JOINT VENTURE
Silicon Valley

AN ECONOMY AT RISK
THE PHASE I DIAGNOSTIC REPORT

June, 1992

PREPARED BY:
CENTER FOR ECONOMIC COMPETITIVENESS, SRI INTERNATIONAL
MISSION STATEMENT

A landmark collaboration of leading economic interests in the Silicon Valley committed to developing a workable plan for regional economic growth and renewal. The objective of this unprecedented community-wide effort will be to construct a rational blueprint for the continued economic vitality of the Silicon Valley as it enters a new era of fierce global competition.

Joint Venture: Silicon Valley will achieve its objectives by seeking out the broadest possible range of insights and perspectives from organizations and individuals throughout the region.

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JOINT VENTURE: Silicon Valley

A Few Words About Joint Venture: Silicon Valley

From living rooms to board rooms, there is a widespread belief that something is fundamentally wrong with Silicon Valley’s economy.

While many now acknowledge that a problem exists, few agree on the nature of the problem. One view is that the current downturn is but another in a historic pattern of cycles in the local economy — and that a correction will occur naturally. The second position is that this recession is different, deep, permanent and too late to correct.

The third position — shared by Joint Venture: Silicon Valley — is that the Golden Age of global technology is only just beginning and that Silicon Valley can still lead the way, but only if we are willing to come together as a community and retool the engine that drives our regional economy.

Regardless of your view, as industries and markets globalize, it is clear Silicon Valley will face much stiffer competition from other regions around the world which also want to share in the explosive growth of high technology. Like these regions, we too must organize for success. Developing a collaborative advantage won’t be easy — but it is possible. That’s what Joint Venture: Silicon Valley is all about.

Joint Venture: Silicon Valley was envisioned as a collaborative initiative in two parts. Phase I was designed to provide a diagnostic frame of reference for the challenges we face. It combines pre-existing economic data, original research conducted for us by SRI International, over 100 interviews with CEOs and civic leaders, and a broad-scale community survey. Taken together, this data package raises some pretty disturbing questions about the trends affecting the future of our Valley.

In Phase II, government, education, community and industry leaders will come together to begin the process of solving problems too large for any one of these groups to solve alone. Phase II will provide a unique, structured approach to community problem solving in a fast-cycle regimen. With your help, we expect to complete Phase II in six months.

Finally, will there be critics to this effort? You bet. But, if the data, methodologies or assumptions can be criticized, we do not believe one can question either the intent or the urgency of this call to action.

Tom Hayes
Chairperson, Joint Venture: Silicon Valley
EXECUTIVE SUMMARY

- The Silicon Valley economy is at risk. While Valley enterprises are reengineering to become world competitive, the region's economic infrastructure is not keeping up with its enterprises.

- How Silicon Valley addresses this growing imbalance between Valley enterprises and its economic infrastructure will determine its future.

- Today, a number of significant warning signs indicate that the region is out of balance:
  - On the enterprise side, we see dramatic business restructuring, slower employment growth, a slowdown in new business formation, and support industries in decline.
  - On the economic infrastructure side, we see a slower growth in precompetitive R&D, a growing skills mismatch, declining venture capital, rising cost of regulations, high housing costs and a perceived decline in quality of life.

- Competitor regions—such as Austin, Phoenix, and Portland in the U.S. and Singapore abroad—have been taking aggressive action to organize for the future by addressing defects in their economic infrastructure and building on their strengths.

- Three possible futures illustrate the choices open to the Valley:
  - High-Tech Manhattan: A headquarters and administrative center with production elsewhere. In this future, companies profit while the community loses employment.
  - Virtual Valley: A node in a network economy with niche operations. In this future, companies gain global market share while the community loses value added.
  - American Technopolis: A dynamic community that supports technology enterprises and retains value added, employment, and wealth. Companies and the community both win.

- Joint Venture: Silicon Valley is an unprecedented effort by Valley enterprises to work together to address the challenges of the future. It will address the growing imbalance by redesigning key elements of the region's economic infrastructure to create a more competitive environment.

- This diagnosis identifies the key challenges that will be addressed by Joint Venture: Silicon Valley as leaders from Valley enterprises and the community begin to work together to identify specific steps to build a balanced economy.

- By doing so, Silicon Valley can once again lead the way toward a next-generation economy. Silicon Valley can reinvent itself and create a new economic model for the twenty-first century.
# TABLE OF CONTENTS

**EXECUTIVE SUMMARY** ........................................................................................................... 1

I. **AN ECONOMY AT RISK** .................................................................................................... 1
   Silicon Valley’s Challenge .................................................................................................. 3
   Warning Signs .................................................................................................................. 5
   Creating a Next-Generation Economy ........................................................................... 5

II. **WHAT MAKES A REGIONAL GLOBAL ECONOMY COMPETITIVE?** ................. 7
    Success Factors Are Critical for Competitive Economies .............................................. 9
    Competitive Economies Create a Vital Cycle ................................................................. 10
    When the Vital Cycle Doesn’t Work, Regions Lose ...................................................... 11

III. **SILICON VALLEY IN THE PAST: A REGION IN BALANCE** ....................................... 13
    1950s: Valley Days ......................................................................................................... 15
    1960s: Launching the Revolution ................................................................................. 15
    1970s: Beyond the Garage ............................................................................................. 16
    1980s: Field of Dreams .................................................................................................. 17

IV. **SILICON VALLEY TODAY: WARNING SIGNS** ............................................................... 21
    Introduction ..................................................................................................................... 23
    Enterprise Warning Signs ............................................................................................... 23
       Warning Sign 1: Valley’s Portfolio of Industries Is Changing ...................................... 23
       Warning Sign 2: Slower Employment Growth .............................................................. 26
       Warning Sign 3: Silicon Valley Is no Longer an Economic Island ............................... 26
       Warning Sign 4: Supporting Industries Are Hurting .................................................. 27
       Warning Sign 5: Major Restructuring ......................................................................... 27
       Warning Sign 6: Birth and Growth of Companies May Be at Risk ............................. 29
       Warning Sign 7: Loss of Confidence? ......................................................................... 30
       Warning Sign 8: Culture of Blame .............................................................................. 32
    Economic Infrastructure Warning Signs ........................................................................ 32
       Warning Sign 1: Declining Technology Advantage ................................................... 33
          Discovery .................................................................................................................. 33
          Development ........................................................................................................... 33
       Warning Sign 2: Declining Human Resource Advantage .......................................... 34
          Preparation .............................................................................................................. 35
          Advancement .......................................................................................................... 35
          Renewal .................................................................................................................... 36
       Warning Sign 3: Declining Finance Advantage ......................................................... 37
          Initiation .................................................................................................................. 37
          Expansion ................................................................................................................ 37
          Restructuring .......................................................................................................... 38
CONTENTS (continued)

Warning Sign 4: Limited Physical Infrastructure ............................................. 38
Facilities ........................................................................................................... 39
Transportation ................................................................................................. 39
Communications .............................................................................................. 40

Warning Sign 5: Regulatory Constraints .......................................................... 40
Growth Policy .................................................................................................... 41
Permitting Systems ............................................................................................ 42
Environmental Systems ..................................................................................... 42
Tax Assessment .................................................................................................. 43

Warning Sign 6: Quality-of-Life Decline .......................................................... 43
Affordable Housing ........................................................................................... 44
Health and Social Services ................................................................................. 45
Culture, Recreation, and Corporate Citizenship .................................................. 46

The Beginning of Action in Silicon Valley ......................................................... 47

V. BENCHMARKING THE VALLEY ...................................................................... 49
How Silicon Valley Compares ............................................................................ 51
Benchmarking Regional Enterprise ..................................................................... 52
Benchmarking Regional Economic Infrastructure .................................................. 53
Challenge to Valley ............................................................................................ 55

VI. POSSIBLE FUTURES FOR SILICON VALLEY ............................................. 57
A Time for Choice ................................................................................................ 59
Scenario Assumptions ........................................................................................ 59
High-Tech Manhattan ......................................................................................... 60
Enterprise Dynamic ........................................................................................... 60
Infrastructure Dynamic ....................................................................................... 60
High-Tech Manhattan Scorecard: Win-Lose ......................................................... 61
Virtual Valley ...................................................................................................... 62
Enterprise Dynamic ........................................................................................... 62
Infrastructure Dynamic ....................................................................................... 63
Virtual Valley Scorecard: Win-Draw ................................................................. 63

American Technopolis ....................................................................................... 64
Enterprise Dynamic ........................................................................................... 64
Infrastructure Dynamic ....................................................................................... 65
American Technopolis Scorecard: Win-Win ......................................................... 66

VII. THE CHALLENGE: JOINT VENTURE: SILICON VALLEY ......................... 67
# TABLE OF CONTENTS

**EXECUTIVE SUMMARY** ............................................................................................................. i

**I. AN ECONOMY AT RISK** ........................................................................................................ 1
   - Silicon Valley’s Challenge ................................................................................................. 3
   - Warning Signs .................................................................................................................. 5
   - Creating a Next-Generation Economy ............................................................................. 5

**II. WHAT MAKES A REGIONAL GLOBAL ECONOMY COMPETITIVE?** .................. 7
   - Success Factors Are Critical for Competitive Economies ............................................. 9
   - Competitive Economies Create a Vital Cycle ............................................................... 10
   - When the Vital Cycle Doesn’t Work, Regions Lose ...................................................... 11

**III. SILICON VALLEY IN THE PAST: A REGION IN BALANCE** ................................. 13
   - 1950s: Valley Days ........................................................................................................ 15
   - 1960s: Launching the Revolution ................................................................................ 15
   - 1970s: Beyond the Garage ............................................................................................ 16
   - 1980s: Field of Dreams ................................................................................................. 17

**IV. SILICON VALLEY TODAY: WARNING SIGNS** .......................................................... 21
   - Introduction ..................................................................................................................... 23
   - Enterprise Warning Signs ............................................................................................. 23
      
   - Warning Sign 1: Valley’s Portfolio of Industries Is Changing ....................................... 23
   - Warning Sign 2: Slower Employment Growth ............................................................... 26
   - Warning Sign 3: Silicon Valley Is no Longer an Economic Island ................................ 26
   - Warning Sign 4: Supporting Industries Are Hurting ................................................... 27
   - Warning Sign 5: Major Restructuring .......................................................................... 27
   - Warning Sign 6: Birth and Growth of Companies May Be at Risk ............................... 29
   - Warning Sign 7: Loss of Confidence? ........................................................................... 30
   - Warning Sign 8: Culture of Blame ............................................................................... 32

   - Economic Infrastructure Warning Signs ...................................................................... 32
      
   - Warning Sign 1: Declining Technology Advantage ...................................................... 33
      - Discovery ................................................................................................................... 33
      - Development ............................................................................................................ 33

   - Warning Sign 2: Declining Human Resource Advantage ........................................... 34
      - Preparation .............................................................................................................. 35
      - Advancement ......................................................................................................... 35
      - Renewal .................................................................................................................. 36

   - Warning Sign 3: Declining Finance Advantage ............................................................ 37
      - Initiation .................................................................................................................. 37
      - Expansion .............................................................................................................. 37
      - Restructuring ........................................................................................................ 38
CONTENTS (continued)

Warning Sign 4: Limited Physical Infrastructure .............................................. 38
   Facilities ................................................................. 39
   Transportation ......................................................... 39
   Communications ....................................................... 40

Warning Sign 5: Regulatory Constraints ......................................................... 40
   Growth Policy ........................................................... 41
   Permitting Systems .................................................... 42
   Environmental Systems ............................................... 42
   Tax Assessment ......................................................... 43

Warning Sign 6: Quality-of-Life Decline ......................................................... 43
   Affordable Housing .................................................... 44
   Health and Social Services .......................................... 45
   Culture, Recreation, and Corporate Citizenship ...................... 46

The Beginning of Action in Silicon Valley ..................................................... 47

V. BENCHMARKING THE VALLEY ......................................................................... 49

   How Silicon Valley Compares ............................................. 51
   Benchmarking Regional Enterprise ....................................... 52
   Benchmarking Regional Economic Infrastructure ................... 53
   Challenge to Valley ......................................................... 55

VI. POSSIBLE FUTURES FOR SILICON VALLEY ............................................. 57

   A Time for Choice ......................................................... 59
   Scenario Assumptions .................................................... 59
   High-Tech Manhattan ....................................................... 60
      Enterprise Dynamic .................................................... 60
      Infrastructure Dynamic ................................................ 60
      High-Tech Manhattan Scorecard: Win-Lose ......................... 61

   Virtual Valley .............................................................. 62
      Enterprise Dynamic .................................................... 62
      Infrastructure Dynamic ................................................ 63
      Virtual Valley Scorecard: Win-Draw ............................... 63

   American Technopolis ..................................................... 64
      Enterprise Dynamic .................................................... 64
      Infrastructure Dynamic ................................................ 65
      American Technopolis Scorecard: Win-Win ......................... 66

VII. THE CHALLENGE: JOINT VENTURE: SILICON VALLEY ........................... 67
CONTENTS (concluded)

APPENDIX A: SILICON VALLEY COMMUNITY SURVEY SUMMARY .................. 71
  Objective ............................................................................. 73
  Methodology ........................................................................ 73
  Findings ............................................................................... 74
    Defining the Region ......................................................... 74
    Likes and Dislikes of the Region ........................................ 74
    Perceptions of the Job Market .......................................... 74
    Levels of Satisfaction ....................................................... 74
    Comparing the Present with the Future .............................. 75
    Traditional Patterns in Some Respects ............................... 75
    Questions about the Private Sector's Commitment ............... 75
    Trade-Offs for a Better Life .............................................. 75

APPENDIX B: PHASE I METHOD ................................................. 77
  Working Group ................................................................... 79
  Advisory Board ................................................................... 79
  Economic Development Directors Working Group ............... 79
  Leadership Interviews ....................................................... 79
  Community Survey ............................................................ 80
  Economic Analysis ............................................................ 80
  Economic Infrastructure Analysis ....................................... 80
  Benchmarking .................................................................... 81
  Challenge Scenarios ......................................................... 81
  Presentation and Report ..................................................... 81

APPENDIX C: REFERENCES ....................................................... 83

ACKNOWLEDGMENTS .......................................................... 87
I. AN ECONOMY AT RISK
Silicon Valley's Challenge

The 1990s will be a decade of opportunity for globally competitive regions. In the past, Silicon Valley set the pace as the world's leading technology region. Will Silicon Valley gain a growing share of the world's technology market in the future? Is Silicon Valley prepared to meet the challenge?

