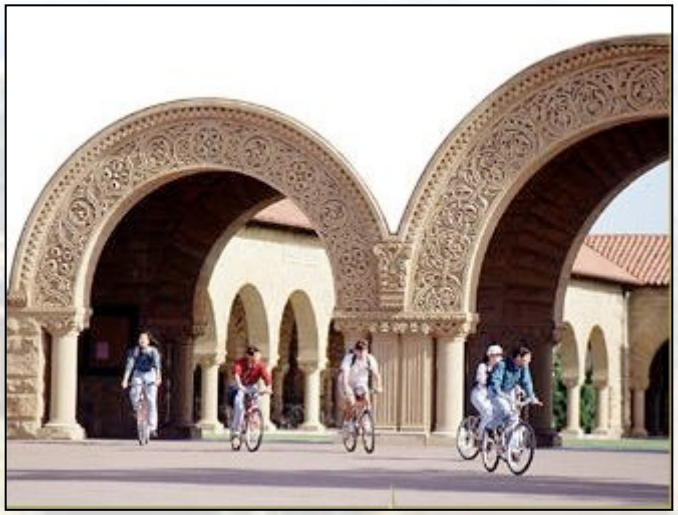
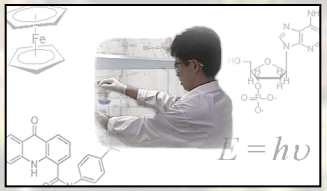
Stanford University & Silicon Valley

Stanford University

- The university opened on October 1, 1891, after six years of planning and building.
- Seven schools: Earth Sciences, Graduate Education, Engineering, Graduate Business, Humanities and Sciences, Law, Medicine
- 2,219 regular academic faculty
- 7,056 undergraduate students from 76 countries
- 9,368 graduate students from over 100 countries
- 2017-18 budget $6.3BN, including a research budget $1.64BN
- 81% of the research funding came from government sources





Stanford faculty awards

Current faculty:

- 17 Nobel Prize winners (31 over all time)
- 4 Pulitzer Prize winners
- 31 MacArthur Fellowships
- 16 National Medals of Science
- 1 National Medal of Technology
- 284 members of the American Academy of Arts and Sciences
- 169 members of the National Academy of Sciences
- 108 members of the National Academy of Engineering
- 29 members of the National Academy of Education
- 77 members of the National Academy of Medicine
- 47 American Philosophical Society members
- 2 Presidential Medal of Freedom winners

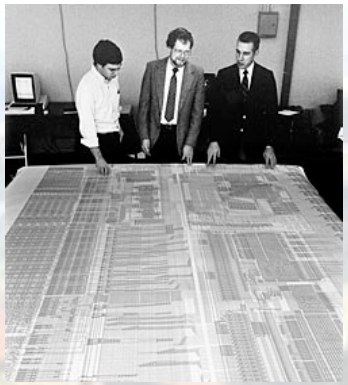
Stanford discoveries

1951. Varian klystron tube

- Synthesis of biologically active DNA in a test tube
- Construction of a recombinant DNA molecule containing DNA from two different species
- Discoveries that led to magnetic resonance imaging
- Invention of the klystron tube, a high frequency amplifier for generating microwaves
- Construction of the first 6-million-volt accelerator for cancer treatment
- Invention of the laser

1981. Heart/lung transplant

- First human heart transplant in the USA
- First heart/lung transplant



1984. RISC chip

- Invention of RISC chip
- Discovery of REM sleep
- Invention of the IQ test
- Invention of the global positioning system (GPS)

Music synthesizer

- Invention of the musical synthesizer widely used in electronic instruments
- Invention of DSL
- Invention of Google search engine

Stanford research park

- Created in 1951
- Today has over 150 companies in electronics, software, biotechnology, and other high tech fields
- 162 buildings occupying 10 million square feet
- About 23,000 employees

