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How the Silicon Valley innovation ecosystem creates success

iKuben Delegation

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– Focus on science, technology, and innovation (STI) policy.  
– Co-founder of Peer Insight in 2003 to help develop the science of service innovation.  
– Developed new service innovations at The NASDAQ Stock Market.  
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ITIF is an economic and technology policy think tank committed to articulating and advancing an unabashedly pro-productivity and pro-innovation policy agenda internationally, in Washington, and in the states.

ITIF focuses on:

- Innovation and competitiveness
- Science/technology policy
- Digital transformation (E-commerce, e-government, e-health, etc.)
- ICT and economic productivity
- Broadband/Internet tech policies
- Energy innovation/Climate change policy
Today’s Presentation

1. What is Innovation and Why Does it Matter?

2. The Silicon Valley Innovation Ecosystem

3. Characteristics of Innovative Silicon Valley Firms
What is Innovation and Why Does It Matter?

- The improvement of existing or the creation of entirely new products, processes, or services.
- The creation of new value for the world.
- The transformation of existing conditions into preferred ones.

***********

- It’s the core driver of modern economic growth.
- 90% of the variation in the growth of income per worker across nations is attributable to innovation.
Create separation from your competitive set

Do something that customers value highly and that your competitors either **cannot** or **will not** do

Thereby gaining bargaining power to earn revenues and margins

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Sustaining Innovation

Constant Improvement

Reliability

Scale

Responding to Trends

Breakthrough Innovation

New Solutions

Unexpected Surprises

Experimentation

Leveraging Trends
Innovation Continuum

Possible   Expected   Required

Impossible   Impractical
Impossible  Impractical  Possible  Expected  Required

Breakthrough Innovation
A Balanced Allocation of Innovation Resources/Efforts

On average, a balanced portfolio likely has about 70% of activity happening in the Core; 20% in Adjacent; and 10% in Transformational.
Expected Returns from Innovation Investments

With that distribution, the cumulative return on investment is virtually the inverse: 70% of long-term return on innovation investment will likely come from Transformational bets, 20% from Adjacent ones and 10% from ongoing operations in the Core.
Today’s Presentation

1. What is Innovation and Why Does it Matter?

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What is Silicon Valley?

- 1,854 sq. miles
- 2.9 million people
- 1.4 million jobs
- Represents world’s 19th largest economy
Innovation-Based Jobs Represent a Larger Share of Employment in SV than Anywhere Else in the U.S.
1) The world’s greatest assembly of scientific research capacity:

- Five world-class research universities:
  - UC Berkeley, Stanford, UC Davis, UC Santa Cruz, UC San Francisco

- Five U.S. national laboratories:
  - Lawrence Berkeley, Lawrence Livermore, Sandia, NASA Ames, and the Stanford Linear Accelerator (SLAC)

- Multiple world-class research institutions:
  - Xerox PARC, SRI, CITRIS, IFTF, JBEI, Buck Center on Aging
  - Corporate research labs: HP, Google, Agilent, Intel, Genentech, IBM

2) Seven decades of intensive federal R&D, seeding $$ and technology

- On average, Santa Clara county received more federal funding for R&D than any other U.S. county from 1950 through 1995
- DoD/DARPA a key driver of investment and innovation
3) World-leading access to risk capital:
   - 40 percent of U.S. venture capital invested in Silicon Valley/Bay Area
   - 7 of the Top 10 U.S. VCs in terms of funding and exits in the Valley.

4) Many of the world’s most innovative companies
   - 6 of the top 10 technology companies globally, with a combined market cap of $1.8 trillion, are located within a 10 sq. mile radius.
   - Silicon Valley’s startup ecosystem is 3x bigger than New York City, 4.5x bigger than London, 12.5x bigger than Berlin.

5) Inviting location for high-skilled talent, especially foreign immigrants
   - % of Bachelors, Masters, PhD holders twice the national average.
   - More than ½ Bay Area startups have at least 1 foreign-born founder.

6) A distinctively entrepreneurial, innovative, and collaborative culture.

*This has given rise to a virtuous, self-sustaining innovation ecosystem.*
Silicon Valley’s Innovation Ecosystem

- Successful Companies
- Talent Draw
- Entrepreneurship Revered
- Self-Referencing Communities
Federal Investment Catalytic to Silicon Valley’s Formation and Continued Dynamism

- DoD investments into integrated circuits foundational to Shockley Semiconductor, Fairchild Semiconductor, and later Intel in the Valley.

