave them, even the boon of fire.
CHORUS: What? radiant fire, to things ephemeral?
PROMETHEUS: Yea—many an art too shall they learn thereby!

Aeschylus, *The Prometheus Bound*¹

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I began working in Silicon Valley in 1992 as a salesman and marketer of surface mount technology and semiconductor manufacturing equipment. The job exposed me to many aspects of the cluster's industrial functioning and the people I met along the way and the lessons I gained from them planted the seeds for this book, although of course neither they nor I realized it at the time. Even though they did not directly (or, perhaps more accurately, consciously) contribute to the research that went into *Clusters of Creativity*, I do thank them for having been a major part of its inspiration.

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Introduction: The Hidden Lessons of “Siliconia”

1

THE SILICON VALLEYS OF THE WORLD

If names are anything to judge by, the imitative, often tenuous, styling of high-technology clusters around the world shows just how eager people are to claim their own version of Silicon Valley. Among the mountainous pinnacles of Austria now protrudes a Silicon Alps. A swath of Silicon Tundra can be found in the frigid latitudes of Canada. An industrial oasis known as Silicon Wadi graces the arid landscape of Israel. A Silicon Fen stretches over the green lowlands of England. The dykes of the Netherlands protect a Silicon Polder. The high-tech product workhorse of the world, Taiwan, is known as Silicon Island. Areas lacking the identifiable geology for siliconization simply localize the Silicon Valley title: Bangalore is called the Silicon Valley of India; Singapore and Penang vie for acknowledgment as the Silicon Valley of East Asia. A website that has made an electronic sport of identifying global “Siliconia”—clusters of technology-based industry that carry nicknames with the word “Silicon” or other technical-sounding designators—registers over 100 locations.²

Although the US is already home to the original Silicon Valley, throughout its lands as well you can find ample attempts, if made only in name, to claim a slice of Siliconia. Witness the existence of a Silicon Bayou, Silicon Glacier, Silicon Gulch, Silicon Hills, Silicon Hollow, Silicon Mesa, Silicon Prairie, Silicon Sandbar, and even a Silicon Swamp. The heated competition in the US for names is so intense, and the range of easily associated geographic features sufficiently limited, that disputed rights to Siliconia nomenclatures have spawned lawsuits.³

Perhaps the ultimate complement to *the* Valley—an area not so long ago looked down on by the more cosmopolitan regions of America as an agricultural backwater—is that the *haute monde* of Manhattan now calls its concentration of Web design firms Silicon Alley. This uptown New York techno-district boasts one of the closest mimics to the original Silicon Valley name and provides a telling metaphor for just how far the Valley has “made it,” becoming a part of the world’s popular imagination and a location of great cachet within the planet’s corporate topography.

As Ethernet inventor Bob Metcalfe famously put it, “Silicon Valley is the only place on earth not trying to figure out how to become Silicon Valley.”⁴ Exaggeration aside, the observation captures the pervasive eagerness to cultivate hotbeds of high-tech enterprise and the alluring yet elusive nature of Silicon Valley’s magic. The accomplishments of Silicon Valley easily inspire the popular imagination: the rags-to-riches success stories, revolutionizing breakthroughs, gee-whiz gadgetry, explosive business growth, headline-grabbing corporate feats, and, most of all, extraordinary economic wealth generated by the cluster make it the ultimate technopolis in a Global Economy (a term frequently used as if interchangeable with the concept of a “New Economy”) that progresses in large measure according to the creation and innovative application of advancing technologies.