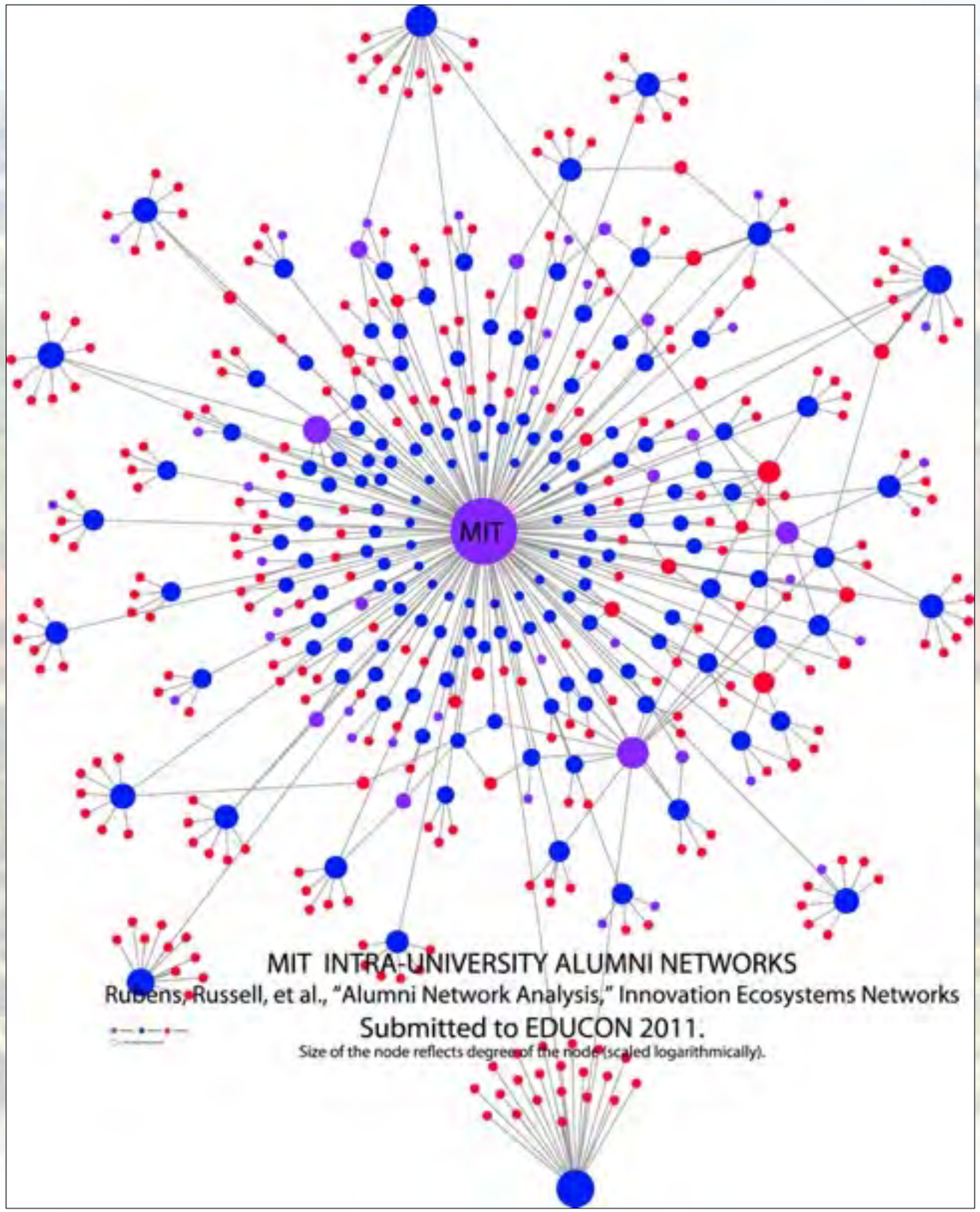
1952. David Packard, William Hewlett and Dean Frederick Terman

