

# **INFO5992**

## **Understanding IT Innovations**

### **(2017 Semester 1)**

#### **Week 11:**

#### **Innovation ecosystems and organisational culture**

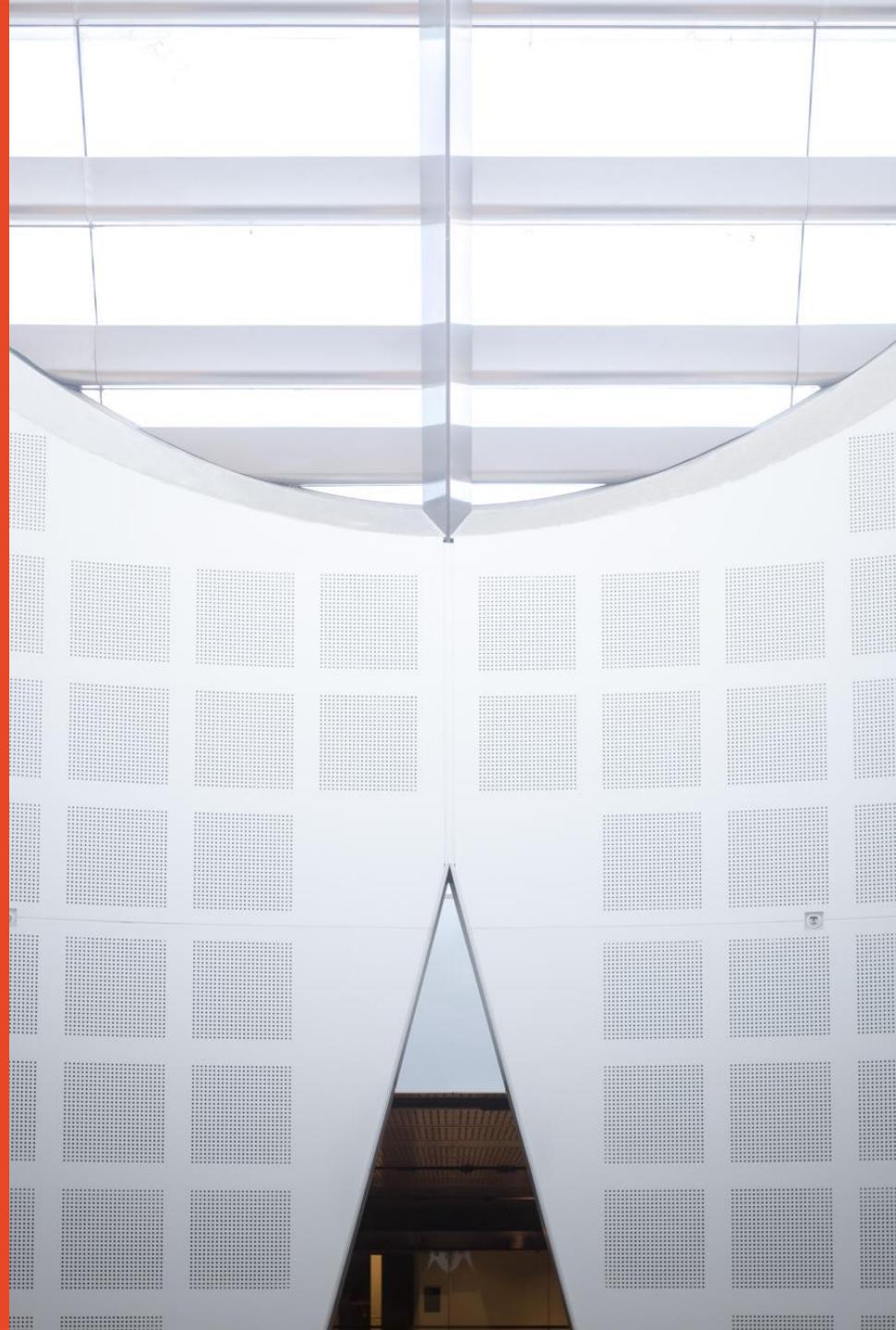
**Presented by**

Bill Simpson-Young (Data61)

