

# Silicon Valley Scene

## Why and How It Works (When it Does, and Doesn't)

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Many people want to duplicate Silicon Valley, but that's difficult (and not necessarily good idea).

This talk shows how SV works + broader lessons that can be learned from its ups and downs, and applied elsewhere.

Some requirements are well-known, like:

good universities, a skilled talent pool, and  
real venture capital (the most likely lacking item).

Some are not so obvious, like:

cheap working space, the right sorts of lawyers and banks, Fry's Electronics,  
the right restaurants, risk-taking culture, and sometimes unusual social behavior:

In many places, if entrepreneurs started companies and failed, that's The End.  
They'd never get funded again, so many don't try.

John R. Mashey

Wednesday April 6 2011

GRAND: <http://www.grand-nce.ca/about/bod>

# Speaker – John R. Mashey

PA { • **Pennsylvania State University, 1964-1973, BS Math, MS/PhD Computer Science**

• **Bell Labs 1973-1983, MTS → Supervisor, early UNIX**

- Programmer's Workbench, shell programming, text processing, workload measurement/tuning in first UNIX computer center, UNIX+mainframe data mining apps, capacity planning/tuning



• **Convergent Technologies 1983-1984, MTS → Director Software**

- Compiler & OS tuning, uniprocessor/multiprocessor servers

• **MIPS Computer Systems 1985-1992, Mgr. OS → VP Systems Technology**

- System coprocessor, TLB, interrupt-handling; byte addressing(!), halfword instructions; ISA evolution, multiprocessor features, multi-page-size TLB, 64-bit
- MIPS Performance Brief editor; a SPEC benchmarking group founder 1988
- Hot Chips Conference (Stanford) committee ... continuing

• **Silicon Graphics 1992-2000, Director Systems Technology → VP & Chief Scientist**

- MIPS R10000 & later architecture, including performance counters & software
- ccNUMA system architecture (NUMAflex in Origin3000, Altix)
- Performance issues in HPC, DBMS; technology forecasting
- Evangelist, much work with sales and marketing, business development, strategy

• **~Half-retired - advise/consult for Venture Capitalists & high-tech companies**

Technical advisory boards (Dust Networks, Streetline Networks, Transitive, ...);

Computer History Museum ([www.computerhistory.org](http://www.computerhistory.org)) Trustee; VCTaskForce.

Travel; ski; hike; bike; occasionally write articles & do talks for fun ... i.e., ~ half-retired ☺

PA {  
New Jersey {

Silicon Valley {

# Angela Hey

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- **Education**
  - Cambridge - MA Math
  - Waterloo - MMath Combinatorics and Optimization
  - Imperial College - MSc PhD Management Science - Corporate Finance and Set Covering Algorithms - *Led Termite Expedition To Nigeria*
- **Bell Labs- >A T&T 1980-1985 MTS - Department Chief**
  - Telecom Systems Interfaces, Strategic Planning, Software Venture With Digital Research (UNIX Library)
  - Adjunct Professor Marketing - Product Innovation - Rutgers University
- **Silicon Valley - 1985-**
  - Venture Capital Due-Diligence Consulting
  - Startup Marketing Management - Palantir (now Nuance Omnipage), General Magic (PDA), Wireless Online (Smart Antennas)
  - Software Management - Federal Reserve Bank (Check Scanning)
  - Industry Analyst - INPUT (Enterprise Software)
  - Technology Reporter - Mountain View Voice (Home of Google)
  - Enterprise Strategy Consulting - Areva International (now Techviser)
  - Speaking Engagements - Tradeshows, Industry Forums
  - Volunteer Activities - WiFi and Ethernet Installation, Website Development (Wiki, Joomla, WordPress, Google Sites, Adobe, Microsoft, AJAX)

# How Did This Talk Arise?

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- Location
  - Palo Alto, CA 1983-1990
  - Portola Valley, 1990- just up hill from Stanford and Sand Hill Rd  
Cannot go to grocery store or restaurant without stumbling over VCs
- Worked for 3 venture-funded companies
  - Early employee at MIPS, company officer across IPO
  - Frequent traveler & evangelist
- When lecturing around world, often asked:  
“How do we duplicate Silicon Valley?”
  - Not easily, but there are useful lessons.
- 1998 Discussion with Peter Mandelson (UK Secty Trade & Industry)
- Occasional talks on venture capital while at SGI
- Consulting for VCs (due diligence), LP in NEA 10
- Helped get several wireless sensor network companies funded
- Advised other startups
- Late 2007 talk in Singapore; 2008 at Penn State and Princeton