Big Stanford spin-offs

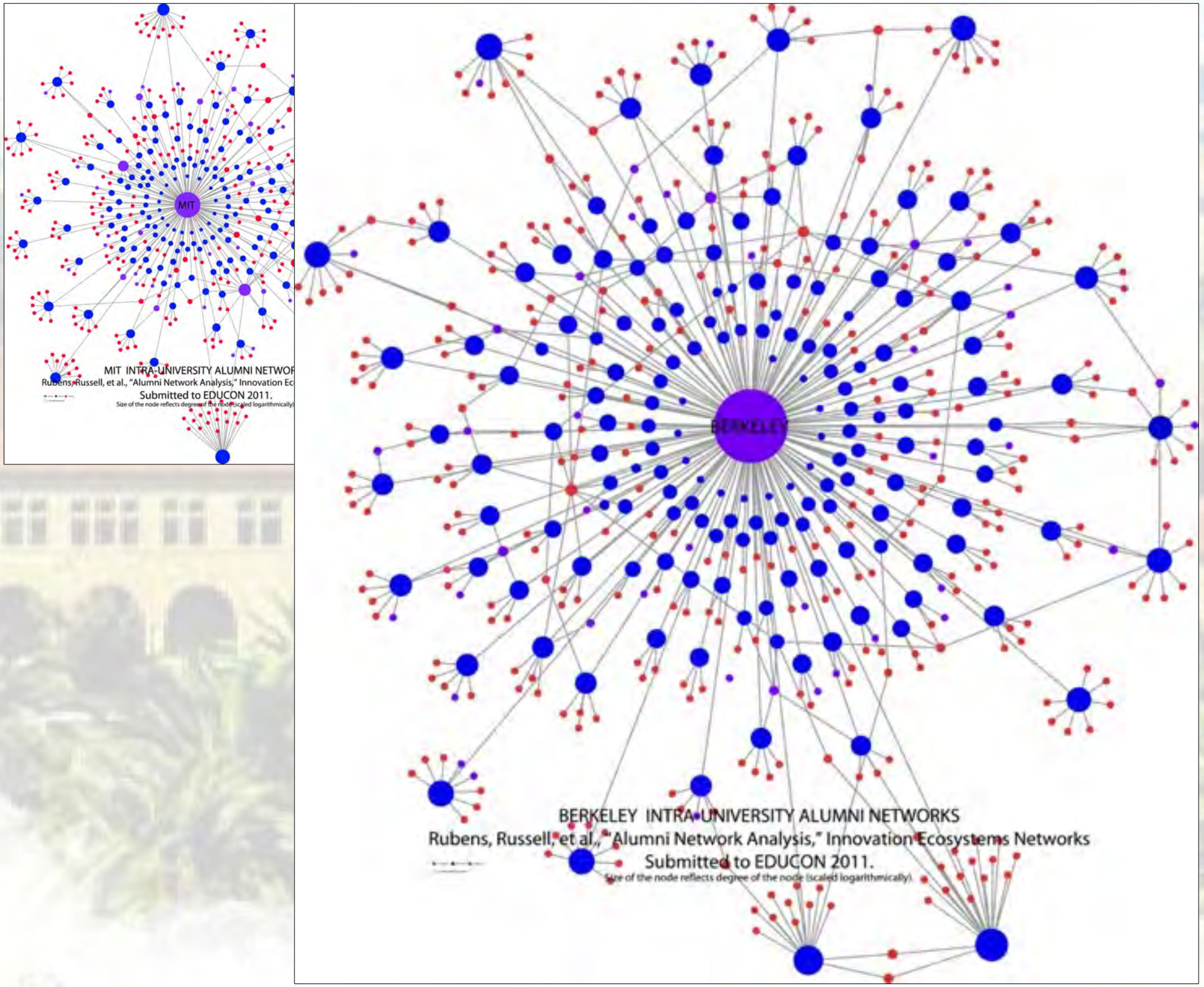
Abrizio
ASK Computer Systems
Cisco Systems, Inc.
Coursera
Dolby Systems
eBay
E*Trade
Electronic Arts
Excite, Inc.
Gap
Google
Hewlett-Packard
IDEO
Intuit, Inc.
Learning Company
Linked-in
Logitech
Mathworks
MIPS Technologies, Inc.
Nike
Netflix
NVIDIA
Orbitz
Octel Communications Corp.
Odwalla
ONI Systems
PayPal
Pure Software, Inc.
Rambus, Inc.
Rational Software
Silicon Graphics, Inc.
Sun Microsystems
Tandem Computers, Inc.
Taiwan Semiconductor
Tensillica
Tesla Motors
Trilogy
Varian Associates, Inc.
VMware
Whole Earth Catalog
Yahoo! Inc.