School of IT



THE UNIVERSITY OF  
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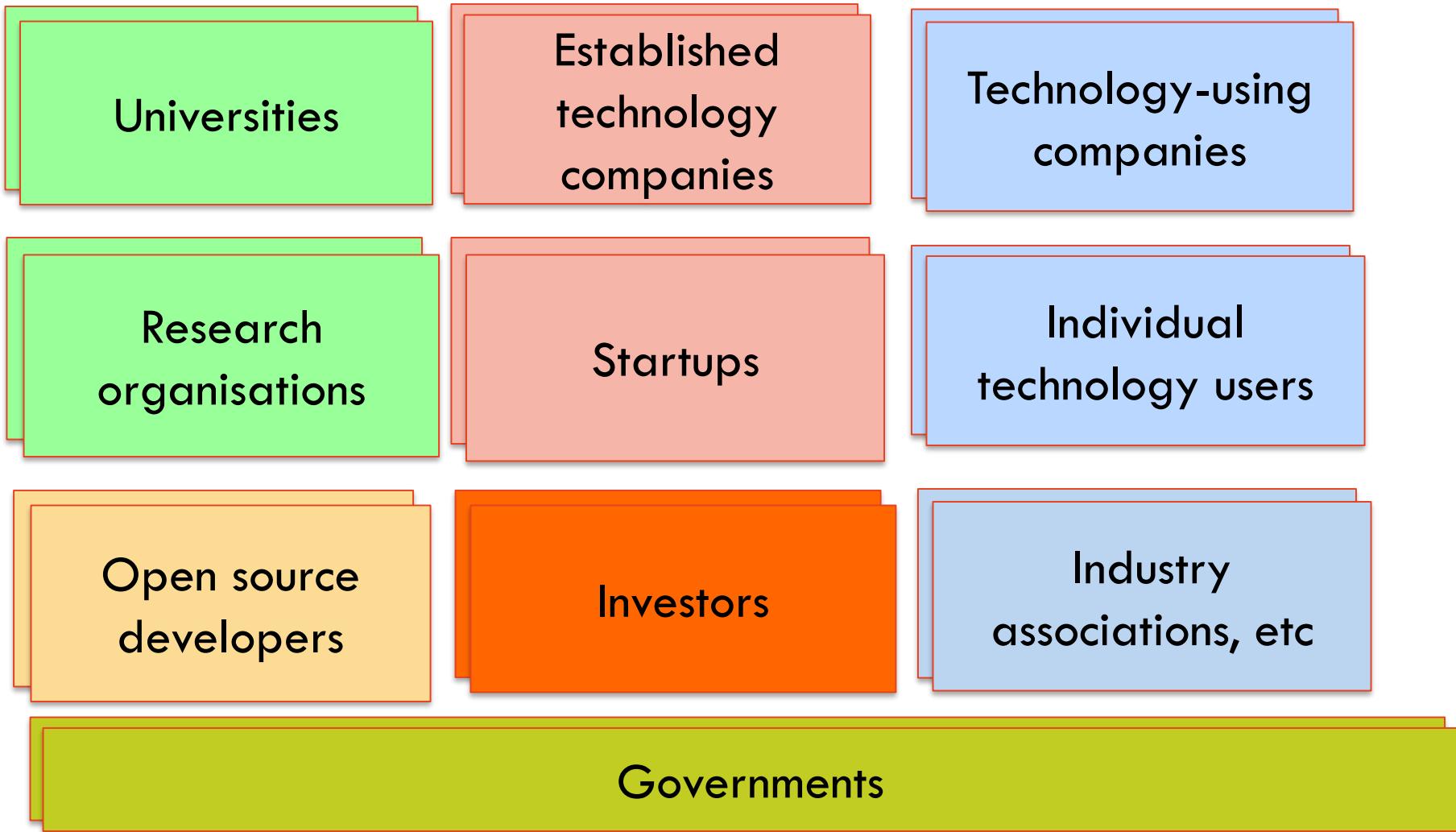
## **Tonight's topics:**

- a) Innovation ecosystems**
- b) Organisational culture for innovation**

## **What we'll cover:**

- a) Innovation ecosystems**
  - What is an innovation ecosystem
  - Silicon Valley as an example of an innovation ecosystem
  - ... and why it is so successful
  - A little on Sydney's innovation ecosystem
- b) Organisational culture for innovation**
  - Creating a culture for creating new ideas
  - Creating a culture for empowerment of people

# IT innovation ecosystem (some key parts)



# Silicon Valley as an example of an innovation ecosystem

# Silicon Valley: Tech company density



<https://www.siliconmaps.com/silicon-valley-map/>

# **Some of the companies built in Silicon Valley**

- Adobe
- Airbnb
- AMD
- Apple
- Cisco
- eBay
- Google
- HP
- Intel
- Intuit
- Juniper Networks
- LSI Logic
- Nvidia
- Oracle
- PayPal
- SanDisk
- Symantec
- Uber
- Yahoo!