- DARPA played key role in developing Internet/other key information/communications techs.
  - Semiconductors;
  - Supercomputers;
  - Lasers;
  - GPS;
  - The Internet;
  - Search Engines
  - Artificial Intelligence;
  - Speech Recognition Technologies;
  - Magnetic Resonance Imaging;
  - The Shale Gas Revolution
Example: The Role of Basic Research in the iPod

- 1988: "giant magnetoresistive effect" (GMR) is discovered, creating the field of spintronics
  
  Basic research foundation: DOE funding for thin-film metallic multilayers

- 1990: development of the lithium-ion battery.
  
  Basic research foundation: DOE funding for Electrochemistry

- 1988: Thin film transistor LCD displays emerge.
  
  Basic research foundation: NIH, NSF, DoD fund liquid crystal research

- 1960–70s: Very Large Scale Integration (VLSI) system and circuit design pioneered.
  
  Basic research foundation: IBM, DARPA funding

- 1965: The “Fast Fourier transform” revolutionizes the field of signal processing.
  
  Basic research foundation: Army Research Office funding
In the mid-1990s, two graduate students received part of a $4.5 million digital libraries research grant from NSF, seeking to better understand, sort, and find information using the Web. They used the funding to develop the BackRub algorithm, precursor to the Google search engine. Today, Google has 46,000 full-time employees, and is worth $370 billion. The return-on-investment ratio is greater than the ratio of the red dot to the white circle on the next slide.
Government-funded university research yields substantial social returns

- Hundreds of companies directly trace their origin to federally-funded university-based research.

http://www.sciencecoalition.org/successstories
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<th>Company Name</th>
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<td>CS-Keys</td>
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US “Innovation Capital”

>$475 billion invested in 2012

- US Corporate R&D: $280bn
- US Government R&D: $125bn
- US University R&D: $25bn
- US VC: $24.3bn
- US CVC: $4.4bn

Angel Capital
US VC
US CVC
US Corp R&D
US Govt R&D
US Unis R&D
Crowd Funding
Venture Capital Has Been Indispensable

- **VCs’ Mission**
  - Identify and sponsor entrepreneurs with world-changing ideas
  - VCs invest approximately $25 billion annually in the U.S.
  - 792 VC firms nationwide
  - Over 2,000 new companies financed each year

- **VCs’ Results**
  - $2.9 trillion in aggregate revenue
  - 12.1 million jobs created

22% US GDP, 11% U.S. Private Sector Jobs
ENTIRE NEW INDUSTRIES

Venture Capital Creates New Industries

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<th>Industry</th>
<th>% Employment</th>
<th>% Revenues</th>
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<td>90%</td>
<td>40%</td>
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<td>Biotech</td>
<td>74%</td>
<td>80%</td>
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<td>Semiconductors/ electronics</td>
<td>72%</td>
<td>88%</td>
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<td>Computers</td>
<td>54%</td>
<td>46%</td>
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Source: National Venture Capital Association (NVCA)
Silicon Valley Accounts for 40% U.S. VC Investment
Silicon Valley Venture Capital By Sector
Silicon Valley Accounts for 13-15% of U.S. IPOs Annually
1. Must be led by entrepreneurs
   • They are the leaders
   • Everybody else – universities, governments, VCs, angels, lawyers, accountants and bankers – are the “feeders”
   • Feeders are essential but cannot themselves create an entrepreneurial community
2. Entrepreneurs need to take a long term (generational) view
3. Everybody must adopt a philosophy of inclusiveness
4. People need to hold substantive activities and events that engage the entire entrepreneurial stack
Silicon Valley Dominates

The 2012 Global Startup Ecosystem Index

<table>
<thead>
<tr>
<th>Ecosystem</th>
<th>Ranking</th>
<th>Startup Output Index</th>
<th>Funding Index</th>
<th>Performance Index</th>
<th>Talent Index</th>
<th>Support Index</th>
<th>Mindset Index</th>
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How Silicon Valley Compares to the Global Average of All Startup Ecosystems

