Silicon Valley

fission, innovation & wealth

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Introduction

- Introduction
- A brief history
- Economic success by fission
- Venture capital
- Attempts at replication
- Conclusions

California

- California is not a low-cost state
- It cannot compete by lowering costs
- To compete and to raise the standard of living it needs a “pro-innovation” strategy
- It must promote the positive: “California assets”
- It must retain and grow current employers as the first priority, by improving the business climate

San Francisco

- 1579 Sir Frances Drake explores the Bay
- 1849 California gold rush
- 1868 University of California founded
- 1869 First train from the east coast
- 1891 Stanford University founded
- 1906 San Francisco earthquake
- 1937 Opening of the Golden Gate Bridge
- 1937 Hewlett-Packard started in a garage
- 1947 Varian Associates founded
- 1955 Shockley Semiconductor founded
- 1970 Xerox Palo Alto Research Center (PARC)

Silicon Valley

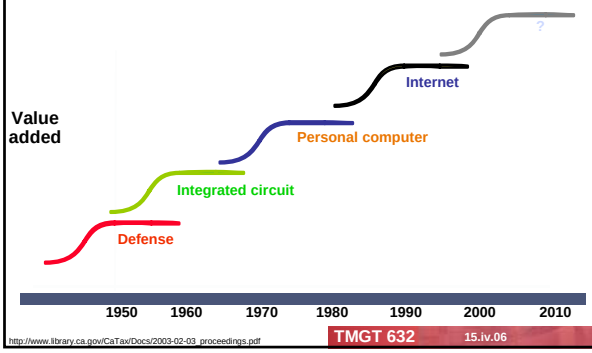
- Bay Area
- Santa Clara
- San Jose
- Palo Alto
- Cupertino
- Saratoga
- Redwood springs

Silicon Valley

- A technological utopia
- An agglomeration of semiconductor and computer companies in the San Francisco Bay Area of California
- A metaphor for the geographic area where those companies cluster
- An ideal to be replicated

"Silicon Valley is the only place on Earth not trying to figure out how to become Silicon Valley." Bob Metcalfe, Founder 3com.

Schumpeter and evolution in Silicon Valley



http://www.library.ca.gov/CaTax/Docs/2003-02-03_proceedings.pdf

Moving away from agriculture

- San Jose produced agricultural products
- Hewlett and Packard in 1937 started their business in a garage making measurement equipment
- During the Second World War San Jose expanded into armaments
- Initially electronics were developed and produced for the military, especially for aerospace
- Stanford University was a primary site of research and development, based on grants from the Department of Defense
- By the late 1970s, Santa Clara County was receiving $2 billion annually in Defense Department contracts

Shockley and Fairchild(ren)

- William Shockley, co-inventor of the transistor, moved to Palo Alto in 1955
- In 1957 the "traitorous eight" engineers defected from Shockley to join Fairchild Camera and Instrument Corp:
  - Robert Noyce and Gordon Moore later founded Intel
  - Eugene Kleiner, later co-founded Kleiner Perkins
- In 1961 Fairchild developed the technology to became the first company to mass produce integrated circuits
- Fairchild staff later left to create, among others:
  - National Semiconductor
  - Intel
- Hundreds of new businesses appeared, splitting off some to supply, some to use and others to make different types of semiconductors

A special culture

- A magnet for imaginative and intelligent people
- An environment for relaxation (beach, sailing, skiing, theatre, etc.)
- A ready supply of capital
- A tolerance of (serial) failure
- A strong cluster effect
- A combination of cooperation and competition

Organisations

- Universities:
  - Stanford University
  - University of California, Berkeley
- Research laboratories:
  - NASA Ames
  - Xerox PARC
- Finance:
  - Bank of America
  - Kleiner, Perkins, Caufield & Byers

Companies

- Adobe Systems
- Advanced Micro Devices
- Apple Computers
- Cisco Systems
- Cypress Semiconductor
- eBay
- Google
- National Semiconductor
- Netscape
- Oracle
- Seagate
- Silicon Graphics
- Sun Microsystems
- Symantex
- Tandem Computers
- Xilinx

http://www.siliconvalley-usa.com/

Silicon Valley

- 41% of the population has a bachelor's degree (or higher)
- 38% of residents are foreign-born
- 53% of engineers and scientists are foreign-born
- Average per capita income is US$ 53,633
- Estimates from 2002 suggest
- Home to more than 22,000 high-tech firms in 2002
- 9,060 patents were granted to inventors in 2004
- 14% of new cars use alternative fuel sources
- 38% of new cars were compact cars