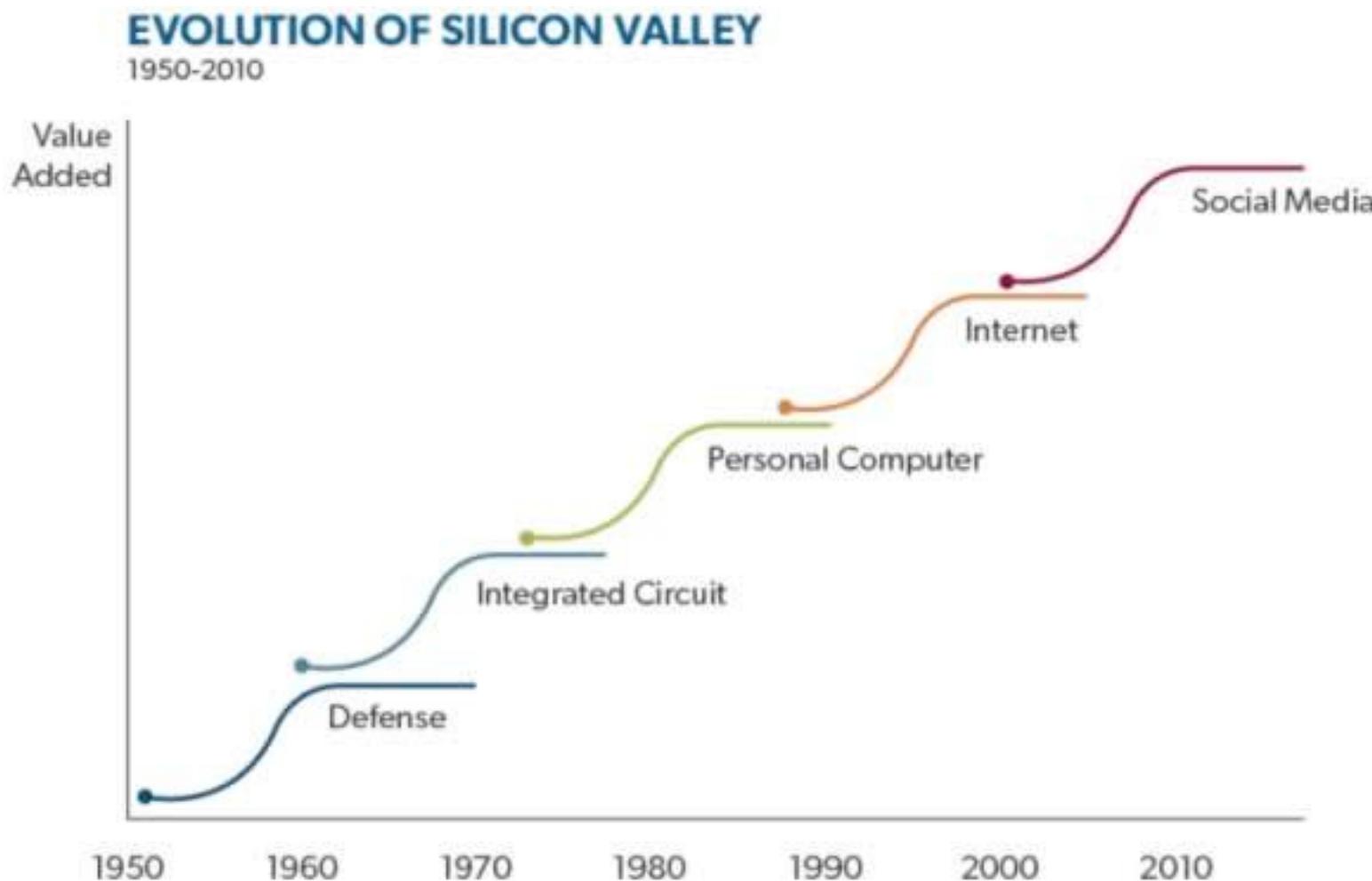
# Factors that led to the emergence of Silicon Valley as a powerful tech ecosystem

(From Steve Blank):

- “Cold War research in microwaves and electronics at Stanford University
- A Stanford Dean of Engineering who encouraged startup culture over pure academic research
- Cold War military and intelligence funding driving microwave and military products for the defense industry in the 1950’s
- A single Bell Labs researcher deciding to start his semiconductor company next to Stanford in the 1950’s which led to
- the wave of semiconductor startups in the 1960’s/70’s,
- the emergence of Venture Capital as a professional industry,
- the personal computer revolution in 1980’s,
- the rise of the Internet in the 1990’s and finally
- the wave of internet commerce applications in the first decade of the 21st century.
- The flood of risk capital into startups at a size and scale that was not only unimaginable at its start, but in the middle of the 20<sup>th</sup> century would have seemed laughable.”