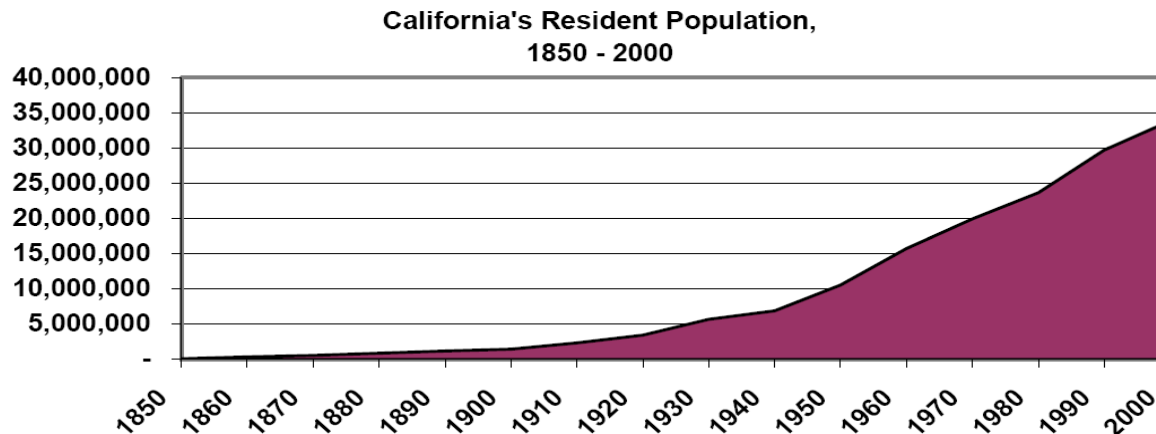
# Overview

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- Brief history of California, San Francisco Bay Area, Silicon Valley (SV)
- Culture, attraction, inward brain drain
- Industrial structure & Cluster
- Education & research universities
- Real estate, lawyers & banks
- Fry's Electronics, Weird Stuff
- **Venture Capitalists (VCs) and Friends**
- Governments
- Summary

# California, Population, History

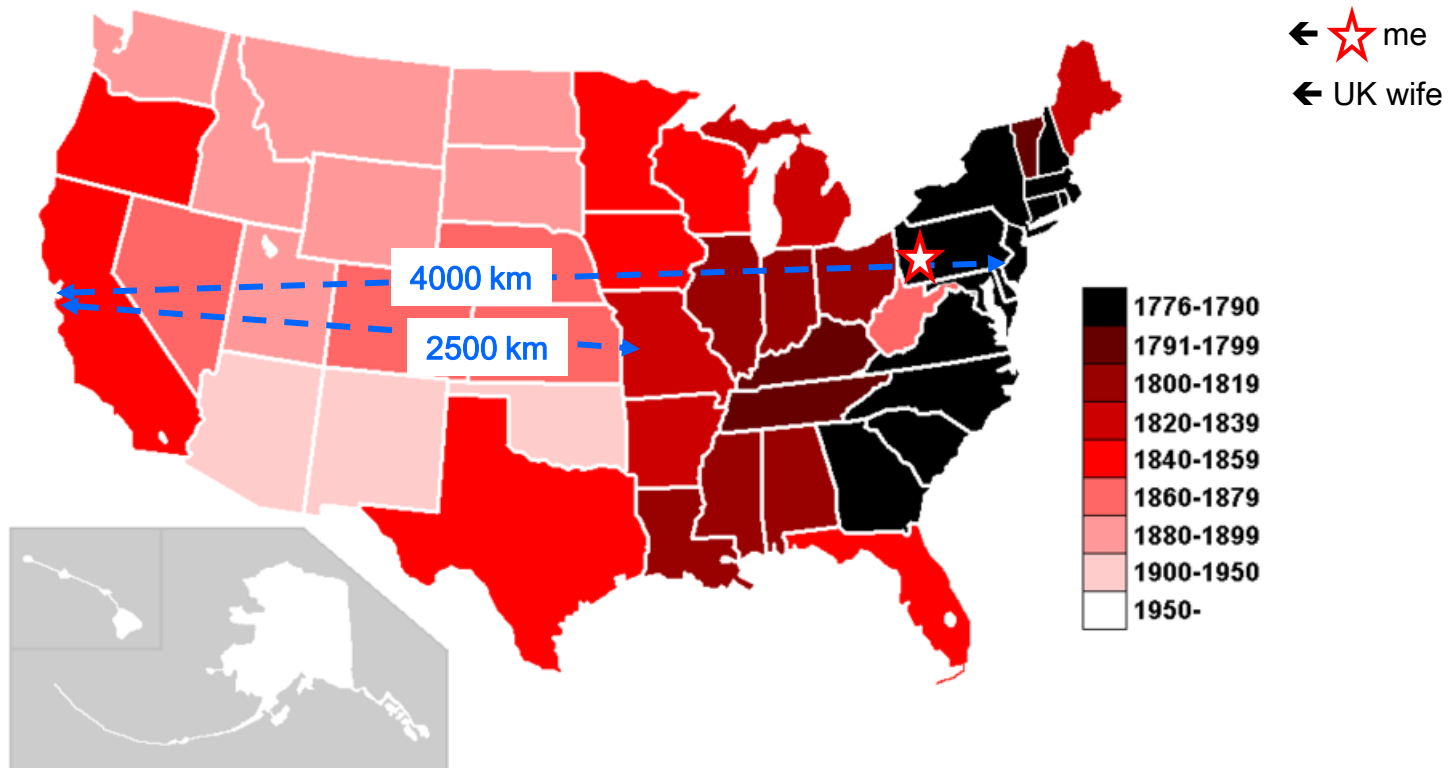
- Now: “Atypical” demographics - younger, more Asian+Hispanic+ (anything)
  - ~36M people, 12% of USA; 17% of GDP, 40+% of venture capital (30% SF Bay)
  - Economy somewhere between #7 and #10 in world
  - Governor ~~Arnold Schwarzenegger~~; Attorney General ~~Jerry Brown~~
  - SF: ~~Speaker of House Nancy Pelosi~~; Senators Dianne Feinstein, Barbara Boxer
  - Special cases, like ability to set emissions control rules for US; own foreign policy
  - Experimental, unruly, chaotic, frequent direct voting referendum; (good / bad)
- Big expansion following World War II
  - Until 1958, Missouri had Westernmost major league baseball (2500km East)