While Valley companies are restructuring to become world competitive, the region's economic infrastructure is not keeping up with the dramatic changes. Signs indicate that Valley enterprise and economic infrastructure are becoming increasingly out of balance. The result is lost investment and slower job growth in the Valley, with future negative consequences for companies and the region. In short, the Silicon Valley economy is at risk.

A competitive regional economy has dynamic clusters of enterprises that create quality jobs based in a supportive economic infrastructure. On the enterprise side, global competition is forcing Valley enterprises to reengineer operations to achieve dramatic productivity gains, promote quality, and shorten time to market. Silicon Valley has achieved major increases in productivity and in the process has been downsizing employment, outsourcing work, and moving manufacturing out of the region. The drivers are a demand for higher quality and flexibility through increasing customization of products and services and a search for lower cost. Silicon Valley is reengineering away from its focus on manufacturing toward value-added development, design, engineering, and services.

The situation is more unstable on the economic infrastructure side. The key elements of supportive economic infrastructure are:

- Accessible technology
- Skilled work force
- Available risk capital
- Advanced physical infrastructure
- Pro-competitive regulatory climate and high quality of life.

A positive, vital cycle develops when clusters and economic infrastructure become mutually supportive: technology, skills, and capital sustain enterprise development; enterprises generate quality jobs and wealth that support future development of economic infrastructure.

Although the dynamic growth of Silicon Valley was based on a vital cycle from the 1950s to the early 1980s, something happened during the 1980s that suggests the breakdown of this vital cycle. As globalization pushed companies to restructure in dramatic ways to compete, the community lagged and the economic environment suffered. In some ways, the community turned hostile to further economic development as it erected a series of increasingly difficult barriers in regulations, housing, transportation, and education.
Today, the Silicon Valley is a region that is extending beyond its original home in Santa Clara County. It is a dynamic region that is both geographically growing and organizationally changing. The consensus seems to be that the Silicon Valley now encompasses not only Santa Clara County but also South Alameda, East Santa Cruz, and South San Mateo Counties. This initiative recognizes this geographic dynamic (see Figure I-1).

**Silicon Valley**

*FIGURE I-1 SILICON VALLEY MAP*
Warning Signs

Now a number of significant warning signs indicate a region out of balance. These include slower employment growth, weaker enterprise formation, a decline in venture capital financing, slow growth in pre-competitive R&D, a growing skills mismatch, rising cost of regulations, high housing costs, transportation congestion, and a perceived decline in quality of life. Survey results suggest that Valley residents see fewer opportunities, and a significant percentage are looking outside the Valley for work.

While Silicon Valley has begun to face problems with its economic infrastructure, competitor regions have not been standing still. American regions such as Austin, Phoenix, and Portland and international regions such as Singapore have been taking aggressive action to organize for the future, address defects in their economic infrastructure, and build on their strengths. Silicon Valley must organize its economic assets to compete both domestically and internationally.

_How Silicon Valley addresses the growing imbalance between Valley enterprise and the region’s economic infrastructure will determine its future._ If present trends continue, Silicon Valley could become a High-Tech Manhattan—a headquarters and administrative center with production elsewhere—or a Virtual Valley—a node in a network economy with niche-focused operation. Under both scenarios, companies win profit and market share (to different degrees), and the community loses employment and wealth. Eventually, however, companies will suffer from a declining economic environment.

Silicon Valley can create a positive future for both companies and the region. If Silicon Valley organizes an effective “joint venture” and takes responsibility for shaping is future, it can create an American Technopolis—a dynamic community that supports technology enterprises and retains value added, employment, and wealth.

Creating a Next-Generation Economy

_Joint Venture: Silicon Valley will address the growing imbalance by redesigning key elements of the economic infrastructure to create a more competitive environment._ This diagnosis identifies key warning signs that point toward a Valley economy at risk and suggest possible futures for the Valley. A second phase will identify specific steps that can be taken by both the pri-
vate and the public sector to build a competitive economic environment that will bring the Valley and the region into balance.

Once again Silicon Valley must lead the way toward a next-generation economy. No technology region has been as successful as the Valley. The challenges of today can be met by an innovative public-private effort that redesigns economic infrastructure to meet the rapidly changing needs of world-class enterprises. Succeeding in this venture will create greater wealth and opportunity for Silicon Valley. It will show the world that the leading technology region can reinvent itself and create the new economic model for the twenty-first century.
II. WHAT MAKES A REGIONAL GLOBAL ECONOMY COMPETITIVE?
The key issue facing Silicon Valley is how to create and maintain competitive advantage in a global economy. Lessons from other regions and the history of Silicon Valley suggest what the critical success factors are for competitive regions.

**Success Factors Are Critical for Competitive Economies**

*Competitive regions have dynamic clusters of enterprises based on supportive economic infrastructure.* At the core of economic clusters are geographic concentrations of interdependent, internationally competitive firms in related industries. Each cluster includes export-oriented firms—those selling primarily outside the region—as well as supporting or linkage firms that provide components, support services, and raw materials (see Figure II-1).

**FIGURE II-1 ELEMENTS OF CLUSTER-DRIVEN ECONOMIC DEVELOPMENT**
Supporting economic clusters is an economic infrastructure specialized in technology, human resources, finance, physical infrastructure, and regulatory environment. Economic infrastructure is provided by both the public sector (e.g., universities, airports) and by some of the companies within the cluster (e.g., venture capital firms, engineering firms).

Economic infrastructure must evolve to meet the changing needs of enterprise clusters. In the past, low-cost labor, basic physical infrastructure, and low taxes were enough to sustain a business climate. As the needs of enterprise clusters have changed, the building blocks of a successful regional economy have changed.

The critical elements of economic infrastructure are:

- Accessible technology
- Skilled work force
- Available capital
- Advanced physical infrastructure
- Pro-competitive regulatory climate
- High quality of life.

A salient feature of economic clusters is that they are self-regenerating; their elements are mutually supporting. Close competition and cooperation spur innovation across industries, often spawning the development of entirely new companies and industries. Personal contacts between companies facilitate the free flow of information and rapid diffusion of innovations, giving cluster enterprises an advantage when competing in global markets. As they grow, economic clusters create their own demand for suppliers to their industries and can attract buyers and partners of local companies.

Cluster companies draw on specialized economic infrastructure, placing demands on them to provide better services: more advanced telecommunication links, higher high school graduation rates, more graduates in special fields. At the same time, companies improve the region’s economic foundations by recruiting and training workers or by developing special facilities. Better economic infrastructure and a growing concentration of related companies increase the attractiveness of the area to outside companies, the potential for spin-offs, and opportunities for expansion of existing companies.

**Competitive Economies Create a Vital Cycle**

Successful regions develop a vital cycle in which clusters of enterprise and economic infrastructure are mutually supportive. When a vital cycle works, competitive enterprises attract investment to the region and incubate new enterprises to generate quality jobs, rising income, and growing tax revenue that support economic foundations. Strong economic infrastructure
attracts technology, human resources, and capital to the region and provides quality workers, financial resources, and ideas for enterprises in the clusters. The mutually reinforcing nature of the vital cycle creates wealth and opportunity for enterprises and people. Figure II-2 provides a description of how the vital cycle works in a competitive region.

![Diagram of the Vital Cycle](image)

**FIGURE II-2 WHEN THE VITAL CYCLE WORKS...**

When the Vital Cycle Doesn’t Work, Regions Lose

The vital cycle can break down at any stage because of external forces or internal changes that throw enterprises and communities out of balance. In this process, the vital cycle can become a vicious cycle, with each link in the chain causing a further breakdown in the economy.

In a vicious cycle, enterprises either move or invest outside the region. Jobs, income, and tax revenue decline. The investment in economic infrastructure suffers. The economic infrastruc-
ture no longer is able to provide adequate workers and capital resources; brain drain occurs, and enterprise formation is limited.

Figure II-3 illustrates what happens when the vital cycle does not work.

The critical point raised by these examples is that although Silicon Valley exhibited the qualities of a vital cycle in the past, troubling signs now indicate that the vital cycle may be breaking down. The mutual support between enterprises and the economic infrastructure is no longer as strong. Investments, jobs, and tax revenue to support infrastructure are slowing down. Although Silicon Valley has not reached the stage of a vicious cycle (as is evident in New York and South-Central Los Angeles), it is no longer showing the strong qualities of the vital cycle of the 1950s–1970s.
III. SILICON VALLEY IN THE PAST: A REGION IN BALANCE
The Silicon Valley has a unique history. The region drew in special resources that became part of the economy and the platform for a "foundry of innovation." The relationship between Valley enterprise and economic infrastructure has evolved substantially over the past 40 years. Each period enabled new changes in the economy (see Table III-1).

Table III-1

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<td>External drivers</td>
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<td>Garage-era pioneers</td>
<td>Space-age</td>
<td>Cowboy entrepreneurs</td>
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<td>Community</td>
<td>Stanford</td>
<td>Education era</td>
<td>Development boom—skills synergy</td>
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1950s: Valley Days

During the 1950s, the region benefited from postwar westward migration of skills and ideas. A number of enterprising engineers became the first generation of garage-era pioneers founding Shockley Transistor and growing Hewlett-Packard. Innovation was shifting from tubes to transistors.

The community was still known as the Valley of Heart's Desire, but the tide was about to turn from agriculture and food processing to instruments and components. Growth in the 1950s went from 10,000 in manufacturing to almost 50,000 by decade's end. Services and trade were larger than manufacturing.

Although 75% of technology firms were located in regions such as Los Angeles, New York, New Jersey, and Pennsylvania, many of these tube-based companies were near the end of their technological dominance. Professor Terman's graduates and later Stanford University's industrial park (1954) were about to change the course of the Valley forever.

1960s: Launching the Revolution

By the early 1960s, the economy was evolving into its second incarnation. With the growth of defense and aerospace programs, enterprise formation levels built up over the decade. Technology shifted from transistors to integrated circuits, and the mainframe computer hit the scene in full force. This was the era of space-age innovators and spin-offs.
The Valley gained parity with other regions that had concentrations of electronics industry. Defense and aerospace industry accounted for 25% of high-tech employment, and defense procurements accounted for 55% of chip sales in the region.

The Valley grew in manufacturing employment from 50,000 to 100,000, with proportionally large growth in services and trade.

The boom in the expanding sectors served as a magnet for more skills, making the region more attractive as a location for business development. The University of California, California State Universities, and the community college system all grew or were born in the middle of the 1960s. New venture capital firms were attracted to the Valley. Stanford Industrial Park filled, and the North-South Valley axis expanded with tilt-up concrete facilities. Annexation mania was driven by San Jose's city manager. Affordable housing and apartments boomed.

1970s: Beyond the Garage

The 1970s tumbled into existence with a peak of new enterprise formation. Fairchild had spun out Intel. Apple was conceived in a suburban living room. Only 42 computer companies existed, with an average total of 122 employees. Driving technology moved from integrated circuits to very large-scale integrated circuits (VLSIC); mainframes were suddenly watching the growth of microcomputers. The entrepreneurial style was risk oriented. Individuals would quit their jobs and “bet the farm” with their breadboard product planning. This generation of cowboy entrepreneurs was the second generation of the Valley’s crop of business.

Employment growth accelerated, bringing manufacturing jobs from 100,000 to more than 220,000. Large jumps also occurred in services and trade.

During this period, R&D was rising in local universities, and talent was spinning off business into the local economy. Venture capital firms increased from 28 to 56 on the West Coast, mostly in this region.

This era was characterized by a dramatic upsurge in competition by the Japanese, while newly industrialized countries, such as Singapore and Malaysia, became sites for manufacturing. At home, growth continued in defense spending in the Valley, but more and more on the research side. Value of military contracts as a percentage of total shipments declined from 45% to 15% in this decade.