Attendant to this spreading zeal for recreating Silicon Valley, a real problem surfaces in that the forces associated with the Valley’s stunning accomplishments frequently blur into the stuff of hype and legend—a situation helped in no small measure by the powers of imagination and self-promotion for which Silicon Valley and its wider territory, the San Francisco Bay Area, are famous. The news media, business commentators, and academics often play supporting roles, providing as much fawning lionization as meaningful analysis in their interpretations of forces that have built up the Valley as a utopia of *techné*. In this and many other regards, something plentiful Silicon Valley typically lacks is a sense of context. The Valley may be a world apart but it is still very much of this world. A melting pot of people and ideas, the cluster has since its beginnings thrived as a magnet, not an island. The Silicon

moniker has stuck for several decades but belies the origins of a vibrant, changing regional economy; one whose dynamism stretches back to a time before the arrival of the semiconductor industry, one that has also moved far beyond the genuinely “silicon” activities of chip- and computer-related manufacturing. The constancy of the nickname that has launched more than 100 derivations gives a false sense of permanence to a cluster whose enterprises thrive on the powers of reinvention. Silicon Valley is more an economy of concepts than products, more of entrepreneurship than technology *per se*. The Valley is most celebrated—and subsequently suffers from the excesses of overconfidence—during high-tech booms, the dotcom bubble that swelled during the final years of the 20th century being but a recent example. Yet one of the greatest strengths Silicon Valley entrepreneurs repeatedly demonstrate is the ability to lead their economy out of its downturns, to seize new opportunities in the face of general decline. The area’s enduring strengths are in many ways best appreciated (and frequently overlooked) when the cluster is challenged, not when it is riding at the peak of the latest technology wave.

The same sort of balanced, contextual appreciation would also benefit an understanding of other high-tech clusters. Lurking within the names of all those “Siliconia” geographies popping up around the world is the implicit notion that these are just distanced (or knock-off) versions of the original Silicon Valley, distinguished mainly by physical features—fen, island, wadi, glen, beach . . . whatever. The Silicon name associations might make for good marketing or pass for catchy headlining of an area’s advanced capabilities, but they gloss over the endogenous forces that contribute to the particular management creativity that drives these divergent locations. There is also the issue of popular theories on the nature and significance of Silicon Valley and other high-tech regional economies. These tend to exhibit two extremes of bias. On the one hand, there are arguments that the emergence and success of Silicon Valley is accidental, a kind of freak of economic nature. The bottom-line message here is that Silicon Valley and similar clusters are really not so special after all. As economic geographies purportedly created by the

luck of “first-mover advantages” and anonymous “cumulative processes” that follow a destined “path-dependent” trajectory, the sheer ingenuity and dedication that various leaders have committed to guiding the development and direction of these clusters receives little more than passing, if any, consideration. From the opposite angle, contentions are made that Silicon Valley effectively has all the answers. One popular body of thought argues that the region has produced a superior, if not altogether infallible, culturally based “system” of networks that will guide business activity so that the cluster is able to defy the mortality that inheres industry- and product-based life cycles. The implication of this way of thinking is that Silicon Valley is so superlative a location that it has found a way to beat out observed realities of managerial capitalism. Accordingly, the Siliconia of other regions are admonished to adhere to the allegedly unfailing wisdom of Silicon Valley’s networking culture and implement a radical, new model for enterprises and industries.

SILICON VALLEY IN CONTEXT

Clusters of Creativity constitutes an attempt to look beyond such exaggerations and obfuscations. It offers readers a more balanced, appropriately nuanced, practical, and internationally relevant set of perspectives for understanding what Silicon Valley and similar phenomena represent. In order to devote enough in-depth analysis while keeping the book of reasonable scope and length, it focuses on two outstanding locations of Siliconia: the original Silicon Valley and Europe’s “Silicon Fen,” the high-tech cluster radiating out from Cambridge, England. The triumphalism, mystique, uncritical adulation, and simple mischaracterizations that surround Silicon Valley and Silicon Fen, the Valley’s closest foreign counterpart, tend to work against deriving widely applicable insights into the powers that sustain the clusters. Although local conditions very much influence the ongoing development of these exemplary regions of the world’s modern economy, their underlying significance is not

wrapped up in enigmas (or, if one prefers, “accidents”) of geography, history, culture, technological discovery, or industrial networks. The progress of the clusters can only be understood if one gets behind how they and the enterprises that populate them have been managed, specifically regarding how management practices facilitate the cluster’s lifeblood of innovation and entrepreneurship—two pillars of economic behavior that are universal to all forms of economic existence, not just the particular sectors of advanced technology with which the Siliconia are so readily associated.