Source: <http://www.census.gov/dmd/www/resapport/states/california.pdf>

# USA, California

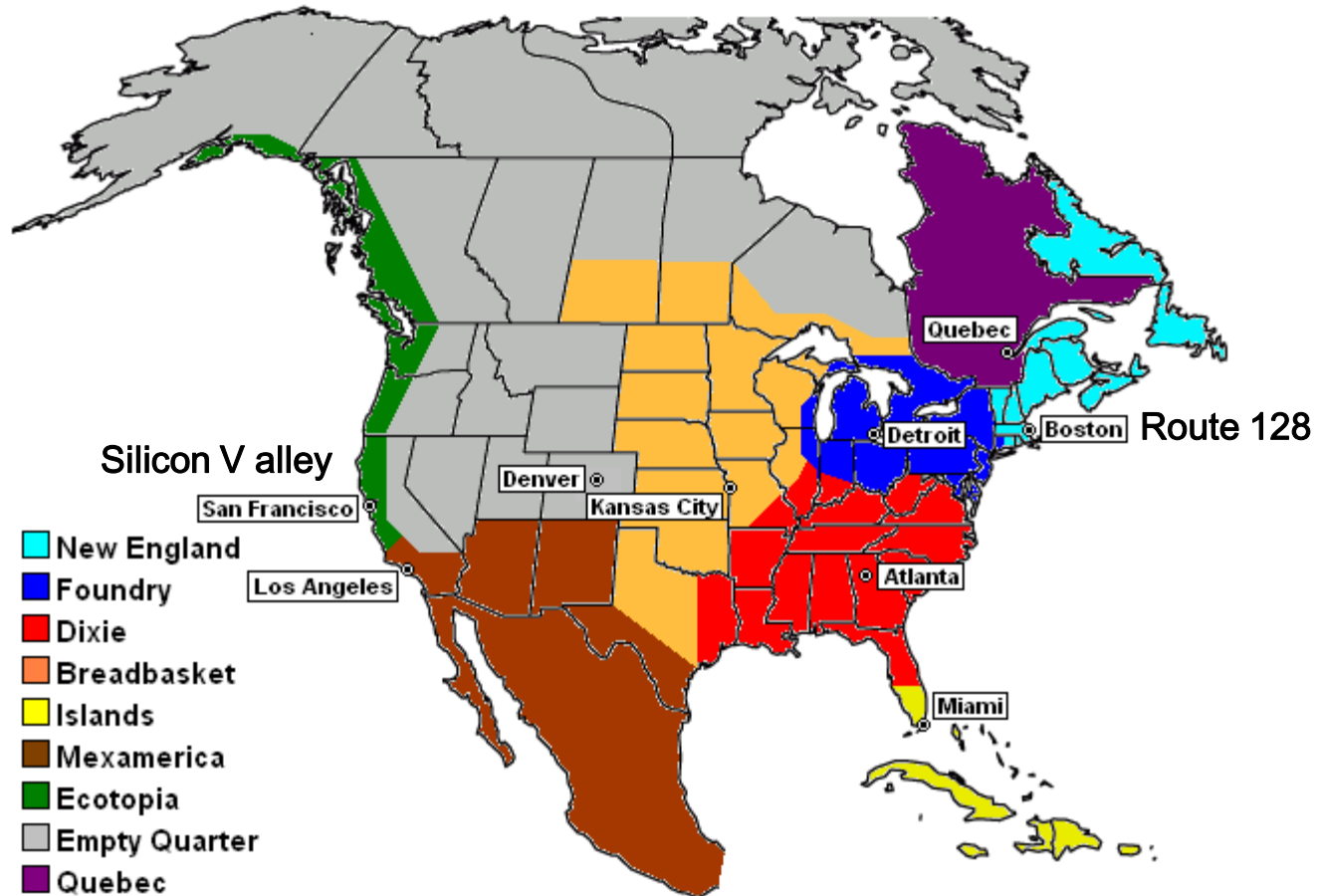
- USA = immigrant country, California especially so
- People moved for opportunity, or to escape rules, **selected for risk-takers**
  - 1849 Gold Rush, not much interest before; long way by wagon train
  - World War II, Pacific Coast ports, GI Bill (education for soldiers)