During the late 1970s, inflation shook the Valley. Home prices soared from $40,000 to $100,000 in a matter of months. The Valley mood began to change to one of impatience.
1980s: Field of Dreams

The 1980s witnessed the formation of the third and fourth generation of Silicon Valley enterprises—Silicon Graphics, Solectron, MassPar, Chips and Technologies—and the first generation of biotechnology companies—Genentech, Cetus. The region’s driving technology shifted from VLSIC toward higher-performance components and application-specific integrated circuits (ASICs), higher-performance computers (workstations), and new communications systems (local area networks). Defense investment in some companies, particularly through the Defense Advanced Research Projects Agency (DARPA) helped seed new software and hardware developments.

This was a time in which manufacturing growth peaked at almost 250,000 jobs, with a similar-size service sector.

During the 1980s, corporate R&D levels grew slowly. Bay Area universities increased their research levels from $289 million in 1980 to about $700 million by 1990. As resources became more constrained on both sides, universities and companies started looking for new ways to work with each other. Stanford developed the Center for Integrated Systems and its Biotechnology Center; San Jose State’s School of Engineering developed an aggressive program of laboratory development and industry relations.

This was the era in which venture capital peaked. Money for new enterprises was more widely available, and the priorities of many entrepreneurs shifted toward getting in and out of deals fast. The payoffs from venture capital investments become apparent with the initial public offering of Genentech in 1981. This payoff incited a growth of venture-capital-backed companies. More than 40 venture capital companies located in the Bay Area. The region attracted more than 25% of all venture placements. This environment began to change after the passage of the Tax Act of 1986. Many investment instruments, such as research and development limited partnerships, were eliminated. The attraction of commercial real estate projects declined. The end of the 1980s witnessed a shift in investment to a more conservative and focused set of priorities.

The 1980s was a decade that started with the peak of inflation in 1980 (18%), followed by the recession of 1981. Foreign direct investment accelerated in the region, reaching $1.8 billion (up 765% from 1977). Employment by foreign-owned firms grew to 21,128, or 10% of the manufacturing work force (a 116% increase from 1977). Strategic alliances and partnerships significantly increased as a means of enhancing competitiveness in global markets for Valley companies.
By mid-decade, economic restructuring had started. Many Valley companies had been hard hit by competition from overseas companies. As they adapted, companies moved the majority of their commodity production to low-cost sites close to the Silicon Valley, such as Roseville or Portland, or to Southeast Asia.

The region became increasingly filled with conflicts. Community groups identified toxic-waste hazards posed by what were thought to be “clean” high-tech industries. Resolution of those issues was expensive for all sides. Growth priorities of communities ceased to be the same as those of developers. Transportation and housing problems became a high priority for businesses. The Santa Clara County Manufacturing Group worked with local governments to improve light rail and highways. The region’s overall economic infrastructure swung from being a highly supportive asset for the region’s economic engine to being a mixed blessing with uncertain prospects. The stage for the 1990s was set.

A graphic depiction of the 1950s–1980s (see Table III-2 and Figure III-1) captures the essence of how the region’s economic infrastructure and economy performed.

Table III-2

<table>
<thead>
<tr>
<th>Factor</th>
<th>1950s</th>
<th>1960s</th>
<th>1970s</th>
<th>1980s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>Poor</td>
<td>Fair</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Human resources</td>
<td>Fair</td>
<td>Good</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>Finance</td>
<td>Poor</td>
<td>Poor</td>
<td>Fair</td>
<td>Good</td>
</tr>
<tr>
<td>Physical infrastructure</td>
<td>Poor</td>
<td>Fair</td>
<td>Fair</td>
<td>Poor</td>
</tr>
<tr>
<td>Quality of life</td>
<td>Poor</td>
<td>Fair</td>
<td>Poor</td>
<td>Poor</td>
</tr>
</tbody>
</table>
Source: Center for the Continuing Study of the California Economy

FIGURE III-1 ENTERPRISE REPORT CARD
EMPLOYMENT GROWTH 1950–1990
IV. SILICON VALLEY TODAY: WARNING SIGNS
Introduction

The challenges of the 1990s are a legacy of the 1980s. Unconstrained growth has taken its toll. For the first time, Silicon Valley is considering the possibility that the current downturn is not cyclical.

Enterprise Warning Signs

As enterprises transform and the community struggles to keep up with the pace of change, the Silicon Valley vital cycle is showing signs of this breakdown. Evidence is revealed through a broad set of indicators. The first set of indicators focuses on the changing nature of the enterprise portion of the vital cycle. The second set details the development of the economic infrastructure.

Warning Sign 1: Valley’s Portfolio of Industries Is Changing

The leading industries in Silicon Valley are shifting. Industrial clusters are evolving as part of an effort to gain and maintain global leadership. A comparison of 1984 and 1991 highlights the direction of the transformation.

In 1984, the Silicon Valley economy was dominated by employment in two industries: computers and electronic components (see Figures IV-1 and IV-2). The electronic components industry was the leading employer at more than 85,000. Within the cluster, 44,000 people were employed in the manufacturing of semiconductor chips. The computer industry ranked a close second, employing more than 62,800 people. In the computer cluster, 95.7% of the employment was in the manufacturing of computers. Other key industries included communications, instruments, an emerging information cluster (data processing and software engineering), and a nascent drugs/biomedical sector. Business services were strong because they supported all the vibrant clusters.

By 1991, the seeds of change became manifest. Employment in electronic components and in communication equipment had dropped by more than 20%; employment in chips decreased by less than 10%. With about 50% of its employment in storage devices and peripherals, the computer cluster was no longer dominated by the production of computers. Instruments remained steady, while the information cluster doubled in size. Biomedical/drugs remained small while it grew steadily. Again the business services sector grew to support the enterprises.

Combining these trends with data on the composition of current venture capital (Figure IV-3) suggests the following:

- We are no longer a hardware-driven economy.
- We are becoming application/software driven.
- The next emerging cluster is biotechnology.
FIGURE IV-1 1984 INDUSTRIAL CLUSTERS

Sources: Center for the Continuing Study of the California Economy, U.S. Department of Commerce, County Business Patterns

FIGURE IV-2 1991 INDUSTRIAL CLUSTERS

Sources: Center for the Continuing Study of the California Economy, Employment Development Department
Whereas surveyed community members view the Valley as a place of innovation (30%) and believe the best employment opportunities are in computers and electronics (50%), only 17% viewed medicine and biomedical enterprise as a source of opportunity (see Exhibit IV-1).

EXHIBIT IV-1

PEOPLE RECOGNIZE VALLEY'S UNIQUE ECONOMIC SYNERGY

- Which of these terms best describes this area?
  - 30% a place of innovation
  - 23% an economy
  - 10% a state of mind
  - 11% a collection of cities
  - 8% a culture
- Where are the best employment opportunities?
  - 50% computers and electronics
  - 21% public sector
  - 19% sales and services
  - 17% medicine and biomedical
  - 14% law
- Which of these products contributes most to the area economy?
  - 35% research
  - 17% manufacturing
  - 16% engineering
  - 21% sales

ARE THESE BELIEFS ON TARGET? IS THE REALITY OF THE VALLEY DIFFERENT?
They view the economy as one in which research plays a strong role: 35% saw research contributing the most to the economy, 17% manufacturing, 16% engineering.

Are these views aligned with the directions in which the economy is moving?

*Silicon Valley must think seriously about how to support this next economy, with its emerging clusters, so it may carry on the tradition of global leadership.*

**Warning Sign 2: Slower Employment Growth**

From 1972 to 1984, Silicon Valley total employment grew at an average of 7% per year; its employment in manufacturing grew at more than 10% (see Figure IV-4). At the same time, the U.S. grew at 2.2% per year and the rest of the Bay Area (not including Silicon Valley) grew at 2.8% per year. From 1984 to 1991, as growth slowed, the numbers reversed themselves. The U.S. grew at an average of 1.9% per year; the Bay Area at 2%. Meanwhile employment in Silicon Valley inched along at 0.7% a year, and manufacturing lost jobs at approximately the same rate: a 0.7% decline per year. *These are all indications that the Silicon Valley economy is shifting and not experiencing a temporary phenomenon.*

![Figure IV-4: Annual Percent Change in Employment in Silicon Valley Compared to Bay Area and U.S.](image)

**Warning Sign 3: Silicon Valley Is no Longer an Economic Island**

Once, Silicon Valley was insulated from national recessions. Now it is hit hard. As the focus of Valley products shifts more to end markets and niched applications, this dependent trend promises to continue (see Figure IV-5). During the 1974 U.S. recession, the Valley hardly felt a tremor. The suffering during the 1981 recession was on par with that of the nation. In 1991, Silicon Valley was affected worse. *The community of Silicon Valley can no longer afford to take the stance: “It can’t happen here.”*
Warning Sign 4: Supporting Industries Are Hurting

The slowdown and fundamental transformation that major industries are experiencing in the Valley are having a ripple effect on supporting industries. Currently a 14% vacancy exists in office space. Construction unemployment is inching upward of 30%. Local bankruptcies are at unprecedented levels: 8003 in 1991 compared to 5826 in 1989. Because supporting enterprises are local in nature, they are held captive by the fluctuations and trends of driving industrial clusters.

Warning Sign 5: Major Restructuring

An overriding factor in shaping the nature of Silicon Valley has been the shift from an accidental manufacturing empire to a more balanced, mature economy. In 1972 manufacturing
accounted for 32.1% of the Valley's employment, in 1982 it peaked at 38.2%, while in 1991 it had slid down to 31.6%. Simultaneously, services has increased from 20.2% to 22.1% to 26.9% respectively (see Figure IV-6). This shift away from manufacturing in the Valley is the result of high costs driving companies to look elsewhere in conjunction with attractive incentives being offered both domestic and globally. As more companies become truly global, this trend will also continue as the need for higher domestic content rises. The net loss of this adjustment has been more than 30,000 jobs in the last few years. Production workers composed 37.9% of manufacturing employment in 1987 as compared to 49.1% in 1977 (see Table IV-1).

![Graph showing percentage of employment for service and manufacturing over years](image)

**Source:** Center for the Continuing Study of the California Economy, Employment Development Department

**FIGURE IV-6 SERVICE VERSUS MANUFACTURING**

**Table IV-1**

Production Workers as a Percent Manufacturing Employment

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
<td>49.1 %</td>
</tr>
<tr>
<td>1982</td>
<td>43.6 %</td>
</tr>
<tr>
<td>1987</td>
<td>37.9 %</td>
</tr>
</tbody>
</table>

**Sources:** U.S. Department of Commerce, Census of Manufacturing
Concurrently, the nature of manufacturing in the Valley has moved to higher and higher valued added (as a percent of shipments) (see Table IV-2). In 1987 value added was 65.1% of shipments in manufacturing. This suggests that the manufacturing that remain in Silicon Valley requires a highly skilled, knowledge-based worker. *Is the Valley prepared to offer the educational resources and necessary support to foster the creation and maintenance of such a work force?*

<table>
<thead>
<tr>
<th>Table IV-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Added as a Percent of Shipments in Manufacturing</td>
</tr>
<tr>
<td>Silicon Valley</td>
</tr>
<tr>
<td>National</td>
</tr>
</tbody>
</table>

Sources: U.S. Department of Commerce, Census of Manufacturing

Corporate America, led by a few of Silicon Valley's companies, is in the process of reinventing itself. Global competition and stakeholder discontent have led to a wrenching self-evaluation. The result has been consolidation with an increase in productivity. *How is the Valley preparing itself for the next wave? What support is needed for increases in newly unemployed?*

**Warning Sign 6: Birth and Growth of Companies May Be at Risk**

Perhaps the biggest concern in Silicon Valley is that its ability to birth and grow new companies is in danger. Silicon Valley is known worldwide for its entrepreneurial culture (see Exhibit IV-2). For the Valley to keep evolving into new arenas, this quality must be maintained. Data show that net establishment growth is waning (see Figure IV-7 and Exhibit IV-2). From 1982 to 1984 there were 5,618 new establishments. From 1986 to 1988 there were only 1,384. Equally important, companies must be encouraged to mature naturally through their life cycle. This would give the Valley a balanced portfolio of companies in terms of age and size. The future outcomes of the Valley would not be inextricably linked to the successes and failures of the "big" companies. Several factors that legitimize the need for concern are:

- Increased difficulty in obtaining venture capital
- Increased bankruptcies
- More start-ups planning to be bought out by large companies rather than growing the enterprise
- Increases in intrapreneuring in large corporations.

*How can the Valley continue to incubate new companies and foster growth of small companies?*
Warning Sign 7: Loss of Confidence?

The region has experienced a significant change in mood. Unemployment is now at 6.4%, compared to 3.9% in 1988. This number may underestimate the actual number of workers now outside the work force—such as the self-employed or those discouraged from seeking work. The unemployed are 25% technical, professional, managerial and 25% are production workers. The ethnic impacts are fairly evenly distributed across whites and Hispanics.

People in the region may be losing confidence in the future. They do not view industry as committed to remaining in the region. 41% said “somewhat” and 32% said “not much.” Equally troubling is that 47% see fewer opportunities than five years ago, and 39% see fewer opportunities in the next five years. 20% of those 18 to 30, and 17% of those 30 to 45 years old have looked for work outside the region in the past 12 months. When asked if they would live here if they could start over again, 36% said no.

These findings suggest the restructuring of the region is reaching all levels of Valley professionals. Does this trend foreshadow greater difficulty for the Valley?
EXHIBIT IV-2

SILICON VALLEY TODAY—A REGION IN TRANSFORMATION

“We’re committed to a company here, but in a different form. Things will shift.”