Spin-off activity

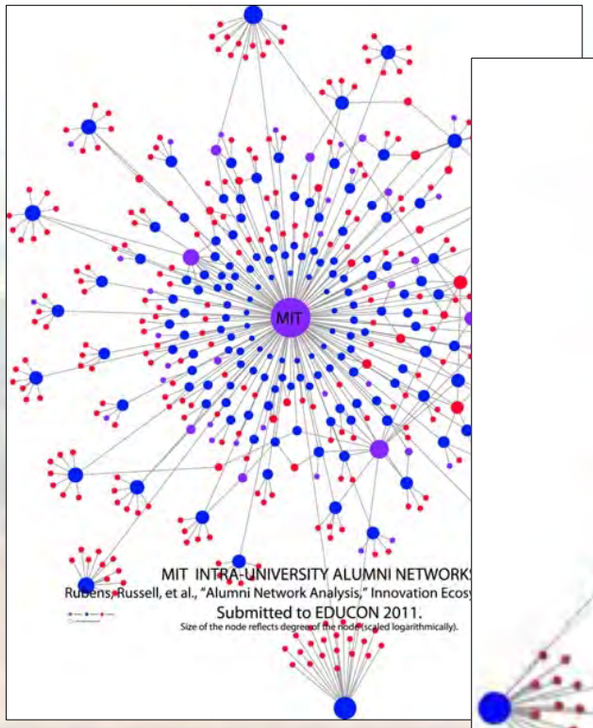
Spin-off activity

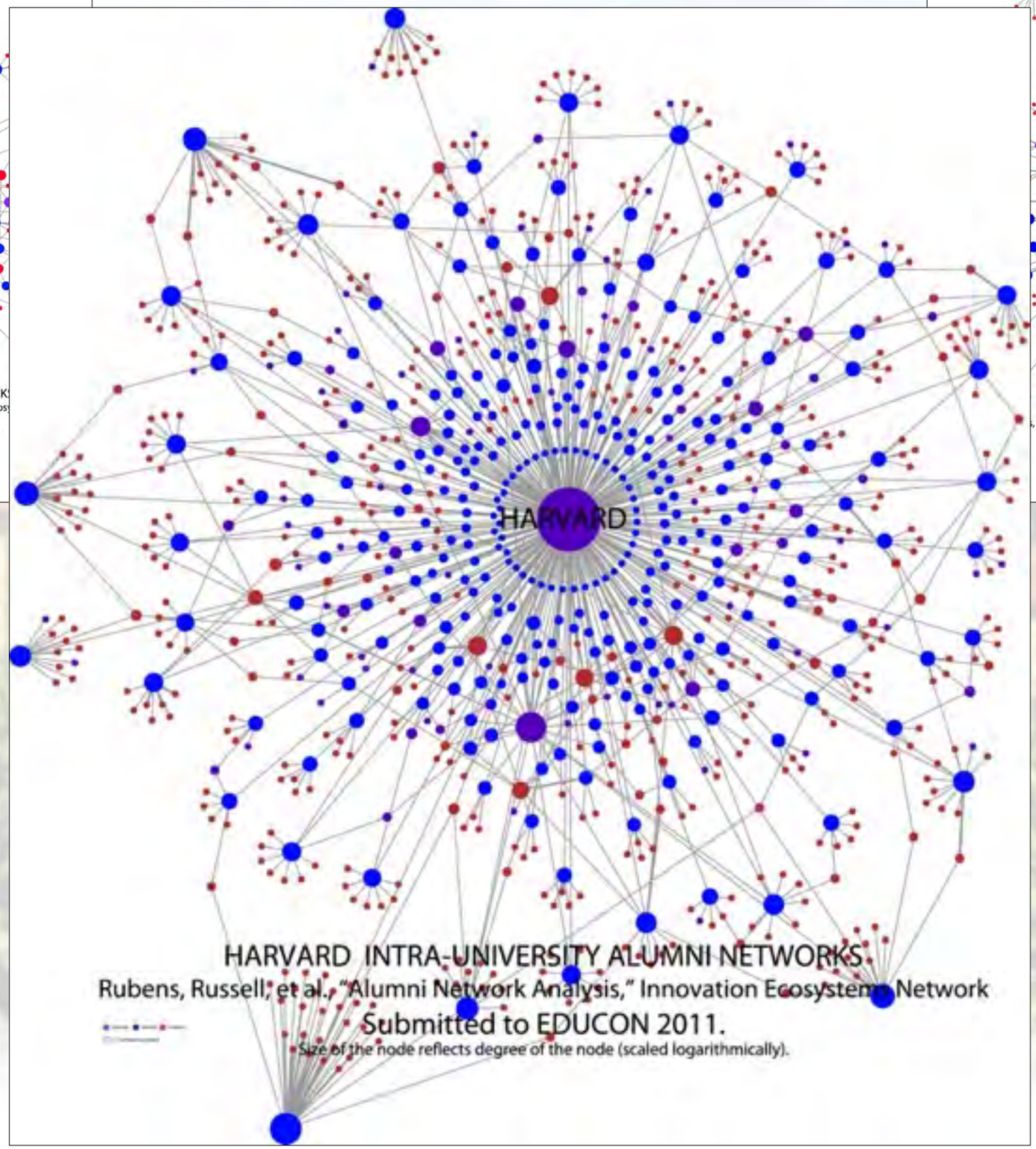


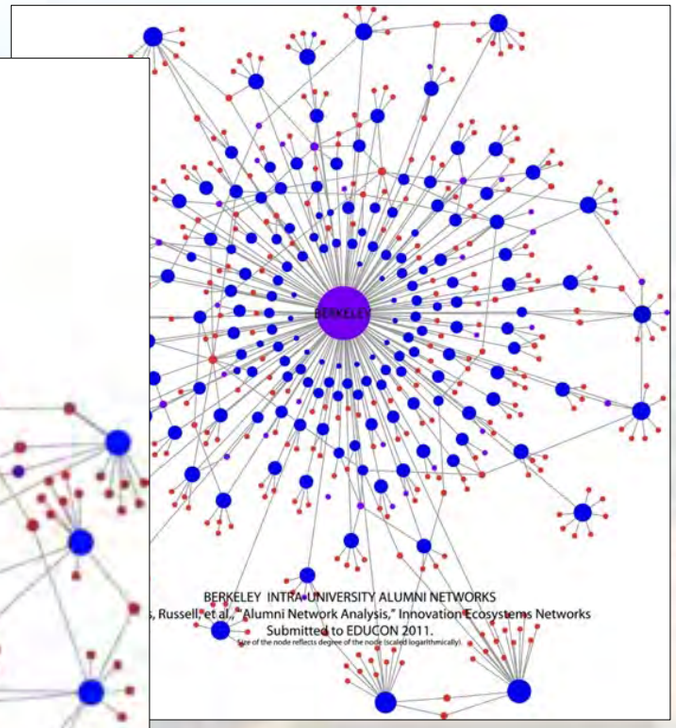