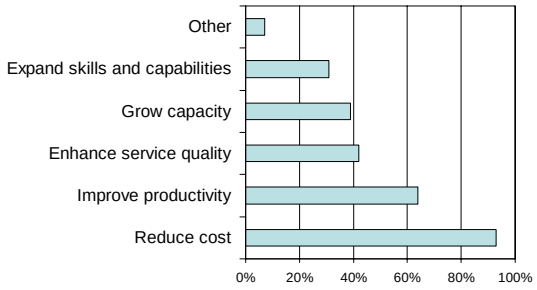
http://www.jointventure.org/

Research to ensure success

- Intensive efforts to ensure continuing success
- Understanding the basis of present success
- Identifying possible future successes
- Looking towards bio-technology

http://sprie.stanford.edu/

Reasons for outsourcing from Silicon Valley



An economic cluster

- Presence of:
  - competitors
  - suppliers
  - customers
  - related institutions (e.g., education and finance)
- Increases productivity of firms in the cluster
- Drives the direction and speed of innovation
- Stimulates the formation of new businesses

Explanations for clusters

- Transactions costs:
  - firms *versus* markets
  - the cost of information
- External economies:
  - urbanisation economies:
    - large labour pool
    - increased density of suppliers
    - large markets
    - knowledge spillovers
  - localisation economies:
    - sharing of specialised labour pool and suppliers
    - monitoring competitors
- Untraded interdependencies

Hollywood

- The *original* California cluster
- Replaced orange groves
- An ideal climate for movies
- Exotic location, attracting future stars
- A pool of actors and actresses
- Production facilities
- Finance
- Special effects

A pop song commentary

It's the edge of the world
And all of western civilization
The sun may rise in the East
At least it settles in the final location
It's understood that Hollywood
sells Californication

Space may be the final frontier
But it's made in a Hollywood basement
Cobain can you hear the spheres
Singing songs off station to station
And Alderon's not far away
It's Californication

http://www.redhotchilipeppers.com/

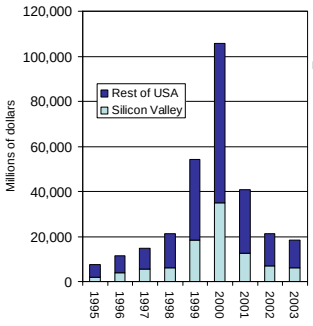
Finance

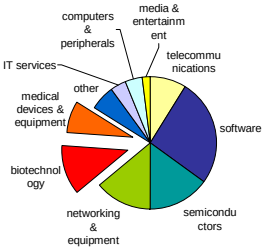
- "angels"
- Venture capitalists:
  - Kleiner, Perkins, Caufield and Byers (KPCB)
  - Sutter Hill Ventures
  - Mayfield Fund
  - Redpoint Ventures
- Investment bankers:
  - Hambrecht and Quist
  - Robertson Steffens
  - Montgomery Securities
  - Morgan Stanley
  - Goldman Sachs

Venture capitalists

- Much more than making investments
- They have experience from previous start-ups
- They know the processes of development
- They can rapidly mobilise the resources and people necessary to create and to support a new firm:
  - executives
  - professionals (lawyers, accountants, consultants, etc.)
- They share the commitment to succeed (and the rewards)

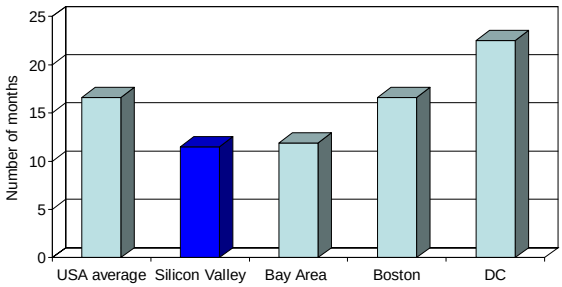
Venture capital in the valley





Distribution by sector in 2005

Time to first-round finance (1992-2001)



Source: http://www.ppic.org/

An archetypal start-up firm

- Is capable of:
  - rapid growth
  - large profits
- Capital gains fuel the process
- Many services are paid in equity
- The created value is realised when entrepreneurs and investors sell:
  - to a bigger company
  - in an Initial Public Offering (IPO)

Special problems with start-ups

- Nothing exists except:
  - the people
  - a business plan
  - a presumed market
- It is necessary to probe plans and the teams with reality checks:
  - are the people believable and trustworthy?
  - do the projections make sense?
  - are the entrepreneurs willing to accept help?
  - is the intellectual property secure?