“Over the next five years, I will cut employment by 40% and increase productivity 10 fold.”

“You will see more and more chip companies with no FABS.”

“Contract manufacturers will grow because no one can afford to change their production lines as often as their products do.”

“Rapid cycle time will result in retaining production here to high-value-added products. Fast response requires proximity.”

“The region is ceasing to be a manufacturing region. Nor is it important to be a manufacturing region. All the factors that would make it attractive are expensive.”

“Manufacturing has changed....Fewer people needed. Everything is built to specification. There is no inventory.”

“What is wonderful and powerful in the valley is the energy of people and freedom of thought. You just do not find this elsewhere. A wonderful breeding ground. People think better than they can elsewhere.”

“When people spend 2+ hours a day in car, you lose that informal human interaction that fosters creativity.”

“You go to a local restaurant—Late for the Train, Il Fornaio—you meet people in your own business....You go to a party you meet someone else with an idea.”

“Innovation in waste treatment is vital to the biotechnology/industry if it is to remain here. Cities must explore alternatives...get 10 companies to work together on it.”

“If we stop taking risks, this will screw up the valley faster than anything.”

30% of the community says: Silicon Valley is a place of innovation.

“There is a feeling that it is harder today. You need more capital. Venture capital is more selective. It takes longer today than five years ago.”

“People who were engineers are now executives who forget what it was like and make the environment harder for the next generation.”

“We must protect, care for, and feed the entrepreneur.”

“Entrepreneurial action is the key to the Valley. Critical mass is here....This is compatible with collaborativeness.”

“Some of the actions taken by larger companies are going to have a constraining impact on new ventures.”

“Litiigiousness, patent protection, paternalism are increasing.”

“The entrepreneurial spirit is changing: no one is willing to give up anything to get anything.”

“The availability has imbued in the minds of the engineering community that one day they too will have a company of their own.”
Warning Sign 8: Culture of Blame

Another warning sign, not quantifiable, is the condition of blame that resides in the Valley. Based on interviews, there is a culture of irresponsibility that prevails. For the most part, the corporate sector blames the public sector for the problems of the Valley. The public sector blames the private sector for not shouldering its fair share of the burden. The small and medium size supporting industry companies blame both the large high tech companies and the public sector for unbearable conditions. In a culture of blame it is difficult to develop an environment of openness and collaboration: key ingredients for creating a successful proactive future. Before anything happens, the key question in Silicon Valley is, “When are we going to take responsibility for ourselves.”

EXHIBIT IV-3

WHAT LEADERS SAY

“Silicon Valley will disintegrate if government does not value this national treasure of the “mind set” and “sharing of knowledge.”

“Businesses in the Valley have been remarkably ‘uncivic minded.”

“The public sector is not entrepreneurial, but closed—do it our way or do it elsewhere.”

“Business has been absent without leave in this area...shamefully so.”

“There is no possibility of the future of San Jose being anything other than the vision of select government officials of San Jose.”

“As individuals we do not remember that charity begins at home. Companies set up programs in Malaysia with child care and come home and do not practice the same values...A Janus-faced corporate organization.”

“How do we make government accountable to citizenry?”

“Corporate management should show some leadership. It is moronic to think you can have your acre of land in Portola Valley and not care about East Palo Alto.”

“When do we take responsibility for ourselves?”

Economic Infrastructure Warning Signs

The strength of Silicon Valley has historically been the strong support it received from the economic infrastructure. Although this was true in the past, it may not be as true now.

A review of six categories of economic infrastructure suggests that we have many strong points that may be becoming more vulnerable. Several critical weak points might even be tipping the Valley’s positive feedback loop in a negative direction.
Warning Sign 1: Declining Technology Advantage

Technology advantage in an economy comes from being able to:

- Discover new knowledge
- Develop new technologies
- Deploy them in new products.

Discovery

In a review of Valley research and development activities we determined that the region still has a strong technology base. However, the “pipeline” that produces the next-generation technologies is getting thinner. Companies are focusing more of their attention on development and deployment to meet the challenges of global markets. The high degree of subsidy for the discovery or precompetitive stage of the pipeline is diminishing. Funding through defense contracts, NASA procurements, and grants to universities is decreasing.

During the 1960s 25% of high-tech employment was sponsored by defense. Another 20% of industry employment was in NASA and aerospace work. This employment provided a tremendous platform of knowledge and capacity to propel the chip and components industries forward. By the 1970s there was a 30% increase in defense spending and a decrease in the value of military shipments. More money was going into research. During the 1980s Star Wars spending became an invisible support for many next-generation technologies.

This source of support is declining now and expected to decline further. Overall defense spending in the Valley is down $6 billion in the past five years. NASA spending is down about $100 million. University R&D has grown substantially in total amount, from $239 million in 1980 to $700 million today, or about 11% per year. Accounting for inflation, this total amounts to a relatively flat growth of about 3% per year.

Development

To compensate, companies have increased their expenditures on development facilities. Strategic alliances and licensing agreements have dramatically increased. They are also acquiring companies as “technology windows” to provide a technical base in a new field. Cross-pollination between hardware and software companies is accelerating product development. As technology resources become more available globally, Silicon Valley companies are expanding their external development centers. Sun Microsystems has six new centers developing outside the Valley. Hewlett-Packard, IBM-Adstar, Varian, and Intel have development centers in international and domestic centers where they do business, although much core research and development still takes place locally.
The current limit on this trend for many companies is that the set of skills and technological resources concentrated in the Valley are so much more highly developed than in other regional centers. Such centers can only serve as outposts to communicate and work with clients, rather than as centers of excellence. As competing regions and global markets expand, there is little doubt that the critical mass in development available here may be capable of being created elsewhere—unless development capabilities remain ahead of those in other regions. Maintenance of critical mass requires investment funds, skills, and suppliers not otherwise available.

The region has not captured the precompetitive technology initiatives that have been organized in the past decade. These centers would have brought money, skills, and knowledge that could build or reinforce a regional competitive edge in R&D. The Microelectronics and Computers Corporation (MCC), and SEMATECH (Semiconductor Manufacturers Association Consortium) were located in Austin; the National Earthquake Research Center was located in Rochester, New York.

On the positive side, Stanford continues to be a crucial asset in the seeding of next-generation technologies, with such industry-university initiatives as Stanford’s Center for Integrated Systems (CIS).

*The region’s distinction as a center for early stage discovery and development needs to be better understood and preserved. We should not take the potential impact of defense cutbacks lightly. We should not take the location of pre-competitive consortia in other regions lightly. Our short-term performance in product development should not be taken for granted.*

**Warning Sign 2: Declining Human Resource Advantage**

Human resource advantage in a regional economy comes from being able to:

- Prepare basic skills
- Advance capabilities
- Renew skills as they become obsolete.

The Silicon Valley has had a longtime advantage in skills that was unparalleled in any other region. This advantage is now at risk. The challenge reaches across the entire community.

In its early days, in-migrants and graduates of Stanford University’s engineering school provided the region’s pioneers. During the 1960s the region began to create its own unique human resource infrastructure. The region acquired community colleges, and San Jose State was transformed into a state university (California State University, San Jose). Santa Clara University has long been a contributor to the region’s skill base of professional workers. During the 1970s and 1980s these institutions worked to build greater capacity to serve industry. Immigration from Asia provided a new generation of workers capable of supplementing the regional work force.
skills. At a minimum, regional institutions produced a work force with strong basic skills. They also produced highly talented technical, engineering, and managerial professionals.

Today, the human resources environment is falling out of balance. There are significant problems in the preparation system, difficulties in recruiting sufficient leading-edge skills, and high costs associated with continuing education.

Preparation

Companies' leaders have stated that although recruiting local workers is feasible, entry-level workers often require costly additional training. Businesses are concerned that the elementary and high school graduates in the region are not prepared to meet industry standards. The concern is that the future graduate population may not be able to meet rising skill requirements of a fast-paced industrial base.

Schools are facing increasing financial constraints and struggling to respond. Companies are working in Chamber of Commerce-sponsored initiatives and on their own to assist schools. They are adopting schools, becoming principals for a day (to understand problems), lending staff to teach classes in key fields such as computer literacy (at company cost), and donating equipment.

The problem is greater than adopt-a-school initiatives can address. Inconsistent size and operating structures of school districts, high administrative costs, and instructor skill inadequacies are concerns. The attractiveness of this region to current and future employers will depend increasingly on a regional school system that performs to current expectations and adapts to future needs.

Advancement

Companies believe they are beginning to have significant difficulties recruiting workers who are on the leading edge of technology disciplines. Top companies do recruit maybe 10% to 15% of their new employees from major regional institutions, such as Stanford and Berkeley. They choose to recruit from universities nationwide that have the varied engineering and related specializations they need for their companies. The challenge of inducing graduates to locate in the region is growing. Although companies may pay 15% higher than national salaries, the cost of housing is 150% or more higher than in other regions.

A number of technology companies mentioned that they have benefited from the growth and availability of employees who are from Pacific Rim nations and who live in the Bay Area. Most companies have commented on the growth in diversity of their work forces and that it has given rise to a new human resource challenge: managing ethnic diversity.
California State University at San Jose has undertaken a systematic effort to bring the Valley’s advanced skills supply into parity with industry expectations and needs. The dean of engineering has successfully expanded the school, increased the number of laboratories to more than 120, and works closely with industry to plan educational programs. The university produces a substantial portion of the graduate engineering labor force for the region. Similarly, the dean of the Business School works with industry. However, the university is facing severe financial constraints that have no easy solution in the near term.

Renewal

Leaders interviewed believe that the region is facing a problem of technical obsolescence that will escalate dramatically in years to come. The half life of engineering skills is getting shorter and shorter. Although for mechanical engineering it may be seven years or less, for software engineering its is less than three years. The problem is not unique to the Valley. Because of the Valley’s composition of industry and skills, technical currency problems will hit harder here. Currently, companies use a diversity of vendors from around the region for training and retraining on a customized basis. Stanford University has for 30 years had the Stanford Instructional Television Network that provides academic programs in which industry professionals in engineering can participate. More recently, an industry-sponsored consortium on Science and Engineering Education Development (SEED) was established at SRI.

As companies downsize and defense contractors lay off workers, there is a growing labor surplus in the region, but many skills in the work force do not meet changing needs. Without extending the scale and scope of training and continuing education in the region, the larger companies may be the only enterprises able to keep up their skills while smaller companies and suppliers may lose ground.

EXHIBIT IV-4

WHAT LEADERS SAY

"Biggest problem is attracting excellent engineers....Bringing people from the outside is very hard."

"Work force viability is a function of training people in areas required by industry. There is a need for a closer working relationship between industry, education, training, and the universities."

"Education is a problem. Amount invested is low."

"Worrisome is the fact that there is a tremendous drop off of minority youth from high school who are not exiting at industrial standards....Industry has to make this up."

"We have been active in partnerships with schools, loaning personnel to teach, executives becoming principals for a day. We are learning about schools and helping them learn business practices."
Warning Sign 3: Declining Finance Advantage

A strong regional economic infrastructure provides three types of financing needed during the life cycle of industry:

- Initiation of enterprise
- Expansion of business
- Modernization and restructuring.

The Silicon Valley has had the most advanced and sophisticated financial infrastructure in the United States in the past two decades. This infrastructure was able to play a key role in providing entrepreneurs with the first and second rounds of venture capital needed to grow companies and eventually complete their initial public offerings.

The real financial wherewithal to start companies has always been in the pockets of entrepreneurs who “bet the farm” on their businesses. Fairchild and Intel are case studies of classic venture financing. Many companies, such as Hewlett-Packard (in the late 1930s), Apple (1970s) and CiscoSystems (1980s) represent enterprises that moved from garage to living room to tilt-up commercial buildings to world-class businesses, with venture capital coming to play later in the development process. A major quality of this region has been its ability to serve as an “incubator without walls”—a place where businesses can start easily and grow, finding the right financial support at the right time. This critical quality may be at risk in the region.

Initiation

Interviews suggest that individuals may be more averse to risking their own financial assets than in the past. The environment for enterprise formation is perceived as riskier now. With increased litigiousness among companies over intellectual property issues, individuals are less likely to attempt an early stage “spin-off” unless they are confident about the uniqueness of their ideas.

Companies are focusing more attention on intrapreneurship and managed spin-offs through joint ventures. Sanctioned programs to finance growth of new businesses in unrelated product lines are being initiated.

Expansion

The overall environment for venture financing has grown far more conservative and cautious since the peak of the early 1980s (see Figure IV-8).
Restructuring

During the past five or more years venture financing has become far more conservative and focused on investments with higher prospects for profitability. Second-round financing needed to bring maturing businesses to initial public offerings, so investors can get their return back faster, is a prime example. Although there is still investment in computers, venture funding is focusing more on biomedical subjects, software, and communications—presumably the leading edge of the next-generation economy.

Warning Sign 4: Limited Physical Infrastructure

A strong physical infrastructure provides the region's enterprise with responsive:

- Facilities
- Transportation
- Communications.
Facilities

Interviews show that the Silicon Valley faces a peculiar dilemma in terms of meeting the facilities needs of current and future enterprise. Land costs are high, and the surplus of older facilities is tremendous. Leaders suggest that the costs of developing new facilities in this region are leading companies to place new growth outside the area.