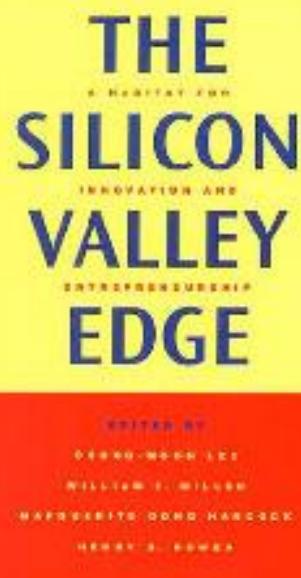
<https://steveblank.com/2017/05/09/innovation-change-and-the-rest-of-your-life/>

# Silicon Valley: Importance during phases of IT innovation history



Source: Silicon Valley Edge

# Silicon Valley: Importance of the innovation ecosystem



## The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship

By Lee, Miller, Hancock and Rowen (2000)

How does Silicon Valley work? Why here and not somewhere else? Although many accounts chronicle the story of Silicon Valley through the lives of important entrepreneurs or companies, these are insufficient to answer the compelling questions of how and why the Valley works. This book argues that the Valley's sustaining edge arises from factors that go beyond any individual or single company. Rather, the Silicon Valley edge stems from an entire environment, or habitat, honed for innovation and entrepreneurship.<sup>2</sup> This habitat has developed endogenously over time, co-evolving with generation after generation of new firms and new technologies.

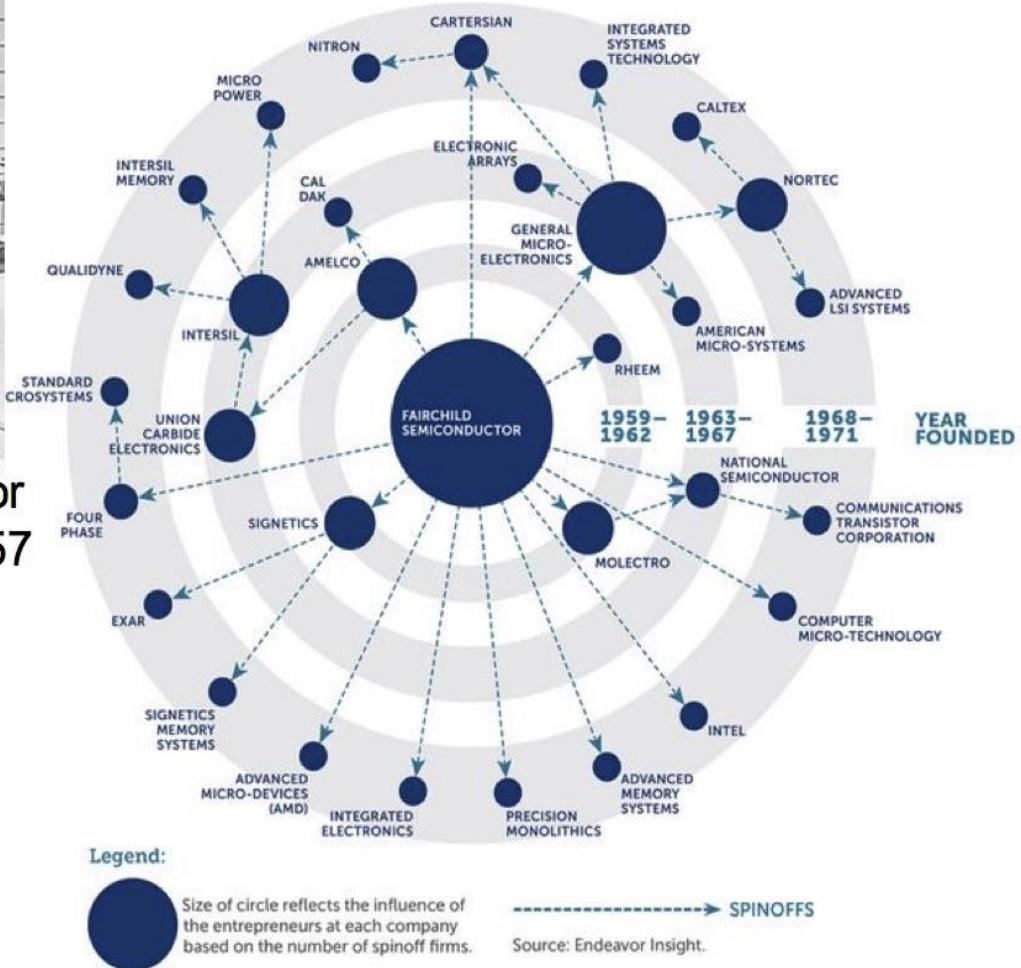
# Silicon Valley: Important role in semiconductors and microprocessors