Source: Wikipedia

Silicon Valley Scene

# USA, Nine Nations View



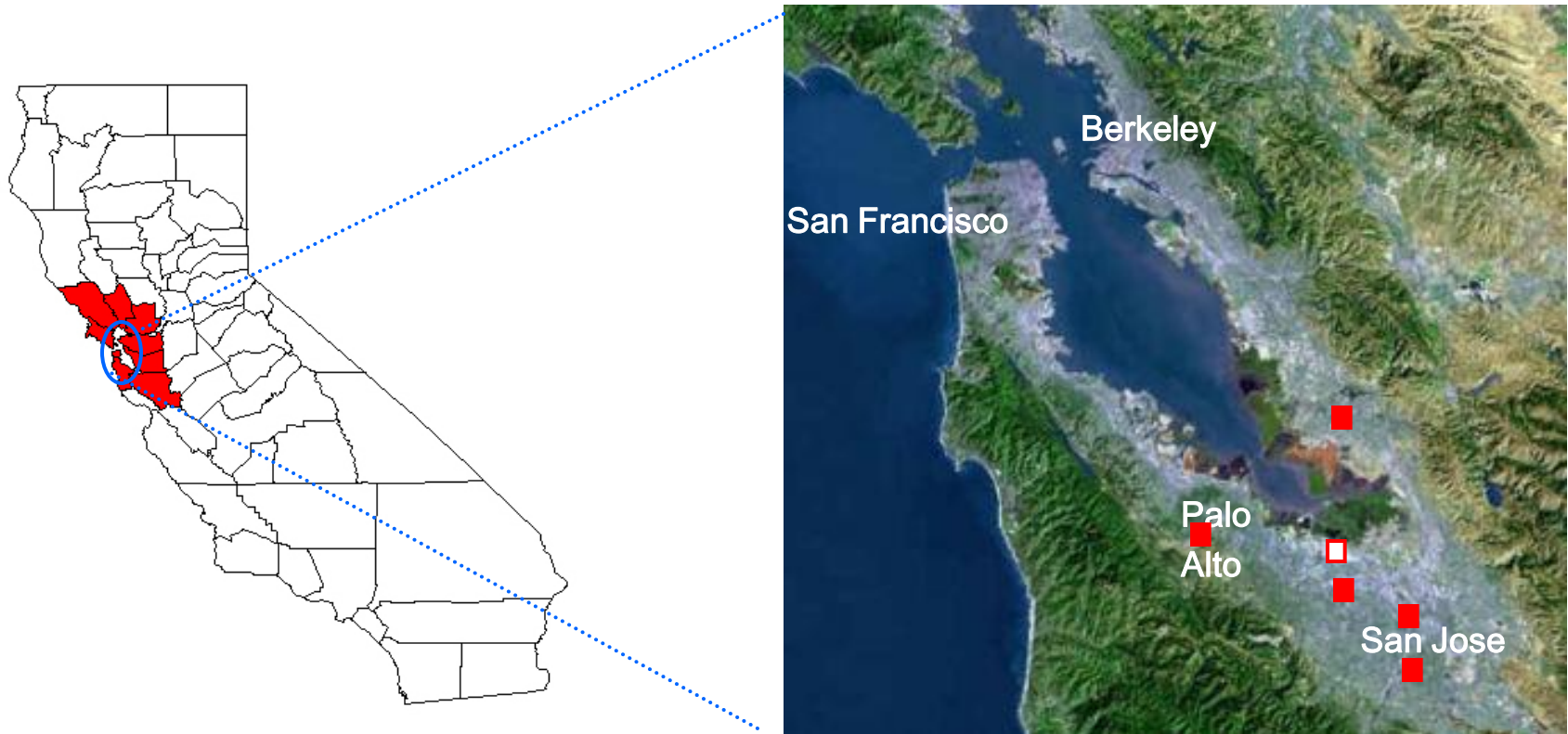
Source: Wikipedia; Joel Garreau, "The Nine Nations of North America"



# San Francisco Bay Area

- San Francisco Bay Area ~7M people
  - Especially strong selection for risk-takers, still long way (4000km to Philadelphia)
  - Special beneficiary of **inward brain drain, from US, world**