New facilities costs are said to have risen so high that they are sometimes ten times more expensive than in competing regions. Land costs are the primary problem. Construction costs can be higher, although productivity in construction and capacity to meet specialized needs of high technology construction projects are highly developed here. Although new development costs are very high, some areas within the Silicon Valley, such as Fremont, have competitively priced industrial land.

Major companies still own considerable amounts of land, which they are developing or would like to develop and cannot because of local government growth restrictions.

Consolidation into owner-occupied buildings and movement up to newer facilities by growing companies has created a huge “iceberg” of older “tilt-up-slab” buildings constructed in the 1960s and 1970s. The excess supply of R&D, office, and commercial space is likely to pose a huge real estate overhang for the region for some time. Current vacancy rates among older facilities are high—often well above 15% and represent a significant financial liability for owner-investors and the region.

This mismatch in regional real estate suggests that there may be possibilities of creating new developments to meet future local growth needs as well as attractive redeveloped facilities. This imbalance also implies that the region could be mired in underutilized facilities that don’t match industry needs.

Transportation

The need to move goods and services effectively within the region and globally is an ongoing concern in the Silicon Valley. Companies interviewed consider the problem to be important, but not of a crisis nature.

The region has successfully undertaken initiatives to improve aspects of the transportation system. Through leadership by the Santa Clara County Manufacturing Group with the public sector, the region was able to pass Measure A that has used sales tax revenue to widen highways and establish diamond lanes, complete highway 85, and establish the Valley’s light rail system. Nonetheless, community residents are not content with their commute situation (see Exhibit IV-5).
EXHIBIT IV-5
SURVEY FINDINGS
19% commute over an hour each day.
27% said that transportation was what they like least about the Valley.

On the positive side, San Jose Airport has expanded with the American Airlines terminal, and nonstop links to Japan. International transportation service is not a major barrier for the region, certainly not in comparison to other regions.

Communications

The byword of the 1990s is networking. The medium for networking in this decade is communications. The pace at which communications technology is advancing far exceeds that rate with which it is used within the region. Companies are moving far more rapidly to utilize new communications capability than is the region overall. While the nation and the state of California have talked about “smart systems” and “information highways”), the Silicon Valley is not holding its own. The regional telecommunications infrastructure is not as advanced as regional companies.

Almost 50% of the region has fiber-optic cable already installed—although significantly underused. The regional businesses have been slow to call for, and invest in, enhanced telecommunications services. The challenge is to create a unique comparative advantage that can serve companies, schools, public institutions, and families. This foundation of communications can enable innovations in regional services that will assist Silicon Valley to improve its appeal and capacity to retain and grow enterprise. The Valley has the ability to become a leader in telecommunicating and in high speed, high bandwidth networking of companies, suppliers, and individuals.

Warning Sign 5: Regulatory Constraints

A successful economic infrastructure has a government system that effectively links policies and administrative practices to economic vision and strategy. These policies and practices extend to the following:

- Growth policy
- Permit system efficiency
- Environmental regulation
- Tax assessment.
Growth Policy

The development of the Silicon Valley has been shaped by historic habits of growth. Today, the maturation of the Valley has thrown these same ambitions into paralysis as communities individually declare a moratorium on development, without considering economic consequences.

Areas are focusing on managing within their "carrying capacity." They are generally opposing additional commercial growth and applying the not-in-my-backyard philosophy of decision making. The result is that growth that had been accommodated within the previous general plans is being prevented. Projects that were once approved have been assaulted with on-again off-again development approvals. Businesses are frustrated and are increasingly planning new growth outside the Silicon Valley. Those who would like to expand in the Valley are deterred by this antigrowth mood. Businesses are sometimes counseled to choose in-fill projects or reuse existing properties—logical, but not always appealing.

Communities are often fighting among themselves (or not talking to each other) about who should be responsible for adding additional housing units to make up the large jobs-housing imbalance. This problem is often also transferred to companies—viewed as the cause of housing shortages. Companies now must participate in the dialogue concerning whether to provide on-site housing or services or pay in lieu of housing fees. Fortunately, companies are becoming more sophisticated in reviewing development options and can contribute more to constructive resolutions of development problems.

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**EXHIBIT IV-6**

**WHAT LEADERS SAY**

"The question of: Are we going to grow here? gets decided every day. We are reaching a state here, by antigrowth...where if you stand still you lose economically."

"In Austin, salaries are 20% to 30% less. Raw land in Silicon Valley is 25 times the price of land in Austin...A 3-bedroom, 2-bath house on 1 acre costs about $100,000."

"Government keeps changing rules. How can you manage a 30-year investment?"

---

Real estate developers see their business opportunities within the region for commercial development as increasingly confined. They would like to see plans accommodate their needs more flexibly.

_The absence of a shared vision of growth for the region impairs effective channeling of investment and capturing of important economic benefits. Without a consistent vision of development, regional economic activity will increasingly become constrained and unpredictable._
Permitting Systems

Independent of the question of growth is the abiding problem of the efficiency and cost of permitting. Interviewed industry leaders as well as real estate developers complain that permitting systems, generally, are slow and idiosyncratic. Conditions for various subdivision approvals, associated use permits, and building permits frequently change or are subject to interpretations that stall development and increase costs. Industry members state that before Proposition 13, a 50,000-square-foot commercial project would cost approximately $5,000 in fees and require three to four weeks for permit issuance. Today that same project may cost $200,000 or more in fees and require a year or more for permit processing.

Although communities such as Sunnyvale and San Jose have introduced permit improvement programs and quality assurance efforts, the reality is that the permitting systems are not yet using or subject to businesslike management and performance practices.

Predictability and reliability are two features of a desirable permit system that industry leaders seek in the Valley. Because permit systems are always viewed as a problem, to overcome this negative, Silicon Valley must not only match, but exceed the performance of other regions against which it is competing.

Environmental Systems

During the mid-1980s community initiatives focused attention on the fact that the region's supposedly "clean" high-technology industries actually produced toxic wastes that had leaked from storage into the groundwater or were produced in the air of production facilities.

Through a hotly debated and expensive process, a new, more realistic climate for addressing regional environmental problems has evolved. Companies are now more forward looking on environmental issues and undertaking innovative solutions. Nonetheless, the region still faces the burden of cleaning up its more than 27 toxic waste sites.

Environmental regulatory problems still remain that may further hurt the economy. Interviews suggest that the manner in which the cities and counties develop and enforce waste-disposal standards for the emerging biomedical industry may ultimately lead these companies to locate elsewhere. The challenge facing the region is to find ways to reduce the costs and increase the efficiency of services to enable accommodation of the wastes this industry produces, rather than deter them from doing business in the region. Some European cities have developed innovative waste-disposal schemes in which biological wastes were channeled together, treated, and incinerated to produce municipal power. The region has such extensive technological capability
that market-based solutions to environmental problems should be feasible and undertaken before damage to the economy is sustained.

Tax Assessment

A common complaint among small and large businesses in this region is the inequity or unfairness of county taxes on businesses. More appeals are being processed than the county can handle.

Currently, almost 2,935 appeals are pending from 1990 to 1991, with the county capable of processing about 2,339 (based on an accountancy estimate of capacity). These appeals—which are mostly from business—must be resolved or granted continuances within 24 months of filing, or be uncontested by the county. Just reaching that point are 596 appeals. Reviewing the value of land and building is not simple and can be time-consuming.

In the current environment of fiscal shortfall, the county will face the dilemma of aggressively increasing its review of tax appeals or face the prospects of losing virtually $8 million in pending appeals. The county reassessed more than 29,000 properties last year to try to reduce the number of future appeals and is looking for more effective ways to manage this process. This includes splitting off single-family from larger appeals, where $1 million or more may be at issue. Virtually every single large company in the Valley has filed tax appeals. The county has formed teams that are focusing on land and buildings and on machinery and equipment to do this job better.

More important is the bottom-line issue of establishing what are fair and effective taxes for the region’s businesses (not to mention home owners). Rates here are 1.1% of value compared to 6% of value in many midwest states. Although the tax rates in this region are not significantly higher than in competing regions, they are, in some cases, heavier on larger companies, such as Lockheed and IBM, which dispute machinery depreciation.

The region needs a strategic view of property, sales, and business taxes that enables the Silicon Valley to improve its physical infrastructure, schools, and assets that contribute to a dynamic economy.

Warning Sign 6: Quality-of-Life Decline

A region’s quality of life supports the attractiveness of the economy as well as its direct operation. Key quality-of-life factors include:
• Affordable variety of housing
• Adequate health and social services
• Creative range of recreation and culture.

Affordable Housing

The cost of housing has been Silicon Valley's major shortcoming in quality of life. Regional residents report that housing costs and transportation are the two major features they dislike about this region. The cost of housing and mismatch in supply is significant enough to have caused 19% of persons surveyed to look for housing outside the region in the past 12 months.

The Silicon Valley region had a dramatic boom cycle of real estate. Launched in the early 1970s, it took a major jump into highly inflated prices during the late 1970s and has had a decline in recent years.

EXHIBIT IV-7
SURVEY FINDINGS

70% say climate and physical quality of region are what they like best.
46% said housing prices are what they like least about the region.
19% of total and 25% of 18 to 30 year olds looked for housing outside the region.

Today, the rate of growth of housing is slower, because less land remains available within defined growth areas, and the price of land is high. Leading housing developers see their business at best producing 500 units a year, in a region where individual companies once produced 2,000 or more annually.

Concurrently, permits are lagging. The actual rate of permit issuance, in many communities, has recently been half the level targeted in most cases and two-thirds what was projected (see Figure IV-9). Bank real estate demand estimates put the actual shortfall of housing at a minimum of about 5,000 units per year.

Despite recent slow growth in employment, housing prices have declined very little. The price of new housing is still rising and has reached an estimated $400,000 for the Valley region (down slightly from 1990). The resale price of homes in San Jose averages about $250,000. Although this price is lower than a new home price, this "bargain" price is still substantially high compared to what is available in other communities. For example, an observer pointed out that in Austin, $100,000 will buy a 1-acre, four-bedroom tract home.
Health and Social Services

This region has a high variety and range of health and social services available. The costs to employers and employees of health plans are high in this region compared to costs in other communities, though not as high as in San Francisco. Community residents who are employed and have health insurance rarely complain about health costs.

The region has a wide variety of health maintenance organizations, preferred provider organizations, and fee-for-service providers. Pressure is increasing on health-care organizations to become more competitive at the same time that there are pressures to care for the indigent and underinsured. To become more competitive, more health-care rationing is taking place. To increase revenues and reduce costs, health-care providers are also shifting from inpatient to outpatient care and are "unbundling" services and establishing more satellite health-provider centers: surgical centers, diagnostic, and urgent-care centers.

The region has a good array of specialty health services, from heart and neurological to spinal injury, fertility, and burn services. The region is also a center for innovation in health-care treatments and technologies. There is a close relationship of hospitals and health centers to biomedical companies in the region involved with instrumentation and various therapies.
The region’s big dilemma in health care is rising costs at a time when the growth of patients with less ability to pay (no insurance) and greater cultural diversity is increasing. Although company corporate citizenship is increasing to health-care providers, it still lags behind that of leading regions. Cash and equipment donations are increasing.

Companies are likely to focus more attention on health-care costs in the future, but for now the issue is not a prominent element in the regional competitiveness debate. The current view is that health-care quality and choice are valuable assets in the regional economy.

Culture, Recreation, and Corporate Citizenship

The Valley has grown in the depth and breadth of its cultural resources over the years. The Silicon Valley has expanded and confirmed its resources in areas such as light opera, symphony (one of the oldest west of the Rockies), and a variety of museums, including the “garage” high-technology museum. The region has expanded the urban services available, strengthening its independence from other urban centers such as San Francisco. Although the efforts to bring the Giants to San Jose did not succeed, the initiative underlying the attempt suggests that the corporate culture is focusing increasingly on broadening regional resources for the maturing industrial base.

As corporations mature, their level of citizenship is increasing. Companies are becoming more active on a broad array of quality-of-life issues, from schools to school services. The Silicon Valley Charity Ball and the CHARITech philanthropy trade show are examples of an emerging civic ethic. Nonetheless (with a few notable exceptions), the Valley’s corporate culture is still in the early stages of its development with respect to working together on community needs.

EXHIBIT IV-8

WHAT LEADERS SAY

How do you get companies who compete globally, who are tied up with their customers, to devote time to local problems....How do you reconcile this?

Businesses in the Valley have not been interested in the community...perhaps because their businesses are young, and they do not find civic concerns important.

Businesses have been absent without leave in this area...shamefully so.

This company has been very inwardly focused. Has the potential to be hurt in the future. They will be shocked and surprised when the issues hit them....
The Beginning of Action in Silicon Valley

Although many of the region's strengths are at risk, the pace of regional problem solving is increasing. Business and government are learning how to solve pieces of the problem by working individually and together. Some examples of significant initiatives include the following:

• Technology

  - Center for Software Innovation: Newly established to provide multiple platforms, testing equipment, and services to new and existing software companies to enable growth.
  