Spin-off activity



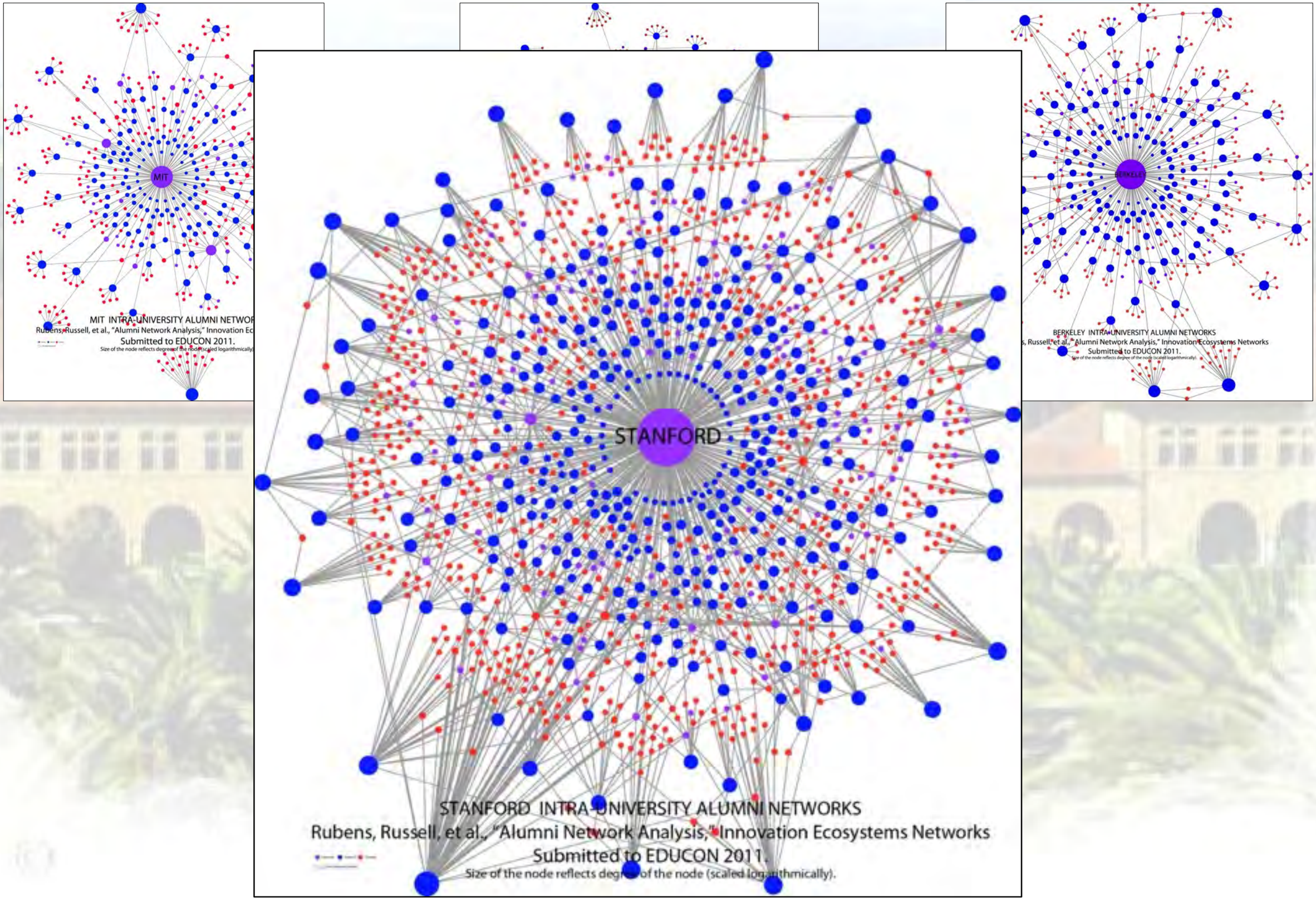
Spin-off activity







Spin-off activity



Stanford and Europe

The Role of the San Francisco