- Fry's Electronics
- Weird Stuff

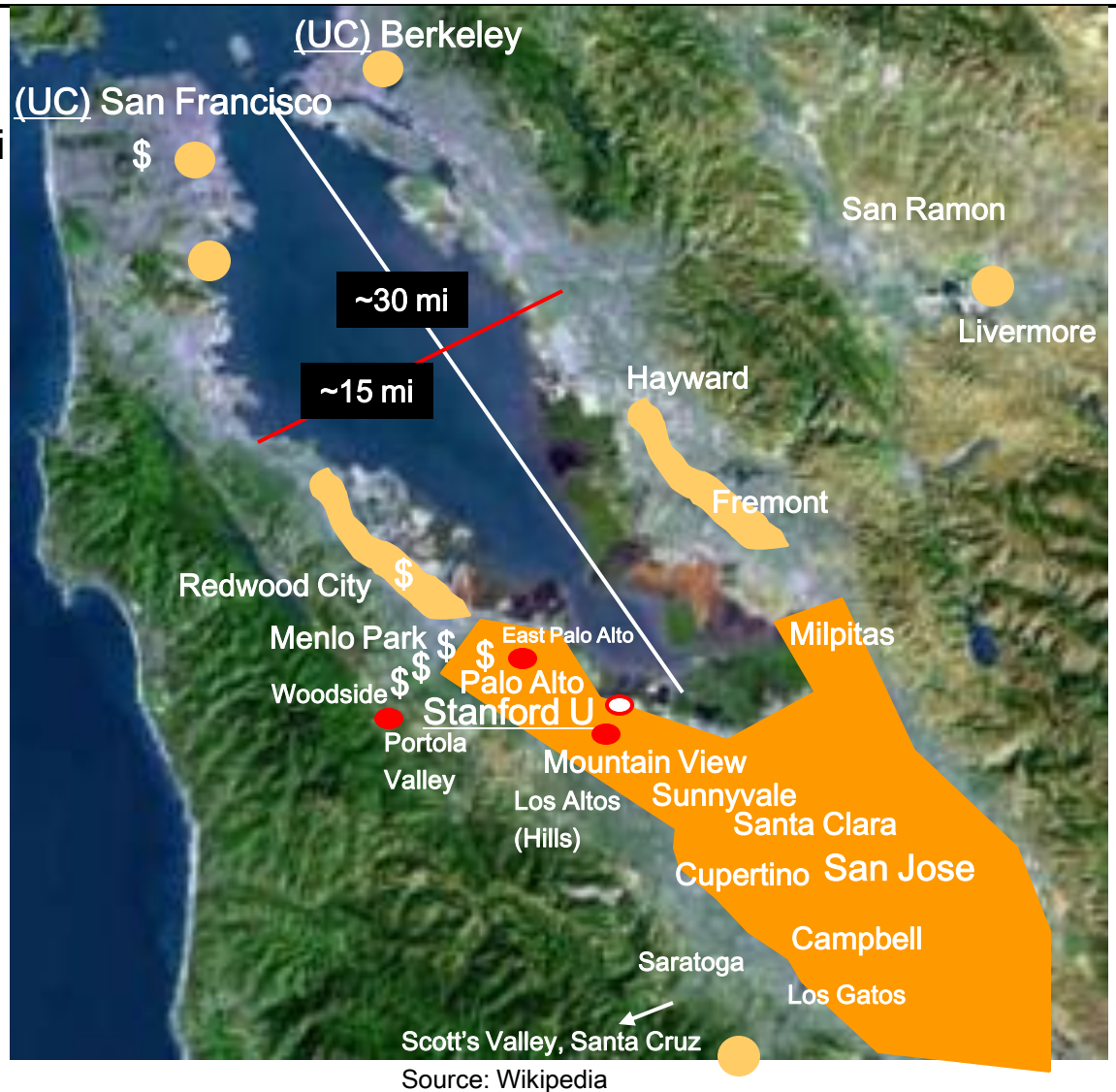


Source: Wikipedia

Silicon Valley Scene

# San Francisco Bay Area, Silicon Valley

- SJ + SC + Sunnyvale + MV + Cupertino: ~270 mi<sup>2</sup>
- San Jose → Palo Alto: ~15mi
- Stanford University
- Venture Capitalists
  - \$\$\$ Sand Hill Road, Menlo Park
  - \$ Palo Alto, other
- Restaurants
  - (Wagon Wheel), Mountain View
  - Bucks, Woodside
  - Il Fornaio, Palo Alto
  - etc
- Computer History Museum, Mountain View
- [www.computerhistory.org](http://www.computerhistory.org)



# Early Silicon Valley History, Key Individuals

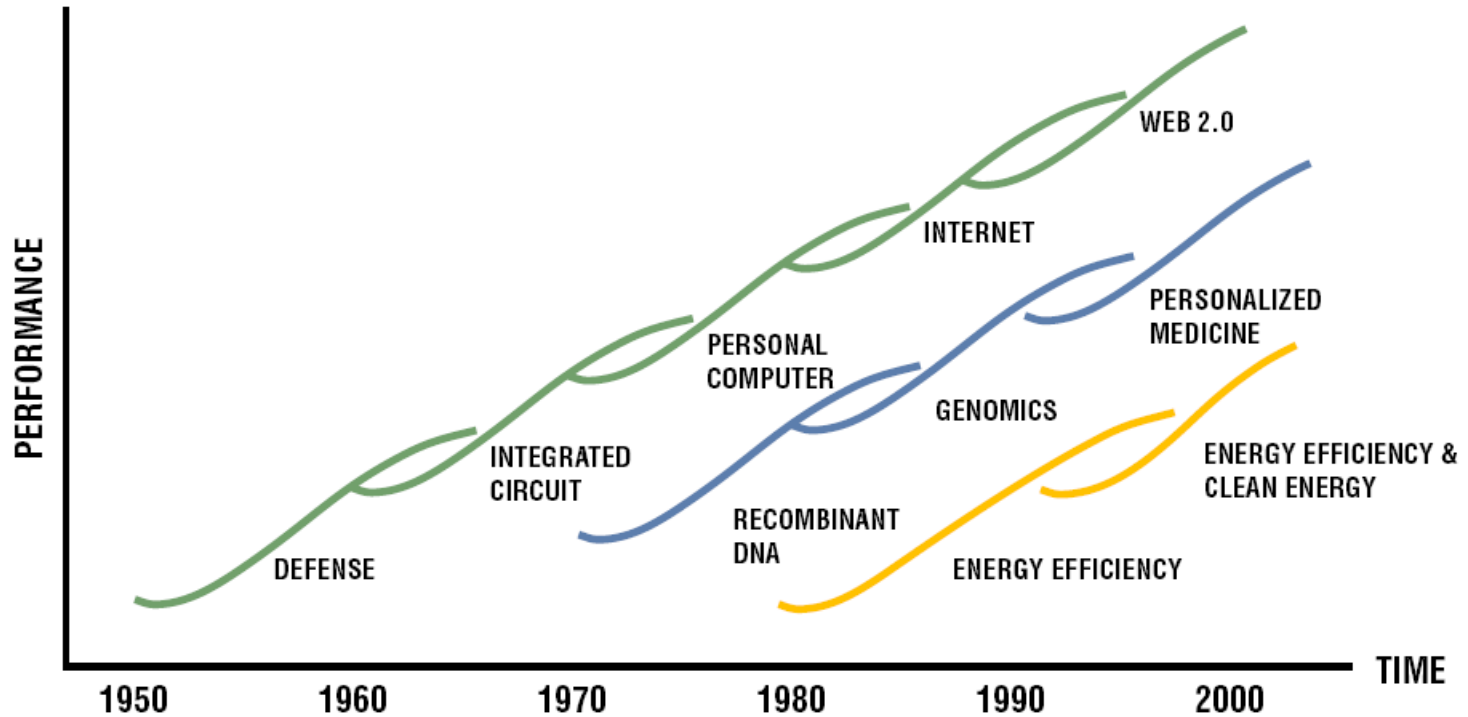
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- Before World War II
  - High tech = East Coast
    - » Boston: MIT, Harvard, etc
    - » New York, New Jersey: IBM, Bell Labs, RCA ...
  - Silicon Valley “The Valley of Heart’s Delight” ... orchards
- Stanford & [Frederick Terman\\*](#), EE, Dean of Engineering, Provost
  - Unhappy that students had to go back East for jobs
  - 1939 Got two to start local business in Palo Alto – [Bill Hewlett, Dave Packard](#)
  - Aerospace (Moffett Field), electronics boost during WW II; Federal Government
  - Stanford Industrial Park (1950s)
    - » Varian, Kodak, Lockheed, Hewlett-Packard ...
  - 1956 Got [William Shockley](#) (Nobel for transistor, Bell Labs) to return home
  - 1957 8 researchers left Shockley → Fairchild Semiconductor → chip companies
  - Got [William Johnson & Carl Djerassi ...](#) (chemists) → biosciences companies
  - HP → systems & software companies, Human Resources
  - Patent licensing, continuing education, interactions with business
  - (IBM disk drives, software) → storage, database software
- Post WW II
  - Steve Blank, “The Secret History of Silicon Valley”

\* Did PhD at MIT, expected to go back as assistant professor; caught tuberculosis over summer ... and stayed.