  - Center for Integrated Systems (CIS): One example of Stanford's efforts to foster improved industry-university collaboration is this center for advanced computer component development and design; other initiatives include Stanford’s Biotechnology Institute.

• Human Resources

  - K-12 Improvement: New chamber and business roundtable partnership with Industry Education Council of California to enhance performance
  
  - Company-sponsored training: VISION, a management training course for school superintendents sponsored by industry, as well as other telecommunications and computer-education courses
  
  - Company-to-school projects: Principal for a day, loan-professionals to teach courses, equipment donations, partnership academies, release time mentoring, scholarships
  
  - Advanced Technology Institute: New public-private partnership with San Jose State University to address spectrum of technology education needs, just issuing report

• Finance

  - Buyer-supplier linkages: San Jose has encouraged service providers to connect with start-ups and has a growing set of supplier-service retention services.
  
  - Enterprise zones: San Jose has an Enterprise Zone Loan Program with tax credits, hiring credits, supporting services, and a $50 million loan pool; also, an industrial incentive zone is in South Silicon Valley.
  
  - Export assistance: San Jose has initiated a Center for International Trade and Development to assist regional firms to identify export opportunities and has partnership relations with European cities.

• Physical Infrastructure

  - Transportation: A partnership between government and business (particularly the Santa Clara County Manufacturing Group) has resulted in Measure A sales tax funding of the county's light rail system, high-occupancy vehicle lanes, and support for completion of Highways 85 and 87.
  
  - Telecommunications: Pacific Bell has provided fiber-optic cable for approximately 50% of the Valley, although it may be underused.
- Urban development: San Jose has an extensive downtown-development program.
- Industry parks: Industrial development funding has been used in redevelopment areas to attract private investment.

• Regulations
  - Permit Processing: Sunnyvale is focusing on quality control and performance issues; other communities such as Palo Alto have analyzed business needs and are examining how to respond more effectively.
  - Tax assessment: Santa Clara County has formed teams to review assessments and expedite handling of appeals.

• Quality of Life
  - Housing: Efforts to introduce in-city, in-fill projects, and multiuse projects have been undertaken from San Jose to Mountain View through zoning changes and redevelopment funding.
  - Culture: Business and government collaborated to establish the new Technology Museum ("Garage") and are encouraging growth of cultural resources.

• Strategy
  - Futures: San Jose has working groups examining future prospects.
  - Santa Clara County Manufacturing Group: Mission and history of action initiatives on transportation and housing.
  - Community Vision: Santa Clara County has undertaken the Strategic Vision 2000 project to review housing, education, social, and economic challenges for the area.
  - Bay Vision 2020: Ongoing public-private working group proposing legislation to integrate region-wide infrastructure organizations.

Important as these actions are, the magnitude of the changes facing the Valley, as well as the scale of action by competitors (see Chapter VI), indicates that more than individual action is necessary. What is necessary is a strategy that defines private- and public-sector roles in an organized effort to create a future for the region. Other regions are already doing this: organizing themselves to build competitive advantage.
V. BENCHMARKING THE VALLEY
How Silicon Valley Compares

While Silicon Valley has been changing, its regional competitors have not been standing still. A decade ago, Silicon Valley became the economic model for regions across the United States and around the world. The rapid growth in technology enterprises and the wealth created by new ventures made Silicon Valley the envy of other regions. The questions were always the same: What makes Silicon Valley successful and what can be done to create a Silicon Valley in my region?

The luster of high technology has diminished somewhat as technology industries have proved to be vulnerable to business cycles, as global competition has made rapid growth more difficult, and as job growth associated with technology firms has slowed because of restructuring. Silicon Valley has matured and begun to run into problems similar to those of other communities. Still, other regions watch Silicon Valley closely to learn what to expect next in high technology and to emulate new developments.

During the past decade, several regions have made significant strides in catching up to Silicon Valley, first by emulation and then by pursuing their own strategies. Some have been successful in luring investments or relocation from Silicon Valley enterprises by offering Silicon Valley–style economic environments, quality of life, and lower costs. These regions have begun to succeed because they are organized, have developed a plan, and are working to address defects in their economic infrastructure while taking advantage of their assets.

Table V-1 provides a comparison of several regions using benchmarking. Key attributes of these regions are identified and compared to determine which regions are doing well.

Four regions are selected for comparison. Three are selected to represent some of the most aggressive regions in the United States that have been competing to become Silicon Valley–like economies.

- **Austin**: A growing technology region with a strong public-private partnership that has aggressively attracted a number of major investments, including MCC, SEMATECH, 3-M, Apple, and AMD.
- **Portland**: An emerging technology region with a strong presence of international firms, including Fujitsu and NEC, homegrown enterprises such as Tektronics, and Silicon Valley firms such as Intel.
- **Phoenix**: A growing technology region with a strong concentration of semiconductor firms—Motorola, Intel—and aerospace companies—McDonnell Douglas, Garrett, and Hughes.

The fourth region represents one of the most aggressive international economies:
• **Singapore**: A leading newly industrial economy (NIE) that has become one of the most successful regions in the world based on its ability to attract foreign investment.

Although other regions could be chosen, these four represent a good cross-section of competitors to Silicon Valley.

Several attributes of these regions correspond to the vital cycle model:

• **Enterprise Vitality**
  - *Enterprise richness*: The degree to which clusters of enterprises have developed across a range of diverse industries and have grown in a dynamic manner
  - *Employment growth*: Job creation resulting from enterprise growth

• **Economic Infrastructure Strength**
  - *Technology*: Quality and accessibility of the region’s technology base and technology institutions
  - *Human Resources*: Quality and accessibility of the region’s skills base and educational institutions
  - *Finance*: Availability of risk capital and responsiveness of financial institutions
  - *Infrastructure*: The quality and responsiveness of transportation, telecommunications, and water infrastructure
  - *Regulations*: Responsiveness of regulations and regulatory organizations to the needs of enterprises
  - *Quality of life*: Quality of natural and artificial environment

**Benchmarking Regional Enterprise**

This benchmark analysis identifies where each region has relative strengths and weaknesses in its enterprises.

In terms of *enterprise richness*, Silicon Valley still has the greatest diversity and strength in its clusters of enterprises. Austin and Portland are catching up from a much lower base of enterprises, and Phoenix still depends on two industries. Singapore alone can compare with Silicon Valley in its enterprise richness. The region is still primarily a production site—a source of R&D driven enterprise. Moreover, a large number of firms are foreign owned. *Silicon Valley is clearly in the lead, but the other regions are gaining.*

*Employment growth* is an area of weakness for Silicon Valley. Whereas the Valley once led the nation and the Bay Area in job growth, the ongoing restructuring process continues to take its toll on employment. Austin and Singapore continue to add jobs through inward investment, while Portland and Phoenix are growing rapidly as a result of both attraction and expansion of their clusters. *Silicon Valley is entering a mature stage of development and now lags in this area.* See Table V-1.
Table V-1
Benchmarking Valley Enterprise

<table>
<thead>
<tr>
<th>Enterprise richness</th>
<th>Silicon Valley</th>
<th>Austin</th>
<th>Portland</th>
<th>Phoenix</th>
<th>Singapore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td></td>
<td>Fair</td>
<td>Fair</td>
<td>Poor</td>
<td>Good</td>
</tr>
<tr>
<td>Employment growth</td>
<td>Poor</td>
<td>Fair</td>
<td>Good</td>
<td>Good</td>
<td>Fair</td>
</tr>
</tbody>
</table>

**Benchmarking Regional Economic Infrastructure**

This benchmark shows the strengths and weaknesses of regional economic infrastructure.

In *technology*, Silicon Valley remains strong, but signs of weakness are emerging. The development and engineering strengths within Valley enterprises are world class; the research strength may be eroding. The loss of Department of Defense (DoD) and NASA funding, along with financial pressures facing the Valley’s leading research universities, raises questions about the future of pre-competitive R&D. On the other hand, Austin has become the home of several pre-competitive R&D initiatives (MCC and SEMATECH) and continues to build on the strength of the University of Texas. Although not world class today, the R&D base in Austin is gaining on that of Silicon Valley. Portland suffers from a lack of a leading university, and Phoenix has yet to build a critical mass around its growing strength in engineering at Arizona State University. Singapore is investing more in R&D than any NIE. *Although Silicon Valley leads today, strong competitors are gaining ground.*

*Human resources* may no longer be a preeminent strength for Silicon Valley. Although the current human resource base remains strong, it is increasingly difficult to recruit top talent because of high cost and because the skills mismatch is growing between the emerging skills needs of enterprises and the current skills in the work force. Local education institutions are suffering from major financial constraints. Austin has made education the cornerstone of its economic effort and has used the University of Texas as major leverage for attracting firms. Education reform efforts in Texas are beginning to show results. Portland faces a human resources disadvantage because of the lack of a major university and financial problems in its K-12 system. Major technology firms in Portland express problems in hiring and retaining skilled workers. Phoenix has begun to address its training problems and can still rely on a large in-migration of talent. Singapore has one of the world’s leading education investment strategies. *Silicon Valley is falling behind in human resources and could learn a few things from Austin and Singapore.*
Finance remains an area of dominance for Silicon Valley. No region in the world has such a heavy concentration of venture capital. The finance network in the Valley has been a key to enterprise growth. In the past few years, venture capital placements have declined and enterprise formation has slowed. Austin, Portland, and Phoenix all suffer relative to Silicon Valley in terms of the availability of risk capital. Furthermore, the collapse of real estate and S&Ls created a tightening of credit in Austin and Phoenix in recent years. Singapore must import foreign capital through a wide variety of government incentives. Singapore is now emerging as a regional financial market. Overall, finance is still a comparative strength for Silicon Valley.

Physical Infrastructure has become a major problem for the Valley. The biggest worry remains cost of facilities. Transportation is also a key concern. A significant portion of Valley residents have experienced longer commutes and increased traffic congestion. Although recent steps (e.g., Measure A) have been taken to address the problem, it still exists. In contrast, Portland has led the nation in creating a well-designed urban transportation system, Phoenix is investing well above the national average in transportation infrastructure, and Austin has made transportation a major economic development priority. Singapore has also been making major investments in its transportation and communication system. Silicon Valley is well behind its competitors in transportation.

Regulation is another problem area for the Valley. Permitting and environmental regulations have significantly increased the cost of doing business in the Valley. Many businesses believe that the regulatory system is fragmented and not “user-friendly.” Although regulatory barriers are a concern in the other regions as well, Austin and Phoenix have developed a more user-friendly approach based on the concept of customer service and total quality management applied to government. After creating some of the toughest environmental standards, Portland is now working more closely with businesses to streamline regulatory processes. Singapore provides “one-stop” service through its Development Board. Silicon Valley has not yet addressed regulatory barriers as aggressively as has its competing regions.

Quality of life—once a major strength of Silicon Valley because of its mild climate and pleasant environment—is no longer a strong point. The cost of housing, congestion, air quality and pace of life have created negatives that offset the advantages of weather. Although artificial amenities and cultural offering have increased, so have the same amenities in the other regions. Although crowded, Singapore has worked aggressively to create a quality of life advantage in Asia. Austin, Portland, and Phoenix offer attractive life-styles, culture, recreation, and opportunities at a lower cost. What these areas may lack relative to Silicon Valley, they make up for in a slower pace of life and less expensive housing. Some see Portland and the Northwest as one of
the emerging regions of the United States. Austin offers unique music and Southwest culture, and Phoenix provides year-round golf. Take your pick of quality-of-life opportunities: Silicon Valley no longer has an edge. See Table V-2.

<table>
<thead>
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<th>Table V-2</th>
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<tbody>
<tr>
<td>Benchmarking Valley Economic Infrastructure</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Silicon Valley</td>
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<tr>
<td>Technology</td>
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<tr>
<td>Human resources</td>
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<tr>
<td>Finance</td>
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<tr>
<td>Infrastructure</td>
</tr>
<tr>
<td>Regulation</td>
</tr>
<tr>
<td>Quality of life</td>
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</tbody>
</table>

Challenge to Valley

The benchmarking identifies clear strengths and weaknesses for Silicon Valley relative to these regional competitors. Although Silicon Valley remains a leader in enterprise richness, technology, and finance, it is falling behind in employment growth, human resources, transportation infrastructure, regulations, and quality of life. Even in the areas of strengths, the other regions are gaining through aggressive economic efforts. The point is that Silicon Valley can no longer expect to lead without effort. The world has become competitive and Silicon Valley’s weaknesses have become liabilities.

The one major attribute that distinguishes each of these regions is that they have all developed and aggressively implemented an economic strategy that builds on their strengths and addresses their weaknesses. Each of these regions has organized its private and public sectors along with the education and community sectors to promote a regional economic competitiveness strategy.

Austin organized a private-sector-led strategy in the mid-1980s that has provided a blueprint for its business, government, and education leaders to aggressively pursue attracting technology firms and building a stronger technology, human resources, and transportation infrastructure. Phoenix developed its strategy in the late 1980s after the collapse of real estate forced private and public-sector leaders to pursue a joint effort to develop new clusters. After the decline of the timber industry in the 1980s forced Portland to develop a new approach, strong statewide efforts
began to create a new strategy that promoted the growth of high value-added industries. Singapore is one of the world leaders in developing and executing effective economic strategies aimed at value-added business development.