Bay Area in European Innovation

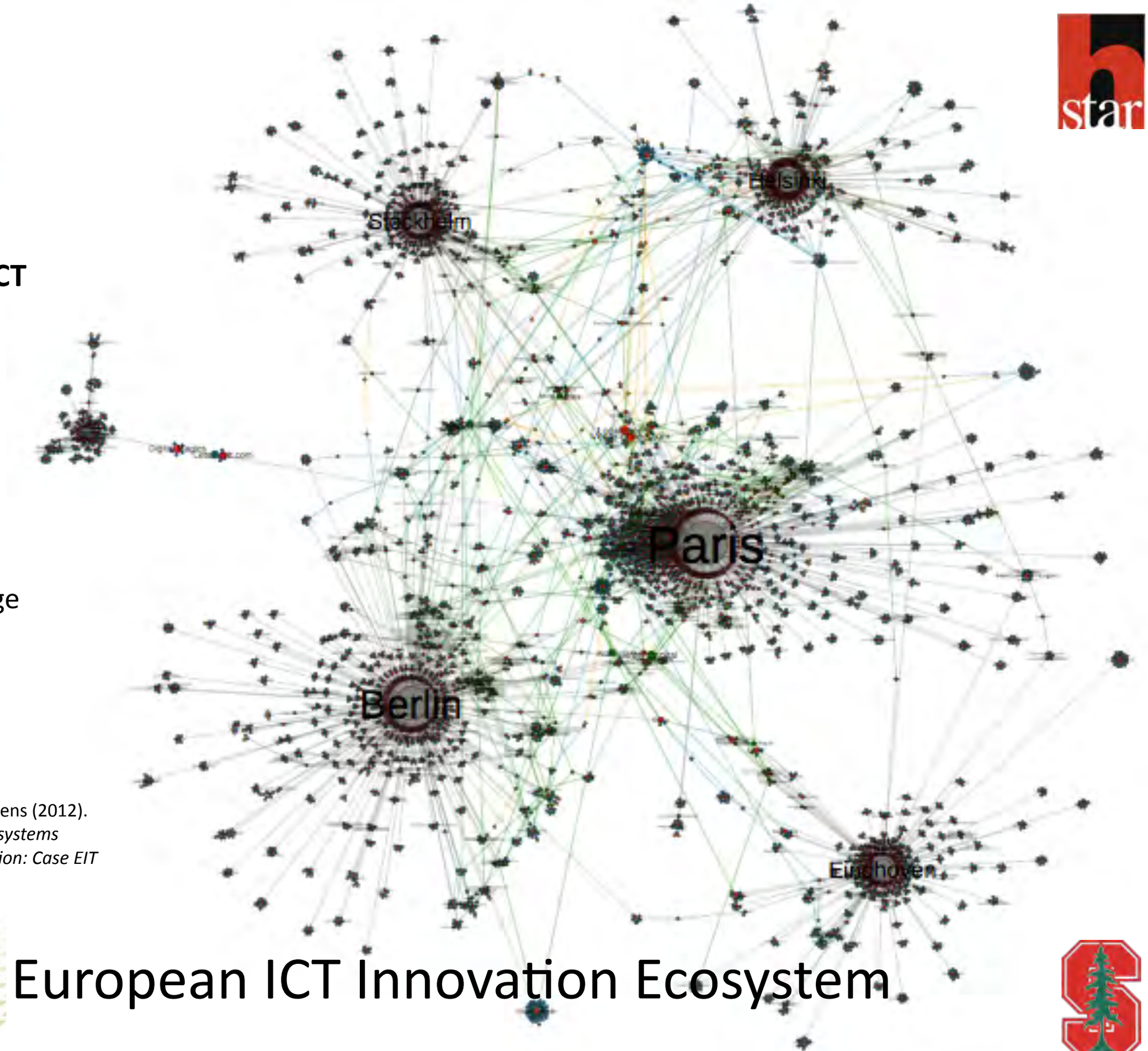
Analysis of EIT ICT Labs (Paris, Berlin, Stockholm, Helsinki, Eindhoven, Trento).