The inclusion of Silicon Fen in this book also does more than add international balance. The Cambridge cluster qualifies as the most innovative and entrepreneurial silicon landscape outside of the US. It is known of well enough in Britain, somewhat in Europe, and only sporadically heard of elsewhere in the world—this is despite Cambridge’s unsurpassed importance in the history of modern science and its position as the birthplace of so much of the human knowledge that underpins high technology in the world today. A comparative analysis of how and why Silicon Fen exists and the reasons that, in spite of its manifold advantages, this location of Siliconia has obtained less recognition (a function of its having built up less economic mass) than Silicon Valley helps put in perspective the factors that really matter in the workings of a vibrant industrial cluster.

Clusters of Creativity furthermore highlights not only instances of best practice but also illuminates instances of managerial failure. Looking at where things go right as well as where things go wrong provides for a more holistic and useful understanding of how these clusters do (and do not) work. Shedding light on shortcomings also helps dispel some of the mythology built up around Siliconia, making the comparative analyses that much more informative, not to mention objective and relevant to the world at large.

In terms of how the book is organized, *Clusters of Creativity* pursues a parallel structure for examining the lessons of Silicon Valley and Silicon Fen. In two separate sections, each location is explored through a brief introductory chapter followed by three principal chapters. The first of

the three principal chapters examines the studied cluster’s history and evolution; the second, its present-day dynamics; the third, the innovators and methods of innovation that fuel its creative vibrancy. A concluding chapter in each section reflects on the major issues and opportunities the cluster faces for continued growth. The text is filled with analyses of a variety of enterprises, exploring the contributing roles played by high-tech businesses and also those by peripherally supportive, low-tech commercial enterprises and institutions such as universities and government bodies. This approach helps provide for a more balanced appreciation of the clusters’ separate functioning.

By deviating from popular theories that assert ill-defined mysterious forces lie at the heart of successful regional economies, this book demonstrates the ways in which matters of choice and management practice determine the direction and accomplishments of the areas studied. Through its focus on the role of decision-making and action, *Clusters of Creativity* serves mainly as an exploration of organizational strategies and leadership. I hope it will provide a useful set of perspectives for a wide range of readers: from practitioners to academics, from the generally curious to those wanting to know more about the types of leaders who make creative organizations and regions possible in order to augment their own efforts as agents for positive change.

In attempting to accommodate a wide range of interests, the book is written in a style intended to be accessible to the general reader. It makes its observations and critical analyses using as much plain talk as possible and does not shirk from repeatedly critiquing popular thinking that cloaks the deeper significances of the subjects it studies. The next two sections of this introductory chapter deal with the key theoretical concepts that the book either argues against or supports. For those less interested in theoretical constructs and wanting to embark directly on the explorations of Silicon Valley and Silicon Fen, they should skip the following two sections of this chapter (which begin below) and go directly to Chapter 2 (which starts on page 19). For those seeking more information on the theories this book challenges or accepts, the following sections on “Breaking with Accepted Orthodoxy” and

“Clusters and Enterprise” provide a sense of the relevant conceptual frameworks.