The major difference between these regions and Silicon Valley is clear. Each of the other regions has a strategy that guides the efforts of the public and private sector to organize economic assets to create a twenty-first century economy. Silicon Valley does not. It never had to because it was the unchallenged leader. It led with effortless grace. Those times are over. *Silicon Valley needs a joint venture to guide its economic future.*
VI. POSSIBLE FUTURES FOR SILICON VALLEY
A Time for Choice

The Silicon Valley economy is at a stage of development where it must make choices about its future or the future will be decided by events.

Three possible futures or "challenge scenarios" dramatize the range of options towards which this economy could move. They illustrate the effects that our choices can have:

- High-Tech Manhattan
- Virtual Valley
- American Technopolis.

The three scenarios are not meant to suggest the form and composition of economy toward which the Valley may want to move. They are simulations of possibilities—things to come but not yet determined.

By thinking about them, we can discover how we might need to work in new ways to achieve a competitive economy for enterprise that also fosters high-quality jobs and income for regional residents. Recognizing the consequences of the actions we take, or fail to take, can set the stage for developing the blueprint for the next-generation Silicon Valley.

Scenario Assumptions

To show how the Valley might evolve in the next decade, each scenario provides a picture of two sides of the economic coin. It examines the enterprise environment and then the economic-infrastructure environment as each might evolve differently as a result of local action. All three scenarios use the same general assumptions about external factors that might shape the Valley. These include:

- Low to moderate global growth (2.5%)
- High domestic content overseas
- Moderate to low direct foreign investment in the U.S.
- Expanding global competition from Japan, newly industrialized countries (NICs), and the European Community (EC)
- Defense cuts at 15% annually
- Minimal reduction in capital gains tax
- Increase in consumer taxes.

Each scenario concludes with a scorecard on the outcomes for businesses and the overall economy.
High-Tech Manhattan

As the name suggests, High-Tech Manhattan is a challenge scenario wherein the Valley becomes dramatically different from what it has been. Silicon Valley moves toward an economy dominated by headquarters and administrative functions, with very little research and development and no production.

Enterprise Dynamic

In the High-Tech Manhattan future, clusters of companies that once competed with each other in global markets have moved their operations out of the Valley to their end markets or to less expensive production sites. In discussions with industry leaders, this prospect appeared very possible, if not likely.

One of the important consequences of this pattern is a reduction in the level of new business formation in the region. One of the key causes would be the loss of research and development skills and entrepreneurial thinkers during a decade of economic “hollowing out.” In this scenario, companies are thinking globally but not locally. They are not concerned with Valley economic issues. “Local” becomes everywhere companies have operations. See Figure VI-1.

![Figure VI-1 Scenario 1: High-Tech Manhattan](image)

Infrastructure Dynamic

The High-Tech Manhattan scenario does not arrive unheralded. During the 1990s, the region’s imbalance between enterprise and infrastructure grows. The region fails to resolve Valley issues, such as commercial and housing growth, permitting, and environmental concerns. This denies the region a comparative advantage in skills and R&D that might retain industry.
During the 1990s, companies repeatedly find the wide array of government agencies and community conflicts about policies a deterrent to further growth. As other competing regions offer increasingly developed skills, R&D resources, and manageable facilities costs, companies begin to scale down remaining operations. In the end, the Valley region does not view itself as a business with a portfolio of assets that need to be managed. The Valley loses its distinct identity. By decade’s end, it is where other regions’ economies “came from.”

High-Tech Manhattan Scorecard: Win-Lose

This scenario results in a win for companies and a lose for the regional economy and community. Large enterprises based in the Valley continue to do well as global corporations. Suppliers of engineering, components, and services close or follow their companies into global markets. Some of the innovative resources that once served companies well will have been dismantled in the Valley. Generation of new enterprises that create jobs will decrease.

During this maturation of the regional economy, job loss will be significant as development, engineering, production, and sales are concentrated in markets outside the Valley. New job creation will be in services, administration, marketing, and, to some extent, research—not development, engineering, or production.

The results will have a large negative economic multiplier effect on the Silicon Valley economy: possible loss of 20%-30% of today’s jobs, replacement jobs with lower wages, regional per capita income decline by 15%. Because of this negative effect and out-migration, housing markets will experience lower demand and prices will substantially drop. The lower tax base would worsen the declining infrastructure of highways, bridges, and environmental systems. See Table VI-1.

Table VI-1

<table>
<thead>
<tr>
<th>Enterprise</th>
<th>Community</th>
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<tbody>
<tr>
<td>• Large share of global markets</td>
<td>• Regional share of value added is 20%-30%.</td>
</tr>
<tr>
<td>• High profitability</td>
<td>• Employment slides to 30% of 1990 levels with</td>
</tr>
<tr>
<td>• Lost local competitive advantage</td>
<td>negative multiplier.</td>
</tr>
<tr>
<td>• Valley innovation foundry gone</td>
<td>• Regional per capita income drops 15% or more.</td>
</tr>
<tr>
<td></td>
<td>• Housing prices drop 35% because of out-migration.</td>
</tr>
<tr>
<td></td>
<td>• Skills and entrepreneurship decline.</td>
</tr>
<tr>
<td></td>
<td>• Infrastructure deteriorates because of lower tax</td>
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<td>base.</td>
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</table>
Virtual Valley

This scenario is very close to the track we are on today. The Valley continues its shift in structure to emphasize research, development, limited high value-added manufacturing, marketing, and administration. Growth plateaus in the region and increases in end markets and competing regions.

Enterprise Dynamic

The positive aspect of the Virtual Valley is its energy and continual change. Companies are evolving toward “network corporation.” Internal operations specialize in design or marketing, an integrated chain of production.

In this environment, companies are “virtual” because the corporate structure consists of a network of suppliers, partners, and allies with whom they do business in the Valley. Less worldwide economic activity takes place in Silicon Valley. As networking grows, it declines further.

Enterprises in the Virtual Valley economy are forced into greater specialization by the nature of fast-changing, highly customer-driven markets. They are lean and quick, moving to bring products to market. Companies focus on niche markets that are cost and performance driven.

The environment is highly interactive and interdependent. With the greatest economic asset of intellectual property and innovation comes protection and security. Rewards are structured to preserve employee loyalty. The Virtual Valley’s rate of new enterprise formation declines from unsanctioned spin-offs.

Companies remain smaller, rapidly moving to form alliances in the markets they serve—wherever they are. Only a critical mass of local corporate facilities and operations remains in the Valley. See Figure VI-2.
Infrastructure Dynamic

The Virtual Valley scenario is predicated on a network business environment and a belief that the Valley's communities have decided that the region has reached a carrying capacity of people and enterprise.

The decade is characterized by development policies emphasizing status quo. New growth should not take place within or adjacent to the Valley. Environmental policies remain guarded and deter development of production activities. Biomedical companies are discouraged from establishing R&D facilities, because laboratory wastes have increasingly expensive disposal costs.

Growth accommodation tends to focus on reuse of existing land. Some growth occurs in accommodating neighbors between Fremont and Tracy; much flows to regional centers with more skills, technology, and production-related capacity. The region tops out in growth and reinvests less in building its comparative position in research, training, and advanced infrastructure.

Virtual Valley Scorecard: Win-Draw

Companies perform well in the Virtual Valley scenario but the region does less well. The good news is that the Valley retains a fair amount of the total value added produced by companies—possibly 40%–50% (compared to 55%–65% now). The bad news is that employment declines 20%–30% from 1990 levels and remains volatile.

One other important negative feature of this scenario, is the failure of the region to absorb the skills made available by the declining defense industry. As defense cuts are seriously deployed, Lockheed, FMC, UTC, Loral, and a wide variety of other defense contractors continue to make periodic layoffs. To some extent, the first waves of software and appropriately skilled workers are absorbed by regional firms. The absence of any systematic efforts to prepare or adapt former defense employees results in higher unemployment among skilled workers and considerable out-migration. The secondary multiplier effect of the defense layoffs also has a substantial negative ripple effect on the service economy. For every single defense job eliminated, a minimum of one or more service jobs are lost.

Silicon Valley continues as a vital economy at a fairly high cost to employment and per capita income. The inability of the Valley to accommodate growth in the region forces new growth to other regions. Local assets, such as skills and R&D capacity, are distributed more broadly to other regions. See Table VI-2.

Table VI-2

<table>
<thead>
<tr>
<th>Enterprise</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bigger share of global markets</td>
<td>Regional share of value added is 40%–50%.</td>
</tr>
<tr>
<td>Growth outside region</td>
<td>Employment declines to 70% of 1990 levels.</td>
</tr>
<tr>
<td>Decentralized competitive advantage</td>
<td>Per capita income is marginally (10%) lower.</td>
</tr>
<tr>
<td>Lower regional innovation</td>
<td>Two-tiered economy stresses community.</td>
</tr>
<tr>
<td></td>
<td>Housing prices decline 20%.</td>
</tr>
<tr>
<td></td>
<td>Regional infrastructure improves marginally.</td>
</tr>
</tbody>
</table>
American Technopolis

Silicon Valley has long been the model for the advanced economies of the world. American Technopolis portrays a scenario in which the comparative advantages that shaped and reinforced the economic uniqueness of the past are reengineered for a successful next generation. The term American Technopolis does not necessarily imply greater urbanization or even growth. It means simply that vital enterprises are supported by economic infrastructure.

Enterprise Dynamic

American Technopolis is an environment in which the headquarters of Valley companies remain. Relative to other scenarios, this one includes a slightly larger share of R&D, engineering, and production. The velocity and amount of new enterprise formation are higher. The economic ecology of the region accommodates the needs of companies to downsize. In this environment the generation of new enterprise offsets the losses, without necessarily creating substantial net new growth. American Technopolis is not a growth scenario as much as it is a picture of dynamic balance between enterprise and economic infrastructure.

American Technopolis is a region in which integrated and network companies alike can profitably do business. The region is characterized by a strong linkage between the stages of advanced research, development, production, and marketing. The economy retains a slightly higher level of value added in the regional economy than today's—possibly 60% to 70%. The diversity of enterprise and concentrated capacity to produce high value allows more economic resources to be channeled into and through the Silicon Valley.

Companies have learned to work better together, building on their emerging experiences in strategic alliances. The region becomes a model of a hybrid American keiretsu or buyer-supplier network.

The diversity of the economy—flowing out of the software, communications, and biomedical technology trends of the 1990s—allows a variety of clusters of industry to grow. These enterprises are not necessarily large, but create high value in the form of limited-run customized products and licenses to other producers.

This diversity combined with the retention of administrative headquarters, R&D, and selected engineering and specialized production gives the Valley a strong portfolio of value and variety to renew its economy continually. The region becomes an incubator without walls, an environment in which the formation and growth of new enterprise occur easily. This fertile milieu, which existed in the 1970s and early 1980s, depends on a positive corporate culture that fosters spin-offs, rather than holds them internally. It encourages risk taking by employees that extends beyond product innovation. In part, more flexible human resource policies and less litigious practices contribute to an environment that generates new enterprises. See Figure IV-3.
Infrastructure Dynamic

The most salient feature of the American Technopolis scenario is the way in which business, the public sector, and the community collaborate on economic infrastructure issues. The region's future is shaped by a shared vision of an evolving economy. This vision links requirements for a successful economy to choices in management of regional assets such as land, environment, education, research, and communications.

To have arrived at the American Technopolis, the region will have reached productive compromises and made innovative investments in the region. These choices will have reinforced the Silicon Valley's comparative advantage and added new capacities.

Efforts to create new resources to support early stage research and development will have been achieved. These efforts might take the form of research consortia and other partnership initiatives between businesses or with government participation. Efforts to accelerate technology transfer and productivity improvements to suppliers may also be at work.

The potential mismatch between the skills of the regional work force and emerging company needs might have been addressed through innovative school initiatives and by creating new training institutions. Financial resources focusing on new enterprise in the region would be grown.

Leaders in the region will have understood that infrastructure problems need to be addressed in a coordinated, negotiated manner. Trade-offs within and across communities will reconcile regionwide growth requirements, including reuse or conversion of surplus commercial space to
housing or new industrial needs. Regulatory hurdles would be restructured and managed in more businesslike manners. Innovative solutions to environmental processing problems of emerging industries would be developed by businesses or government. Strategic partnerships could be formed to accelerate growth of more advanced telecommunications services.

**American Technopolis Scorecard: Win-Win**

American Technopolis is a scenario that portrays a constructive working relationship across the sectors of the economy and the community, driven by realistic economic perspectives.

Enterprise wins in this scenario because companies have lower costs and higher productivity, with restructuring accommodated and supported by the regional economic infrastructure. The region has assets that retain more value added in the economy—rather than exiling to competitors.

The scenario does not produce extensive additional growth. It creates an economic ecology that grows new enterprises to offset losses and to assist existing companies in meeting supplier needs. In this vital cycle, new enterprises mature, grow, globalize, and seed new enterprises in the region that represent the next generation.

Because of this positive-sum game, the region is able to maintain a modest unemployment level, retain or increase regional per capita income, increase its supply of housing and appropriate corporate facilities, and generate tax revenues to operate an advanced economic infrastructure. See Table VI-3.