The good and the bad

Fundable

- High-growth, technology-based businesses
- Stable technologies and real solutions that meet real market needs
- Business concepts tested outside of the classroom
- Capable of venture scale returns
- Decisive, functional teams

Unfundable

- Non-technology businesses or clever gadgets
- Research projects
- Unproved technologies
- Insular ideas that have not been externally validated
- Contract engineering, consulting or family business
- Argumentative, dysfunctional teams

The "idea"

- Only a starting point
- Many successes have been followers (IBM, Microsoft, Lotus 1-2-3)
- Must be development not research
- How long to build the business?
- Can it be replicated by others?
- Are others already out there?
- Can activities be outsourced?
- Can the business be scaled up?

Checklist

- Product, market and industry:
  - demand
  - market size
  - growth rate
  - market capacity
  - attainable market share
  - cost structure
- Factor markets:
  - resources required
  - market structure
- Economics:
  - profit potential
  - time to break-even
  - ROI potential
  - capital requirements
  - IRR
  - free cash flow
  - gross margins
- Competitive advantage
  - variable/fixed costs
  - degree of control
  - entry barriers
  - protectable intellectual property
  - positional advantage
- Personal
  - personal goals
  - personal fit
  - upside *versus* downside
  - opportunity cost
  - stress tolerance
- Sustainable advantage
- Opportunities for extension
- Management team
- Harvest

Stages

- Opportunity description and marketing plan
  - Describe your opportunity, expected penetration, competitive landscape and product differentiation.
  - Describe your marketing and sales plan, including your potential customer base and initial customer targets
  - Include detailed revenue projections and COGS for 5 years (Use a proxy for projections)
  - Proxy Analysis - identify a similar company and compare your projections to their financials at similar stages, be prepared to defend differences between the proxy and your plan
- Operations and development plan
  - Describe your product development and operations plan
  - Expand your financial projections to include detailed 5 year cash flow breakeven
  - Distinguish you're the development phase from your steady state
  - Use your proxy to ground your operating projections
- Capitalisation plan
  - Identify the timing and sources of your operating capital (describe why each investor is appropriate for each stage)
  - Map your risk reduction against your planned fundraising rounds
  - Decide how much capital you want to raise at each round and your anticipated dilution, outlining the projected returns to investors at each investment stage
  - Use your proxy to ground your capital requirements

Dot.com boom and bust

- Massive burst of interest during 1990s
- A rapid acceleration in interest
- Share prices rose dramatically
- Start-ups were driven to rapid IPOs
- Irrational exuberance
- Like all financial bubbles it collapsed
- Very many start-ups died with that

Bubble economies

- C17th Tulips in the Netherlands
- C18th South Sea Co. in England
- C18th Mississippi Co. in France
- C19th canals and railways in UK and USA
- 1990s Dot.com

Silicon clones

- The success of Silicon Valley was quickly spotted in other places
- Considerable efforts to create similar stories
- Sometimes based on:
  - misunderstandings
  - hopeless or willful optimism
- It has proved very difficult to combine:
  - the attractiveness for:
    - people
    - ideas
    - money
  - the absence of:
    - red tape
    - resistance to change

Analogues

- Route 128 (Cambridge, Mass.)
- Silicon Forest (Portland, Oregon)
- Silicon Mountain (Colorado Springs)
- Silicon Island (Singapore)
- Silicon Alley (Manhattan)
- Silicon Valley North (Ottawa)
- Silicon Glen (Scotland)
- Silicon Bog (Ireland)

Ireland

- Very successful in attracting FDI in the ICT sector
- Industrial Development Agency (IDA Ireland) has been very active in marketing Ireland as a location:
  - Apple Computer
  - Dell
  - Intel
  - Microsoft
- Ireland's "unique investment environment"
  - a skilled and flexible workforce
  - one of the lowest corporate tax rates in the world
  - youngest and one of the best educated populations in Europe
  - a positive political and economic environment

http://www.forfas.ie/

Scotland – Silicon Glen

- Began in 1946 with IBM making typewriters
- Expanded in light manufacturing: Honeywell and Timex
- Later to semiconductors: Motorola, Hewlett-Packard and NEC
- Minicomputers: Sun and Digital Equipment Company
- Mobile phones and PCs: IBM and Compaq
- Scattered all over the Scottish lowlands
- Many turned out to be rootless branch plants
- Required the addition of research and development
- Many other locations were fighting for each new round of investment by the companies

Silicon Valleys in Asia

- Malaysia Multimedia Super Corridor
- Saigon Software Park
- Zhongguancun, China
- Software Park Bangkok
- Bali Camp
- Philippines IT Parks
- Hsinchu Science Park, Taiwan
- Dubai Internet City

Conclusions

- Economic clusters are a very important policy aim, but hard to achieve
- Most of the resources for ICTs are highly mobile, even volatile
- Every country and city wants to attract high technology industry
- Businesses can move with each new cycle of technology and investment
- So limited chances of success and little to secure existing investors

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