# Silicon Valley Waves

## WAVES OF INNOVATION



Source: Next 10, [http://www.next10.org/pdf/GII/Next10\\_FullFindings\\_EN.pdf](http://www.next10.org/pdf/GII/Next10_FullFindings_EN.pdf)

# How Strong Technology Cluster Works, SV Example

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- Industrial structure, cluster
- Culture, attraction, inward brain drain
- Education & research universities
- Real estate, lawyers & banks
- Fry's Electronics, Weird Stuff
- **Venture Capitalists (VCs) and Friends**
- Governments

# Industry structure, cluster

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- East Coast companies tended to be vertically integrated
  - IBM, AT&T, Boston minicomputer companies, RCA
  - “Employee for life”
  - Leave Digital Equipment → Data General – “Goodbye. Don’t talk to us ever”
  - Geography around Route 128 (Boston ring-road) spread people out
- West Coast companies smaller
  - Rarely vertically integrated
  - Focus on being best in specific parts of value chains
  - Rely on network of suppliers & customers
- SV People move between companies, often
  - Geography puts companies close together
    - » “Joe Smith changed companies at lunch, didn’t move his car.”
  - Expected, within reason
  - → Tight-coupled personal networks
  - Spinoffs, not only from universities, but from companies
- Restaurants important as neutral meeting grounds
  - “Wagon Wheel” frequent meeting place for early semiconductor people

Annalee Saxenian, “Regional Advantage – Culture and Competition in Silicon Valley and Route 128”

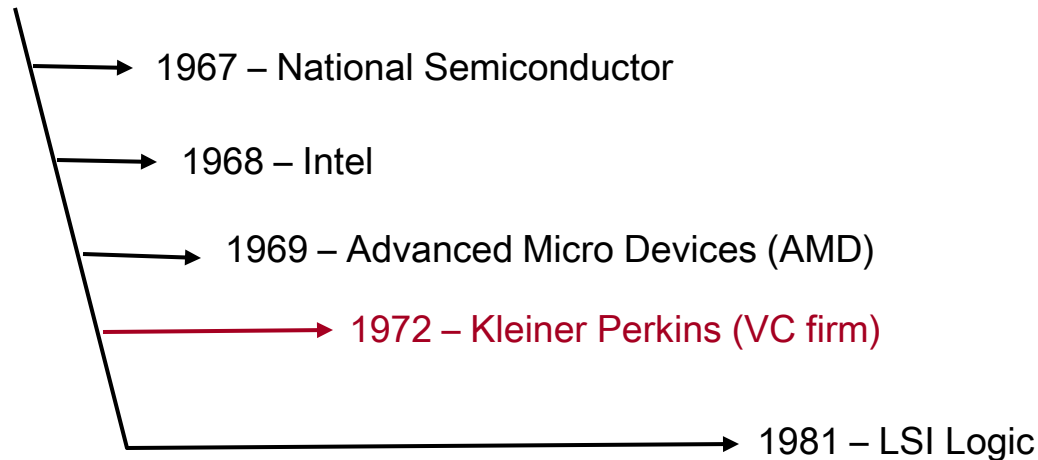
# Example: Early Spinoff History (Semiconductors)

(Stanford, Frederick Terman)

↓  
1956 – Shockley Semiconductor

↓ “Traitorous eight” Arthur Rock & Tommy Davis (VCs)

1957 – Fairchild Semiconductor



And through 1986: 28 other companies, including: Signetics, Cirrus Logic, PMC-Sierra, Atmel, Zilog, Xilinx, Cypress Semiconductor. Many more by now from these.

Sources: Semiconductor Equipment and Materials International; San Jose Mercury News

# Culture, attraction, inward brain drain

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- Risk-taking, entrepreneurial culture
  - Varies radically by area, surrounding national & local culture
  - Willingness to fail
    - » Silicon Valley > CA > USA > (much of world)
    - » Can be encouraged, but very difficult in some places & cultures (in and outside US)
  - Sometimes, SV acts crazy
    - » Internet boom ... bust
    - » Growth forever, over-optimism, lemmings (disk drives, PCs, minisupers, DOT.COM)
- Attractive place to live
  - Lifestyle, weather, having fun; work hard, play hard
  - Educate and keep smart people; very strong universities
    - » But CA has K-12 education problem
  - Housing
    - » Young singles in first jobs [rent] OK; well-established families, dual-earners OK
    - » Problem: ~impossible to move a family from mid-West or many other places
  - Inward brain drain helps beat demographic statistics
    - » Abilities normally distributed, and only 5% are in the top 5% (and if well-trained...)
    - » But, if you can attract more of the top 5% from other places...
    - » CA good at this, but USA Federal Government confused recently



# Education & Research Universities

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- Educational infrastructure crucial, formal AND continuing
- K-12 (CA quite variable, and **not as good as it needs to be**)
- Junior Colleges (2-year, continuing education)
  - Ex: Foothill College, Canada College, etc
- CSU - California State University System
  - 23 campuses, 46,000 faculty, 450,000 students
  - San Jose State U, CSU East Bay, San Francisco State U
  - <http://www.calstate.edu/>
- UC - University of California
  - 10 campuses++, 170,000 faculty+staff, 214,000 students
  - UC Berkeley\*, UC San Francisco\*, (UC Davis\*, UC Santa Cruz\*)
  - <http://www.universityofcalifornia.edu/>
- Private universities\*
  - U of San Francisco, U of Santa Clara
  - [Stanford University](#)

\* San Francisco Bay Area;  
elsewhere: UCSD; UCLA; UCSB; CalPoly; CalTech, etc.