**Table VI-3**

**Scorecard: Win-Win**

<table>
<thead>
<tr>
<th>Enterprise</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increased share of global markets</td>
<td>• Enterprise formation offsets restructuring</td>
</tr>
<tr>
<td>• Higher profitability</td>
<td>job loss.</td>
</tr>
<tr>
<td>• Strengthened innovation</td>
<td>• Employment grows 5%–8% annually because of</td>
</tr>
<tr>
<td>• High comparative advantages</td>
<td>diversity and multiplier effect.</td>
</tr>
<tr>
<td></td>
<td>• Per capita income is stable or increases.</td>
</tr>
<tr>
<td></td>
<td>• Housing prices are stable; supply increases.</td>
</tr>
<tr>
<td></td>
<td>• Physical infrastructure improves through</td>
</tr>
<tr>
<td></td>
<td>innovative solutions.</td>
</tr>
</tbody>
</table>
VII. THE CHALLENGE:
JOINT VENTURE:
SILICON VALLEY
Joint Venture: Silicon Valley is an unprecedented effort by Valley enterprises to work together to address the challenges of the future. Choosing a future requires aggressive public and private action to address economic infrastructure challenges and build stronger links between Valley enterprises and the community. Joint Venture: Silicon Valley will address the growing imbalance between enterprises and the community by redesigning key elements of the economic infrastructure to create a more competitive economic environment.

The first step is to diagnose the key warning signs that point toward a Valley at risk and to act before there is a crisis. That is what this Phase I diagnosis is designed to do: alert the community to the possible dangers ahead and mobilize the region to create a vision of its future.

The second phase of Joint Venture: Silicon Valley will develop a strategy for the future. This strategy will identify specific actions to build a competitive economy. This economic environment will bring Valley enterprises and the region back into balance. This phase creates an action agenda that can be implemented by a public-private partnership that will work to create a positive future for the Valley.

The first steps in Phase II involve forming cluster working groups. These working groups will collaborate in developing in-depth analyses of the changing dynamics of the Valley's economic clusters. They will also evaluate the strengths and weaknesses of the Valley's economic infrastructure. Through this process, cluster and economic infrastructure working groups will help to identify critical needs and possible solutions. These views will be brought together to shape a strategic vision for the region—a business plan for the regional economy. Through this process, participants from the private and public sectors will work toward developing a specific action plan as well as a broader consensus around the critical action steps that the region must take.

Joint Venture: Silicon Valley is designed to be action oriented. The initiative will develop consensus-based initiatives that will address critical problems with the current economic infrastructure in areas such as technology, skills, capital, physical infrastructure, regulatory environment, and quality of life. These actions will be driven by the needs of enterprises and linked together in an overall strategy for the economic competitiveness of the Silicon Valley.

The bottom line is that Joint Venture: Silicon Valley is about organizing economic assets to create and maintain competitive advantage. Silicon Valley did not have to organize in the past, but today competition is too great. Now is the time for Silicon Valley to choose its own future before the future is chosen for the region.
APPENDIX A: SILICON VALLEY COMMUNITY SURVEY SUMMARY
Objective

As part of a comprehensive assessment of Silicon Valley, Larry N. Gerston, Ph.D., conducted a public opinion survey of Silicon Valley residents. The purpose of the telephone survey was both to gather quantitative data on public opinion and to determine the extent to which the public's values reflected those of the business and political communities.

The major themes of the survey focused on:

- Likes and dislikes of the region
- The extent to which respondents perceived current as well as future opportunities
- Perceptions of the job market
- Degree of interest in moving and/or living away from the region
- The state of the area's public education systems
- Whether respondents would still locate here and why/why not
- The lengths of typical work weeks and commute patterns
- The appropriate agents for solving problems such as education, jobs, housing, and traffic
- The trade-offs, if any, respondents would be willing to make in exchange for area betterment.

In addition, the survey inquired about traditional demographic information—i.e., age, education, race, income, gender, political party affiliation, and place of residence.

Methodology

The author prepared a 42-question survey instrument to gain knowledge of the issues listed above. All 42 questions relied upon the "closed-ended" approach to prevent potentially subjective treatment of the basic information provided by the respondents. Interviewers controlled for residential jurisdictions and age minimums through appropriate screening procedures.

The survey was administered during the late afternoons and evenings of April 26–30, 1992, to 519 respondents in the Silicon Valley region. A computerized random-digit-dialing program was utilized, assuring that telephone inquiries would be distributed to residents with unlisted as well as listed phone numbers. The number of participants in the survey was sufficient to assure a 95% confidence level that the representativeness of their replies would be within +/-4% of the region as a whole.

Survey breakdowns by gender, age distributions, and voter registration offer further indications of representativeness. Race was the only major category not reflecting demographic proportionality; whereas Census Bureau data suggest that Hispanics constitute approximately 18% of the region, only 13% participated in the survey.

Silicon Valley was defined as the portion of San Mateo County from the San Francisco Airport south, through the entirety of Santa Clara County, and as far north as Fremont in Alameda County. Thus, the region encompassed all or parts of four counties and 32 cities.
Findings

Defining the Region

For most residents of the area, Silicon Valley has more of an ethereal quality than any substantive meaning. When asked to choose from a list of descriptions, 30% of the respondents classified the area as “a place of innovation,” 10% said “a state of mind,” and 8% replied “a culture.” On a more concrete level, 23% referred to the area as “an economy,” with 11% describing the region as “a collection of cities.”

Likes and Dislikes of the Region

Citizens appreciate the area more for its beauty than economic opportunities. When asked what they like most about Silicon Valley, 70% of the respondents selected climate and physical environment. Of those elements they liked least, nearly half (46%) pointed to housing prices, followed by 27% who cited transportation problems.

Perceptions of the Job Market

Vocationally, Silicon Valley is still viewed as a center of high-tech industries. Half the respondents pointed to computers and electronics as the industries that provide the best job opportunities; the medicine and biomedical category came in a distant second with 17%. As for those jobs with the least opportunities, 21% cited employment in the public sector, followed by 19% who referred to sales and service positions, followed by 14% who pointed to law.

Of interest is that 13%—one out of eight—responded that the computer and electronics industries had the worst job opportunities.

Levels of Satisfaction

The results indicate a growing restlessness among some members of the region. For example, within the past 12 months, 13% have seriously looked for work outside the region; 19% replied that they had looked for housing outside the region during the same period. When asked whether they would move to the area if they could start afresh in Silicon Valley, respondents answered in the affirmative by a 61% to 36% margin.

Of greater importance, however, was a breakdown of the perception by age. The survey showed a willingness of young people to work or live away from the region, suggesting the possibility of future labor and talent drains. One-fifth of those between 18 and 30 have looked for
jobs out of the area within the past 12 months; likewise, one-quarter of those in the 18–30 age group have looked for housing outside the area. Clearly, the young are not optimistic about life in Silicon Valley.

**Comparing the Present with the Future**

The results suggest that Silicon Valley residents may be at a crossroads. When asked if they are better off today than five years ago, 50% said yes, 31% indicated no change, and 18% said they were worse off. However, only 11% thought there are more work opportunities today, compared to 47% who believed there are fewer work opportunities.

When asked about predicting their condition five years from now, 47% thought there would be fewer work opportunities, in contrast to 11% who predicted a brighter future.

**Traditional Patterns in Some Respects**

Despite contentions to the contrary, residents of the area spend traditional lengths of time at work. The survey found that of those who are employed, 39% spend 31–40 hours per week on the job, and 32% spend between 41 and 50 hours in a working environment. Only 13% are at work for more than 50 hours per week.

Commute patterns are also more conventional than some observers might have thought. Of those who work, 48% have daily round-trip commutes of 30 minutes or less, and 30% complete their daily round trips in less than an hour. Nineteen percent of those in the work force are on the road each day for more than one hour.

**Questions about the Private Sector’s Commitment**

The survey finds that respondents are uncertain about the extent of commitment by business to Silicon Valley. When asked “to what extent do you believe major businesses are committed to remaining in the area?” 23% replied “a lot,” 42% answered “somewhat,” and 32% responded “not much.”

**Trade-Offs for a Better Life**

Respondents were presented a series of economic and social trade-offs in exchange for a better life in the region. The possibilities included employee training, merged local governments and services, longer work commutes, increased taxes, and higher density. Of these possibilities, only employee training (83%) and regional government (70%) attracted significant support. The
remaining categories drew relatively small percentages of affirmative responses. They included longer commutes (39%), higher taxes (38%), and greater housing density patterns (29%).

With respect to the results from the cross-tabulations, those in income brackets between $50,000 and $100,000 were considerably more supportive of higher taxes and longer commutes, but never to the point of constituting majorities in their subsets. Residents in Santa Clara County were most supportive of regional governments and offered the greatest backing for higher taxes, although still in the 40% range.
APPENDIX B: PHASE I METHOD
The purpose of Phase I of Joint Venture: Silicon Valley has been to identify regional economic issues and key questions that should be investigated and acted upon in Phase II. Phase II of Joint Venture: Silicon Valley will develop a regional strategy and action initiatives for the next-generation Valley economy. SRI International’s Center for Economic Competitiveness (CEC) designed and carried out the diagnostic work in this phase, setting the stage for Phase II.

Phase I was carried out over three months and included ten activities essential to the start-up of a regional initiative for next-generation Silicon Valley economy:

Working Group

A working group was formed, comprising major industry associations and key companies. Working-group members are executive directors of industry associations and appropriate corporate managers. In addition to having their sponsorship, the working group has the mission of providing technical and process support to the initiative in this early stage. Members met bi-weekly to review the diagnostic activities and plan the kickoff of the overall initiative.

Advisory Board

An advisory board for Joint Venture: Silicon Valley was formed early in this phase to provide senior executive support and strategic direction for the overall initiative. The board members are CEOs of leading Valley companies. The advisory board met several times during this phase and will guide the initiative as it continues.

Economic Development Directors Working Group

A working group consisting of the economic development directors of communities in the Silicon Valley region was formed to advise on economic perspectives during the initiative. This group was convened twice during this diagnostic process and will become more directly involved as Phase II begins.

Leadership Interviews

100 industry, government, education, and community-organization leaders were interviewed during this diagnostic phase. An interview guide was prepared focusing on questions pertaining to current views of the Valley economy, positive and negative forces shaping it today, expected future for the Valley, and requirements for evolving the Valley to its next generation. Interview
content was analyzed to define major issues, areas of agreement and disagreement, and key themes to shape Phase II of the initiative.

Community Survey

In order to identify community perceptions of the current status and risks facing the Silicon Valley, a random-probability sample of 550 residents of the region was carried out by Professor Larry Gerston, a public-opinion-poll consultant (see Appendix A). The sample included residents from Santa Clara County, and census tracts in South Alameda County, East Santa Cruz County, and South San Mateo County. A telephone survey was carried out using a set of questions designed with SRI International's Center for Economic Competitiveness, based on preliminary insights of leadership interviews and economic analysis. The resulting data were entered and cross-tabulated. The pertinent findings are used in this report and were used to build the cases presented.

Economic Analysis

No primary data were collected about the Silicon Valley in this phase of Joint Venture: Silicon Valley. Only existing data were analyzed. SRI's CEC worked with the Center for the Continuing Study of the California Economy to analyze historic data on the economic performance of the Silicon Valley. CEC was also assisted by Professor Richard Gordon, Silicon Valley Research Group, University of California, Santa Cruz, who has an ongoing program studying the Valley, as well as by the Phil Kohlenberg, State Employment Development Department (EDD), who offered information from the State of California. The analysis involved reviewing the change in employment and unemployment, comparative employment growth over time, changes in manufacturing as part of overall employment, occupational shifts within manufacturing (production and nonproduction workers), and net growth of enterprise in the region.

Economic Infrastructure Analysis

No primary data collection was carried out in this phase on economic infrastructure issues. CEC staff used information from interviews with leaders, their materials, and review of existing literature on economic infrastructure to identify challenges pertaining to technology, human resources, finance, physical infrastructure, regulations, and quality of life. In Phase II, a systematic analysis of how each element of the economic infrastructure responds to industrial clusters will be carried out.
Benchmarking


Challenge Scenarios

Three challenge scenarios were created to illustrate possible futures toward which Silicon Valley may move depending on local choices. These scenarios were based on a fixed set of assumptions concerning the global economy and a changing set of responses by the Valley to these factors. The scenarios were meant to be thought provoking, not a prediction of things to come. Development of the Valley’s strategic vision is independent of these examples.

Presentation and Report

SRI’s CEC analyzed the set of materials described above and developed the summary presentation delivery on June 23 at the kickoff of Joint Venture: Silicon Valley. This report presents the key analytic findings and sets the stage for beginning Phase II actions.
APPENDIX C: REFERENCES

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ACKNOWLEDGMENTS

Many people gave their time and energy to assist us in this report. Their efforts included ferreting out important data and information, molding ideas, setting up interviews, and handling logistics. For all of this we are grateful. Thank you.

Center for the Continuing Study of the California Economy—Stephen Levy, Bob Arnold, and Aviva Bernstein

Bill Claggett, San Jose Office of Economic Development

Shannon Fryhoff, PRx

Richard Gordon, Silicon Valley Research Group, and University of California, Santa Cruz

Sharon Hart, Applied Materials

Jamie Heisler, California Employment Development Department (EDD)

Pitch Johnson, Asset Management Company

Marie R. Jones, Center for Economic Conversion

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