- Capital raised in SV is 32% higher across all stages of a startup’s development
- SV has 20% more mentors
- SV has 35% more serial entrepreneurs
- Silicon Valley entrepreneurs are much more ambitious, shown by how they:
  - Entrepreneur’s ambition in Silicon Valley is paramount compared to entrepreneur’s ambition on average across all other ecosystems.
  - work longer hours daily.
  - are more committed to work full time.
  - are 19% more likely to motivate themselves by the vision of changing the world, rather than just building a good product
  - are 30% less likely to tackle ‘niche’ markets.
The New Innovation System is Intensely Collaborative

Innovation Awards to Interorganizational Collaborations

Foreign Born Talent a Key Asset for the Valley

Percentage of the Total Population Who Are Foreign Born
Santa Clara & San Mateo Counties, California, and the United States
2012

Percentage
Silicon Valley: 36.4%
California: 27.1%
United States: 13.0%

Immigrant-Founded Start-Ups as a Percent of Total Start-Ups in Tech Centers

Today’s Presentation

1. What is Innovation and Why Does it Matter?

2. The Silicon Valley Innovation Ecosystem

3. Characteristics of Innovative Silicon Valley Firms
Silicon Valley’s Culture of Innovation

- Assessed 275 Bay Area companies included in the 2011 Global Innovation 1000 Index.

- Found that a “distinct culture of innovation exists among Bay Area companies.”
  - Openness to new ideas;
  - Question the “status quo”;
  - Do things that have never been done before;
  - Set ridiculously ambition goals;
  - Easy movement of people, ideas, and capital;
  - Experiment, rapidly iterate;
  - Take acceptable risks and don’t fear failure;
  - Fail fast to succeed sooner;
  - Get to market first because scale matters;
  - It’s not how much R&D $ you invest, but how you invest them.
There are Three Types of Companies

1) "Need Seekers" (e.g., Apple)
   - Adopt a first-mover strategy;
   - Actively engage current and potential customers to help shape new products and services based on a superior understanding of their customers’ needs;
   - Strive to address unarticulated needs and work to be first to market with the resulting new products and services.

2) "Market Readers" (e.g., Samsung)
   - Adopt a second-mover strategy;
   - Closely monitor both customers and competitors, but maintain a more cautious approach;
   - Focus largely on creating value through incremental innovations to their products and being “fast followers” in the marketplace.
There are Three Types of Companies

3) “Technology Drivers” (e.g., Google)
   - Follow the direction suggested by their technological capabilities, leveraging their sustained investments in R&D to drive both breakthrough innovation and incremental change;
   - Least proactive in directly contacting customers;
   - Often seek to solve the unarticulated needs of their customers through leading-edge new technology.
“Need Seekers” Dominate in the Bay Area

- Nearly ½ of all Bay Area companies are “Need Seekers”;
- Nearly 2x the national average.

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**Strategy Distribution – Overall Survey Companies**

- Need Seekers: 38.3%
- Market Readers: 27.7%
- Technology Drivers: 33.9%

**Strategy Distribution – Bay Area HQ Companies**

- Need Seekers: 35.7%
- Market Readers: 17.9%
- Technology Drivers: 46.4%

N = 595

1 Statistically Derived Strategy Segments
2 Booz & Company Industry Classification

N = 28
“Need Seekers” Better Align Their Innovation Strategy with Their Business Strategies

- 3 times more likely to report strong alignment than other approaches
“Need Seekers” Corporate Culture Supports Innovation

- 3 to 7 times more likely to report strong alignment
The Most Successful Innovators Align Their Innovation Strategy, Corporate Strategy, and Culture

![Graph showing gross profit and enterprise value by core profile models.](image-url)
What are the Successful Innovators’ Secrets?
- They Have an Innovation Strategy, Led by Senior Mgmt.
What are the Successful Innovators’ Secrets?
- Their Technology Teams Report Directly to the CEO
What are the Successful Innovators’ Secrets?
- They Continuously Refresh Product Development Talent
What are the Successful Innovators’ Secrets?

- They Start with Customer Needs

**Traditional NPD Model**

Technology → Products, services → Superb quality, Amazing features, Affordable price → Customers

**cX Model**

Technology → Technical feasibility → Envision possible experiences → Important, meaningful challenges in their lives → Customers we want

Business model → Products, services → Compelling experiences
Tusen Takk!

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