Courtesy of Special Collections, Stanford University Libraries

**Founders of Fairchild Semiconductor**  
 (left Shockley Semiconductor in 1957  
 to form Fairchild)

## THE CREATION OF SILICON VALLEY: GROWTH OF THE LOCAL COMPUTER CHIP INDUSTRY

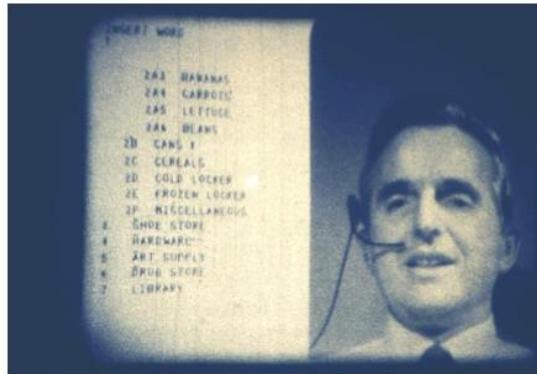


Source: Endeavor Insight.

# Silicon Valley: Important role in personal computers



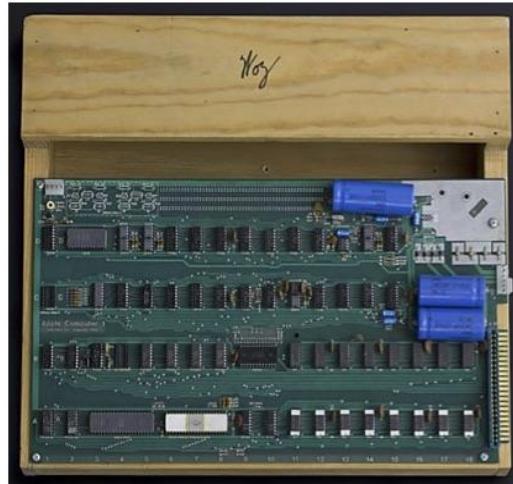
[http://en.wikipedia.org/wiki/The\\_Mother\\_of\\_All\\_Demos](http://en.wikipedia.org/wiki/The_Mother_of_All_Demos)



<http://douengelbart.org>

Doug Engelbart, Stanford University.

first mouse, windows, hypermedia, on-screen video teleconference, 1968



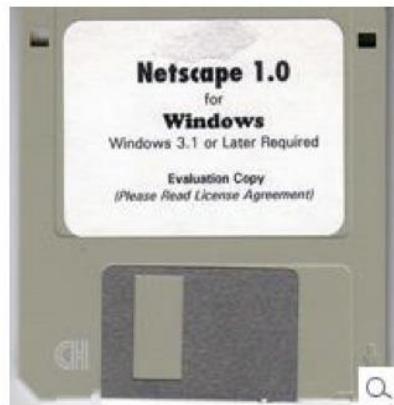
Apple-1, Steve Wozniak, 1976  
<http://computerhistory.org>



Apple-II, Steve Jobs and  
Steve Wozniak, 1977

<http://computerhistory.org>

# Silicon Valley: Important role in the Internet



<http://computerhistory.org>  
Netscape (first mainstream web browser)

# Google!

BETA



Google (first mainstream search engine)

# Why is Silicon Valley a successful innovation ecosystem?

1. Strong research-driven universities (with endowments)
2. Globally experienced repeat entrepreneurs
3. Sophisticated risk capital
4. Social capital
5. Knowledge sharing
6. Tolerance for risk taking
7. Creative destruction
8. Constructive failure
9. Positive aggregate returns
10. Supportive government policy

From Adrian Turner: “Blue Sky Mining: Building Australia’s next billion dollar industries”