individuals: blue

companies: red

investors: green

universities: orange



Still, Huhtamäki, Russell, Rubens (2012). *Transforming Innovation Ecosystems Through Network Orchestration: Case EIT ICT Labs*

European ICT Innovation Ecosystem

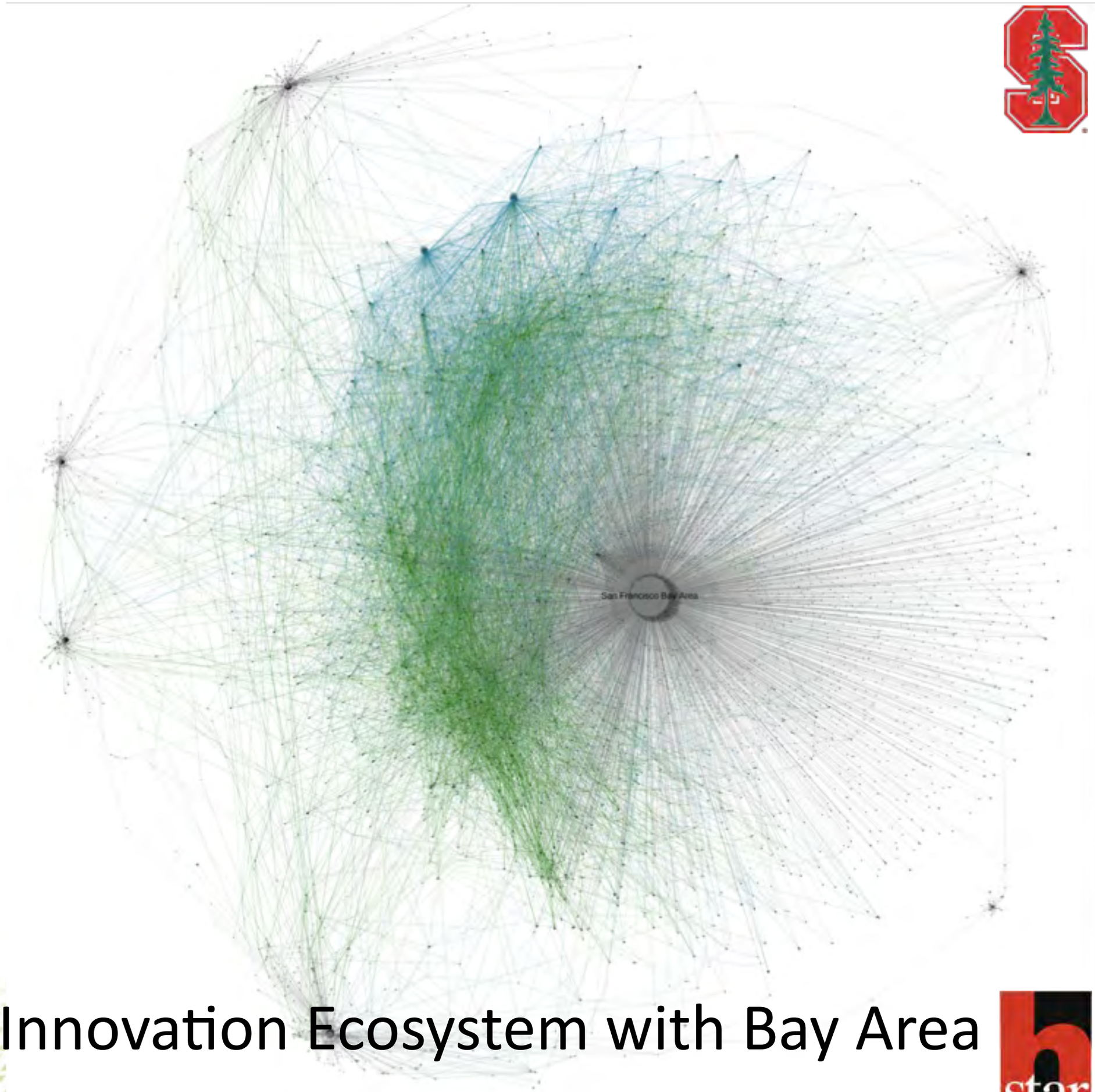
Adding San Francisco Bay Area as "a seventh EIT ICT Labs node"