BREAKING WITH ACCEPTED ORTHODOXY

Being a book about leaders and their roles in fostering and channeling the forces of innovation and entrepreneurship, *Clusters of Creativity* breaks with a disturbing aspect of fashionable thinking about Silicon Valley that discounts—if not outright dismisses—the role of management and human decision-making. As stated earlier, this work takes issue with two bodies of widely received thought in particular: explanations that attribute Silicon Valley’s functioning to the powers of historical accidents and those that credit the omnipotence of a Silicon Valley system, or culture, of networks. There are variations on the “accidental” and “networks” themes but the reasoning articulated by two leading academic theorists stands out in particular. Because these theories offer the clearest articulations of popular schools of thought, the book occasionally refers back to them in order to contrast its analyses with these paradigms of conventional wisdom. Criticisms are raised not to put down the theories’ advocates or their ideas but are voiced in the spirit of a constructive but pointedly argued debate on matters central to understanding the importance of clusters in modern society and business.⁵

Accidents or Actions?

Princeton University economist Paul Krugman, probably the most vocal and visible economic pundit alive, is a spokesman for what is called “new trade theory” or “new international economics.” A fundamental line of reasoning promoted by this school of thought is the concept of “increasing returns.” The notion of increasing returns attempts to describe the workings of a variety of economic phenomena, and does so in many regards quite brilliantly. One of the areas where concept strays from providing meaningful insight, however, is when it is used to make the rather unenlightening claim that regions and the

industries and companies based in them emerge from the occurrence of accidents and then grow simply through a fated "path-dependent" steam-rolling of "cumulative processes." Some economists seize on such aspects of increasing returns theory to show that a place like Silicon Valley is really not so special after all. Krugman in particular argues that the cluster is simply an over-promoted location based more on hoopla than substance. Somewhat ironically, this basic line of reasoning has found a receptive audience among Valley technologists and thinkers—not because of its depreciation for the way Silicon Valley works, but because the logic of the theory can also be used to explain the "unfairness" of how inferior technologies have succeeded in the marketplace. The classic example is Microsoft Windows—a product that, like the company that produces it, a significant number of individuals (especially those in Silicon Valley) truly love to hate. Windows is but one of several well-known but dubious examples of technologies that increasing returns theorists claim have accidentally locked in certain markets. The implied consequences of this interpretation of economic reality has actually been invoked by Silicon Valley interest groups to spur the US Department of Justice to prosecute Microsoft for anti-competitive behavior. Though an unproven theory, such thinking has not only entered Silicon Valley's state of mind but become an underpinning justification for new directions in federal government policy.

In regards to understanding the significance of clusters, although there are different ways to apply the reasoning of increasing returns theory, for Krugman (the theory's highest profile advocate) the important lesson is that localization of industry is a matter of happenstance. According to this interpretation, clusters are born and develop because an "accident" leads "to the establishment of the industry in a particular location" after which time "cumulative processes" will "take over" the industry's growth.⁶ What these "cumulative processes" are exactly is never fully explained. What is clear, however, is that if regional economies are appreciated merely as the inevitable outcome of historical accidents, they lose much, if not all, of their value as places for understanding how and why they and their enterprises are managed in a particular

manner—no need to bother with the details of management practices if it is history and the ripple effect of “cumulative processes” that dictate a cluster’s economic success. Not surprisingly, Krugman is therefore particularly dismissive of Silicon Valley, a location that he argues “is not at all unique, either in time or space, but is simply a glitzy version of a traditional phenomenon.”⁷

Krugman’s interpretation of high-technology clusters seems framed by the irrelevant (even if true) conclusion that the origins of Silicon Valley or Route 128 (the technology district surrounding Boston and Cambridge, Massachusetts) are “on the whole . . . less romantic” than the beginnings of Old Economy manufacturing centers like Motown (Detroit) or Iron City (Pittsburgh). He furthermore observes that “[i]n general the new high technology clusters were the product less of intrepid individuals than of visionary bureaucrats (if that is not an oxymoron).” A summary by Krugman of Silicon Valley’s evolution builds on similarly irrelevant (and to varying degrees, erroneous) descriptions:

Silicon Valley was created largely through the initiative of Fred Terman, the vice-president of Stanford University. Through his initiative the university provided an initial stake for Hewlett-Packard, which became the nucleus of the Valley. It also established the famous research park on university land, on which Hewlett-Packard, then many other firms, began operations. There was a noticeable cumulative process operating through the university itself: the revenues from the research park helped to finance Stanford’s ascent to world-class status in science and engineering, and the university’s rise helped make Silicon Valley an attractive place for high-tech business.⁸

Krugman’s observation of Silicon Valley and other clusters leads him to posit: “The important point is that the logic of localization remains similar. . . . small historical events start a cumulative process in which the presence of a large number of firms and workers acts as an incentive for still more firms and workers to congregate at a particular location.”⁹ It is a surprisingly limited observation, one whose reasoning is rooted in a sense of historical determinism. The only significance this type of

analysis can derive from a place like Silicon Valley is that the cluster simply manifests the inevitable; that the Siliconia of today are created by "cumulative processes" that begin randomly as "small events" or "accidents." Mention of "incentive" at least implies that some consideration is given to the role of human agency but individual efforts are relegated to a status beneath that of those mysterious, and totally unexamined, "cumulative processes" that "take over" a cluster's development. In general, the powers of choice and agency are either blithely ignored or deemed bizarre, which is why someone like Stanford's Fred Terman (whose strategies and management practices are absolutely key to understanding Silicon Valley's origins) is treated as an abnormality, an incongruously "visionary" bureaucrat.

The assumption that the success of a regional economy somehow results from happenstance is the greatest misconception made by this line of thinking. Attributing key characteristics of an economy to matters of chance utterly ignores the complexity of forces at play. After all, any propagative occurrence in life (starting with one's own birth) can be classified as "accidental." What matters is not the "accident" itself but *how growth and development is guided thereafter*. We should be alerted by the ease with which one can label crucial occurrences in the formation of a Siliconia location as resulting from random events that somehow unleash the regenerative mechanisms necessary to create a flourishing concentration of enterprise. Clusters do not manage themselves, they are managed.¹⁰ As the later pages of this book will detail, what is crucial to a cluster's development is not happenstance but rather how people respond to or, perhaps more accurately, create opportunities. Cambridge's cluster has surprising similarities to its Northern California counterpart: at the same time that Silicon Valley was gestating and growing, Cambridge had the benefits of its own visionary bureaucrat, a university-affiliated science park, a flourishing high-tech industrial base, a large pool of knowledge-workers (whose record of discovery and genuinely original innovations actually exceeded that of Silicon Valley's). The region was altogether massive in the drawing power that increasing returns theory claims would generate the kind of economic mass Silicon Valley has acquired. Yet Silicon Fen

never drew in as many firms and workers as Silicon Valley did. Europe's version of Silicon Valley has nothing like the economic weight built up by its American cousin and has evolved in an entirely dissimilar manner. Neither "small events" nor "accidents" explain the difference, but the nature and effectiveness of management that has divergently responded to opportunities for growth does. What is so extraordinary—and not merely "glitzy"—about these two locales of Siliconia is the multitude ways in which individuals have reacted to prevailing circumstances (which by no means have been always favorable) to build up the exceptionally creative but economically unlike environments that they have. Managerial thinking and behavior, not chance, lies at the heart of the phenomenon.¹¹

Networks or Individuals?

Like assumptions about the deterministic powers of history and its "cumulative processes," assumptions about the workings of Silicon Valley's fabled body of networks also subordinate the importance of human agency to the concept of a mysteriously operating external force. It is not hard to see why some variation of a network's *über alles* perspective frequently informs interpretations of Silicon Valley. The area's skilled workers tend to cultivate social and professional affiliations throughout the cluster. They usually have friends and acquaintances in a wide number of local companies and the turnover rate for employees at high-tech firms is high. Workers will recognize a competitor as not only being staffed by friends but view it as a potential future employer. These human linkages widen the scope of personal economic opportunities and support a live-and-let-live attitude amidst an environment otherwise characterized by cut-throat competition and high-charged capitalism. Enterprises of many different kinds are also often bound together, sometimes through strategic intent. For example, Silicon Valley's leading venture capital firm, Kleiner Perkins, tries to foster synergies between the companies it invests in according to a modified version of Japan's intensely interlocked *keiretsu*-style of corporate linkages. At a