# Stanford [Think: (Harvard + MIT)/2, 100 vs 400/150 years]

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- Students
  - ~7000 undergrad (5% outside US)
  - ~8000 graduate (30% outside US)
- Excellent school in usual ways...
  - Strong ties to business & technology enterprise
  - Stanford Research Park
  - Continuing education programs for engineers
- But off-the-scale-weird in some other ways
  - Remember [Frederick Terman](#)?
  - Strong entrepreneurial emphasis, infrastructure, [experience](#)
    - » Engineering, business, medicine, science
  - Student priorities: (a) Found startup, (b) Join startup, (c) Join big company...
  - Very smart about technology licensing
    - » Startups get it cheap, or “free”, Stanford gets stock (? Recent ?)
    - » Many universities fail to get this right
  - [Faculty take sabbatical, start company, return, 20% consult time](#)
    - » MIPS, Rambus, Atheros, Tensilica, Granite, VMware, etc
    - » EE/CS: quite a few multimillionaire faculty...

# Stanford Example: President John Hennessy

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- Joined Stanford in 1977, Asst Prof. EE
- 1983-1993 Director Computer Systems Laboratory
  - 1984-1985 sabbatical to start MIPS Computer Systems
- 1994-1996 Chair Computer Science Department
- 1996-1999 Dean, Engineering
- 1999-2000 Provost
- 2000- President
  - Board of Directors: Atheros (Teresa Meng), Cisco, Google
- “Doing MIPS was a real eye-opener”
- “First 50 years of last century = physicists, second 50 years = us computer folks (and we’re not done), next century = biologists”
- Strong emphasis on interdisciplinary work
  - Bio-X, clever techniques for \$\$
  - Global Climate and Energy Project, GCEP
  - Precourt Institute for Energy Efficiency
- “Stanford’s ‘geek president’ Hennessy”

# Real estate, lawyers, and banks

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- Real estate
  - Incubators useful, startups need cheap, flexible space
  - SV: recycle buildings, buildings designed for reconfiguration
  - 10/07 lease rates, US\$ / square foot / month [low, average, high]
    - » [\$0.95, \$1.36, \$2.19] R&D
    - » [\$2.25, \$2.73, \$4.47] Office space
    - » [\$0.48, \$0.71, \$0.83] Industrial
- Banks
  - Must understand startups
  - [Silicon Valley Bank](#)
- Lawyers
  - Need experience with startups, VCs, patents, technology
  - May charge very low rates early, hope client grows, may take some equity
  - [WSGR \(Wilson, Sonsini, Goodrich, Rossotti\)](#)
    - » SV filled with aggressive, competitive people, spinoffs
    - » Larry Sonsini's office, not in court
  - Law firms now own some very fine buildings (mostly in Palo Alto)
    - » Mostly grew that way via business, less by lawsuits

# Fry's Electronics, Weird Stuff

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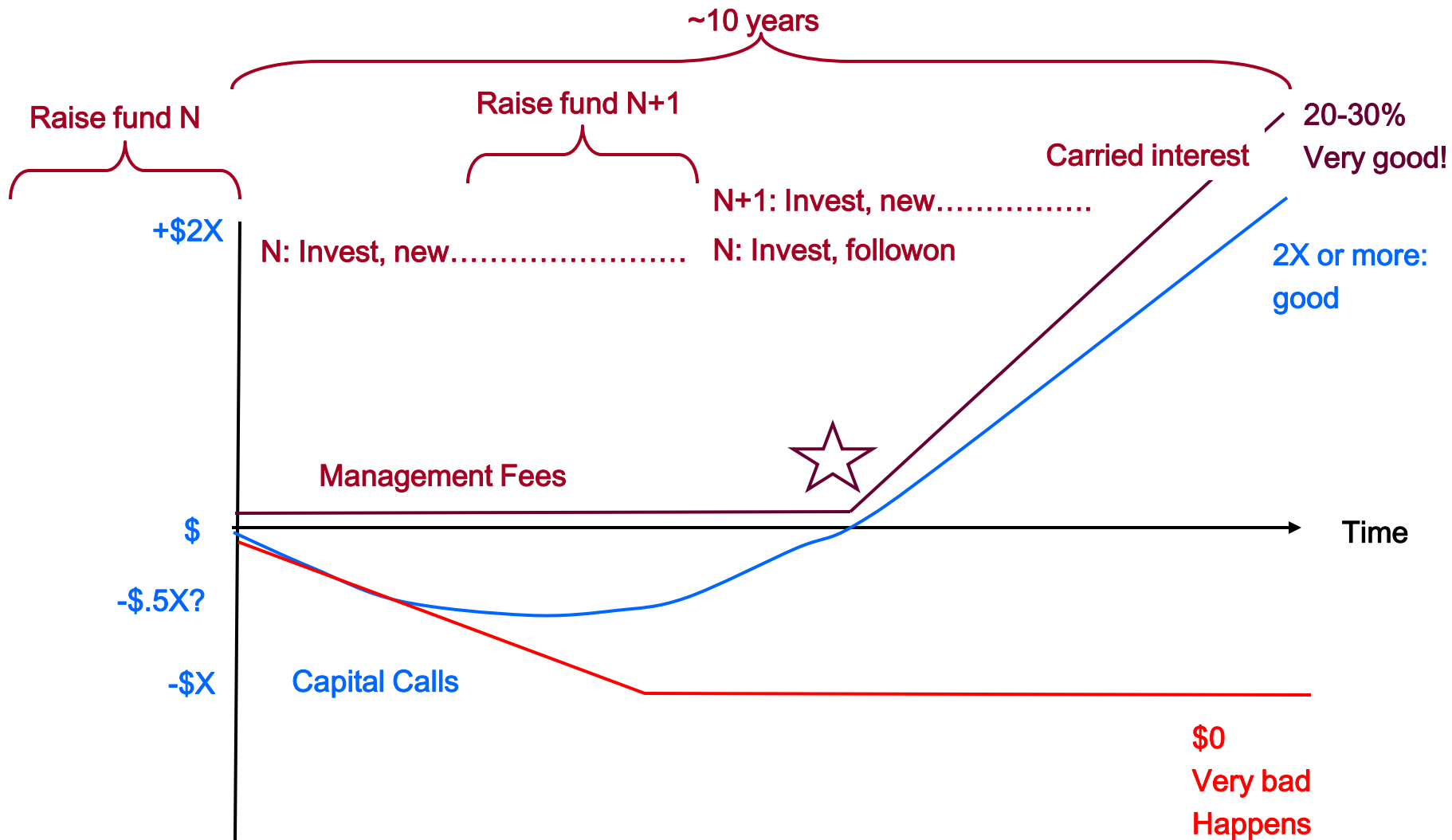
- (now) Chain of stores, started in Sunnyvale, 8 in Northern California
  - Across much of Western US
  - All sorts of consumer products ... but
- (Then) Started in Silicon Valley, half a dozen stores
  - Everything for the engineer to build things
  - Memory chips
  - Microprocessor chips
  - Potato chips, candy
  - Disk drives
  - Circuit boards
  - Tools
  - Jolt Cola
  - <http://www.frys.com/>
  - [http://en.wikipedia.org/wiki/Fry's\\_Electronics](http://en.wikipedia.org/wiki/Fry's_Electronics)
- Weird Stuff
  - Surplus, old computers, parts, almost-junk ... but might be needed sometime
  - <http://www.weirdstuff.com/>