# Silicon Valley success factors

## 1. Strong research-driven universities (with endowments)



<http://stanford.edu>

### Stanford University

- Endowment: US\$22.4 billion
- Fundraising: Approx US\$1 billion per year

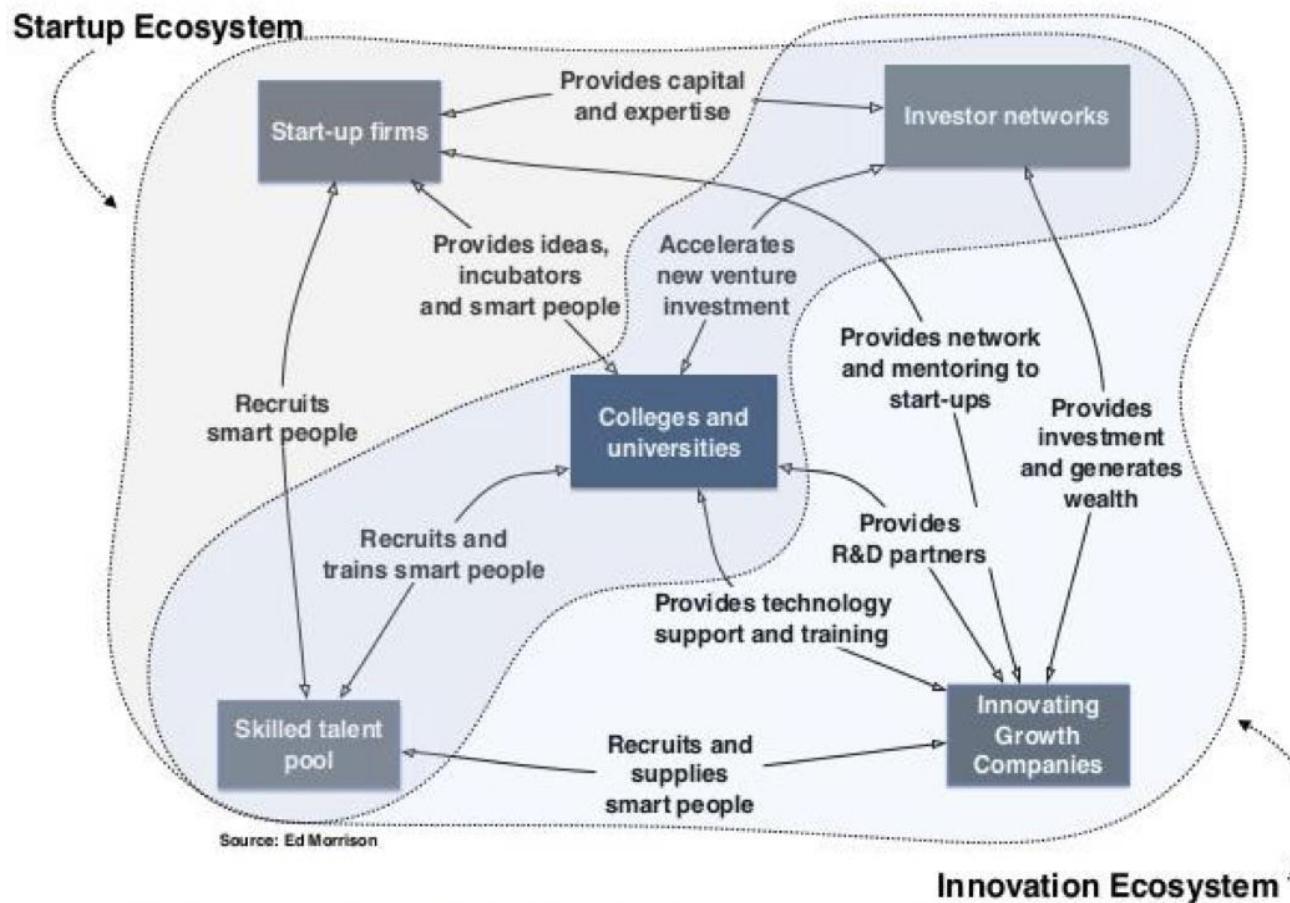


<http://berkeley.edu>

### University of California Berkeley

# Universities in the innovation ecosystem

## Universities Operate Within Ecosystems



<http://www.slideshare.net/edpro/strengthening-purdue-innovation-ecosystem>

## Silicon Valley success factors

### 2. Globally experienced repeat entrepreneurs

Eg Elon Musk



## Silicon Valley success factors

### 3. Sophisticated risk capital



ANDREESSEN  
HOROWITZ

Sophisticated venture capital



Sophisticated angel investors

Eg Ron Conway

"With us and many other angel groups, Y Combinator startups get moved to the top of the list automatically." – Ron Conway