individuals: blue

companies: red

investors: green

universities: orange



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European ICT Innovation Ecosystem with Bay Area

Silicon Valley history on a single slide

- Technology in the area goes back to the early 20th century, when it was a major site of U.S. Navy technology research and development.
- After the Second World War, Frederick Terman returned to Stanford to become Dean of Engineering and brought in large amount of Defense Dept Cold War funding.
- He introduced the notion of "entrepreneurial science," developed at MIT during the war.
- In 1951, he established the Stanford Industrial Park (later Stanford Research Park).
- Terman secured venture capital for technology start-ups. A major early success was Hewlett-Packard, founded by Stanford graduates William Hewlett and David Packard.
- 1957: Fairchild Semiconductor founded by eight engineers from Shockley Semiconductor.
- 1968: Robert Noyce and Gordon Moore left Fairchild to form Intel (**Int**egrated **El**ectronics Corporation).
- 1971: The name *Silicon Valley* appeared a series of articles in the weekly trade paper *Electronic News*.
- 1972: Venture capital industry emerged on Sand Hill Road, beginning with Kleiner Perkins.
- 1980: Apple IPO raised $1.3 billion, attracted more venture capitalists to the area.
- 1980s: several national and international law firms opened offices in San Francisco and Palo Alto to provide Silicon Valley startups with legal services.
- 1984: Len Bosack and Sandy Lerner founded Cisco Systems. (The name comes from "San Francisco.")
- Today: Silicon Valley has the highest concentration of high-tech workers of any metropolitan area, with 285.9 out of every 1,000 private-sector workers.

Silicon Valley: the secret sauce(s)

- Geographically concentrated, very active **human network**
  - Researchers, business leaders, entrepreneurs, funders
- High density of some very big technology companies
- Powerful, wealthy university (Stanford) with a **culture** of involvement with industry and of entrepreneurial spinoffs (**"Entrepreneurial science"**)
- Nearby world class, **large** state university (Cal Berkeley)
- Good **local supply** of skilled employees (San Jose State University)
- Culture of risk taking and **acceptance of failure**
  - The world sees Silicon Valley as a location of great successes
  - Here we know it is a location of a great many "failures"
- Easy access to "free" advice and assistance **at the start**
- Massive amounts of **government funding** for **basic** research
- Large amount of **private funding** to **exploit** the research
- A highly **fluid** workforce
  - You can change employer without having to move your home
- **Anyone** can play
  - Admittance and acceptance are based entirely on your ideas and abilities
  - You are only as good as your latest idea
- Attractive place to live, good climate, **tolerant and accepting culture**