# Venture Capital & Friends (Art Rock & Tommy Davis)

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- VC raises a fund, usually with ~10-year life
  - VCs are “General Partners” (GPs)
    - » Engineers, business people
    - » Occasionally freshly-minted MBAs (uh-oh) or athletes (in Dot.com Boom, UH-OH)
  - Money is raised from “Limited Partners (LPs)”
    - » Pension funds, university endowments, “alternate investments” of financial institutions
    - » Companies
    - » Family offices
    - » Rich individuals
    - » Occasionally, not-so-rich entrepreneurial friends\* [us!]
    - » Occasional special cases, like CIA’s In-Q-Tel
  - Big VC firms: \$1B - \$1.5B fund
    - » M&A / VC firms even bigger, maybe \$5-6B, but mostly different
    - » LP has \$X commitment over life of fund, not at beginning
    - » Periodic “Capital Calls” → write check **or else**
  - Invest over several years in portfolio of companies
    - » Asymmetric information
    - » Domain expertise + tight network of friends and consultants → value-add
  - Over time, companies IPO or get bought [stock or \$\$\$ → LPs]
    - » Of course, most fail ... but maybe one is Google! (then, no worry)

# Life of a Fund (GP, LP or LP)



## Investments – 3Q07

- Venture Capital invested in companies, by type

– USA	SF Bay Area	%	Type
\$Million	\$Million		
\$ 902	\$ 150		Business / consumer / retail
\$2472	\$ 494		Healthcare
\$3770	\$1573		Information technology (Semiconductors, systems, software)
\$ 927	\$ 306		Other
			SF Bay Area: much cleantech/greentech
\$8071	\$2523	31%	Total

Cleantech and energy are hard, unclear if VC model works so well

Sources: Dow Jones/VentureOne & Ernst & Young; San Jose Mercury News



# VC and Friends - Infrastructure

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- Example VCs
  - Kleiner Perkins [Al Gore just joined]
  - Sequoia
  - New Enterprise Associates (NEA)
  - Mayfield Fund
  - Etc, etc, etc, etc, etc, etc
- Other Investors
  - “Friends and family”
  - Angel investors, such as Band of Angels
  - Company venture arms
- Other infrastructure
  - MIT/Stanford Venture Forum
  - VCTaskForce
  - SDForum
  - TIE (The Indus Entrepreneurs)
  - Special Interest Groups of one sort or another
- Huge built-up expertise base, not same as visiting VC...

# Governments

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- Government must
  - Fund research, strategically
    - Sometimes, can fund business (SV defense, Arpanet→Internet)
    - Often: providing a market
  - Fund education at all levels
  - Be very careful of rules on state-sponsored universities, spinoffs
  - Make it easy to start business
  - Make it easy to end business
  - Be very careful about legal penalties for failure
  - Think hard about tax laws
  - Predictable relevant laws (cleantech really depends on this)
  - Stay out of the way
- Hard for government to do
  - Edict creativity and entrepreneurship
    - » But can promote, make sure entrepreneurs are heroes/heroines
    - » Prizes are really good (like smart car competitions)
  - Simulate VCs very well (In-Q-Tel is not KP)

# Summary

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- Silicon Valley is very hard to duplicate
  - But, this is still new, a sleepy backwater just 50 years ago
  - Lucky accidents of great individuals ([Terman, Rock/Davis](#)) + risk-taking + smart investments can yield good results
- → Other places can create good technology clusters
  - BUT, it takes more different skill sets than many think
- Good luck!