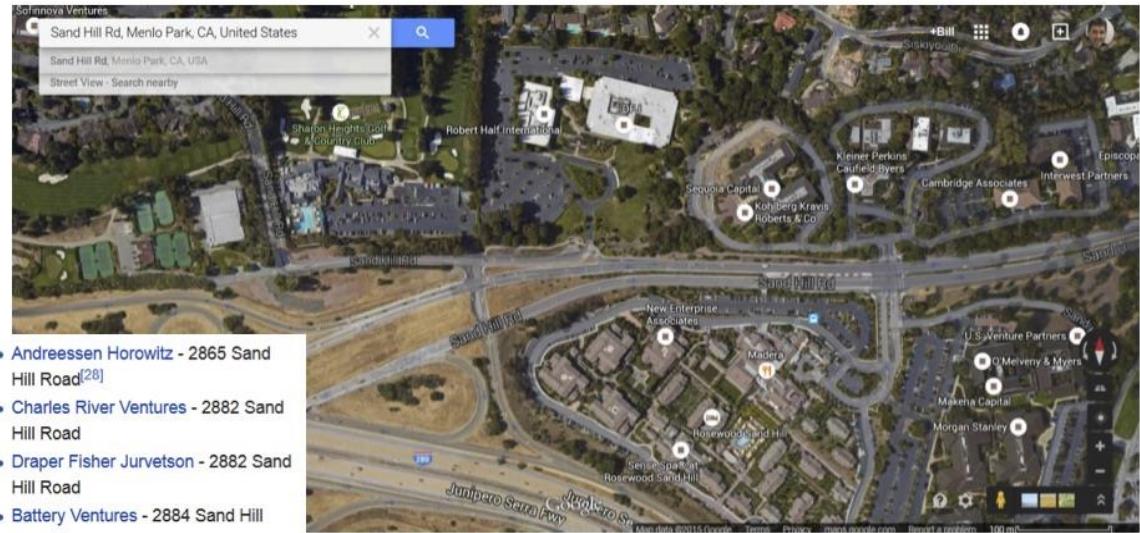
Sophisticated corporate investors



Sophisticated stock exchange

# Silicon Valley: Importance in funding of innovation

- [Astellas Venture Management](#) - 2882 Sand Hill Road<sup>[7]</sup>
- [Khosla Ventures](#) - 2128 Sand Hill Road<sup>[8]</sup>
- [Canaan Partners](#) - 2765 Sand Hill Road<sup>[9]</sup>
- [Altimeter Capital](#) - 2420 Sand Hill Road<sup>[10]</sup>
- [GI Partners](#) - 2180 Sand Hill Road<sup>[11]</sup>
- [5AM Ventures](#) - 2200 Sand Hill Road<sup>[12]</sup>
- [Lightspeed Venture Partners](#) - 2200 Sand Hill Road<sup>[13]</sup>
- [The Westly Group](#) - 2200 Sand Hill Road<sup>[14]</sup>
- [Nexus Venture Partners](#) - 2200 Sand Hill Road<sup>[15]</sup>
- [Greylock Partners](#) - 2250 Sand Hill Road<sup>[16]</sup>
- [Highland Capital Partners](#) - 2420 Sand Hill Road, Suite 300<sup>[17]</sup>
- [DCM Ventures](#) - 2420 Sand Hill Road<sup>[18]</sup>
- [Shasta Ventures](#) - 2440 Sand Hill Road<sup>[17]</sup>
- [Storm Ventures](#) - 2440 Sand Hill Road<sup>[19]</sup>
- [Mayfield Fund](#) - 2484 Sand Hill Road<sup>[20]</sup>
- [Onset Ventures](#) - 2490 Sand Hill Road<sup>[21]</sup>
- [GGV Capital](#) - 2494 Sand Hill Road<sup>[22]</sup>
- [The Blackstone Group](#) - 2494 Sand Hill Road<sup>[23]</sup>
- [Morgenthaler](#) - 2710 Sand Hill Road
- [InterWest Partners](#) - 2710 Sand Hill Road<sup>[24]</sup>
- [U.S. Venture Partners](#) - 2735 Sand Hill Road
- [Kleiner, Perkins, Caufield & Byers](#) - 2750 Sand Hill Road<sup>[25]</sup>
- [TriplePoint Capital](#) - 2755 Sand Hill Road<sup>[26]</sup>
- [Makena Capital Management](#) - 2755 Sand Hill Road<sup>[27]</sup>
- [Silver Lake Partners](#) - 2775 Sand Hill Road
- [Kohlberg Kravis Roberts](#) - 2800 Sand Hill Road
- [Sofinnova Ventures](#) - 2800 Sand Hill Road
- [Andreessen Horowitz](#) - 2865 Sand Hill Road<sup>[28]</sup>
- [Charles River Ventures](#) - 2882 Sand Hill Road
- [Draper Fisher Jurvetson](#) - 2882 Sand Hill Road
- [Battery Ventures](#) - 2884 Sand Hill Road
- [Sierra Ventures](#) - 2884 Sand Hill Road
- [Institutional Venture Partners](#) - 3000 Sand Hill Road<sup>[29]</sup>
- [Mohr Davidow Ventures](#) - 3000 Sand Hill Road
- [Menlo Ventures](#) - 3000 Sand Hill Road
- [Redpoint Ventures](#) - 3000 Sand Hill Road
- [Relay Ventures](#) - 3000 Sand Hill Road<sup>[30]</sup>
- [Sequoia Capital](#) - 3000 Sand Hill Road
- [Trinity Ventures](#) - 3000 Sand Hill Road, Building 4, Suite 160
- [Bright Capital](#) - 3000 Sand Hill Road, building 2<sup>[31]</sup>
- [New Enterprise Associates](#) - 2855 Sand Hill Road