more basic level, local companies will often simply elect to become intertwined because of advantages in integrating their supply chains. These aspects of work life in the Valley provide a strong sense that the cluster is a collection of virtual businesses that operate almost as if they were without boundaries between one another. The interlacing helps keep alive the feeling that there is more a unified Silicon Valley Inc. than a landscape of corporately separate firms and independently acting individuals.

It is important not to confuse the nature of causality in appreciating the role of networks, however. This book shows how networks—both of the human and technical kind—are a by-product of the innovative and entrepreneurial drives of individuals in Silicon Valley. The work that people in the cluster have done with the whole concept of networked interactivity, and in particular their contributions to building up Internet- and Web-based technologies and commerce, is exceptional and impressive. But just as the euphoria that surrounded Internet businesses exaggerated the value of e-commerce enterprises to ridiculous extremes (an aspect of the Silicon Valley dynamic that is explored in Chapter 4), so too has accepted wisdom on the powers of Silicon Valley's human- and industrial-based networks exaggerated their powers as well. The classic example of such thinking comes from the body of theories advanced by the University of California at Berkeley's AnnaLee Saxenian in her magnum opus, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*.¹²

A key premise of *Regional Advantage* is that "[i]n Silicon Valley, the region and its networks, rather than individual firms" function as "the locus of economic activity."¹³ According to this viewpoint, with "a network-based industrial system like that in Silicon Valley, the region—if not all the firms in the region—is organized to adapt continuously to fast-changing markets and technologies."¹⁴ The powers of this "industrial system" are said to be so great that the region is somehow capable of pursuing "multiple technical opportunities through spontaneous regroupings of skill, technology and capital."¹⁵ This truly amazing, if not utterly incredible, ability of Silicon Valley for spontaneously reconfigur-

ing its base of skills, technology, and capital allegedly confers a type of immortal omnipotence, making the local economy immune to such marketplace fundamentals as the turbulence created by product life cycles.¹⁶

In such ways and others, the *Regional Advantage* conceptualization of Silicon Valley suffers principally from its overstatements of the value and usages of networks. Networks can greatly aid the work of the innovative and the entrepreneurial but no evidence has ever surfaced that they have come to replace people or firms as the actual “locus of economic activity.” Nor does anything suggest that even sectors as tightly networked as those found in Silicon Valley have found ways to reorganize instantly and automatically their resources according to changing market conditions. One need go no further than the tech-sector-driven recession unleashed in 2000—the world’s real Y2K disaster—to see that the Valley is not so “protean,” as the book describes the cluster, as to be immune from suffering downturns in market cycles. Yet *Regional Advantage* concludes by admonishing managers in the private and public sectors hoping to emulate Silicon Valley’s success to abandon an “outdated conception of the firm.”¹⁷ The solution offered up is radical and (literally) ill-defined: a call for leaders to adopt a model of organization whereby companies are so tightly networked that their individual boundaries become simultaneously “turned inside out” and “blurred.”¹⁸ Taken as a whole, the body of concepts being advanced makes a profound assault on the competitive integrity and individualistic thinking that is key to innovative and entrepreneurially managed enterprise.¹⁹

These sorts of claims are cause for concern because they so heavily inform general thinking about Silicon Valley. *Regional Advantage* is required reading in business schools and university departments where regional economics and policy are studied. *Encyclopaedia Britannica* cites the book as one of only two recommended for reading on the subject of Silicon Valley. As with many of Krugman’s mass-market works, Saxenian’s *Regional Advantage* can even be found in airport bookstores, an indication that its wisdom spreads far beyond those with merely an