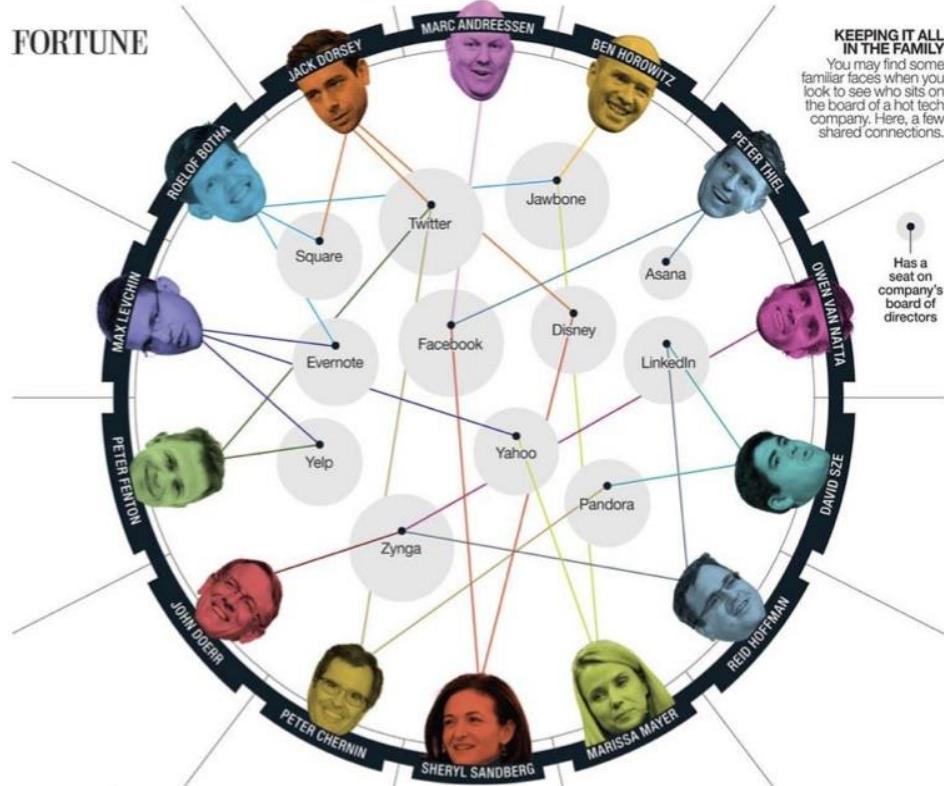


Sand Hill Rd, Menlo Park, Silicon Valley

1/3 of all venture capital investment in USA is invested in Silicon Valley (SV has < 1% of US population)

# Silicon Valley success factors

## 4. Social capital



“Some call it an ecosystem; others call it incestuous. In Silicon Valley every prominent player is just an adviser, an investor, a co-founder, an acquirer, or a director away from another. It’s an industry worth trillions that operates like a small town.”

<http://fortune.com/2014/03/20/silicon-valleys-single-degree-of-separation/>

# Silicon Valley success factors

## 5. Knowledge sharing



# Silicon Valley: Importance in startup accelerators

# Y Combinator



# Silicon Valley: Importance in startup accelerators

- Accelerator for startups
  - Nearly 1500 startups so far (since 2005)
  - >100 new startups per year
  - Market cap of companies > \$80b
  - Startup founders come back to mentor later founders
    - Community of > 3000 founders



"Y Combinator is the best program for creating top-end entrepreneurs that has ever existed."

***Marc Andreessen***, General Partner, Andreessen Horowitz

## Silicon Valley: Importance in startup accelerators

- Ycombinator startups include:
  - Reddit (#9 most visited site in world)
  - Dropbox (>500m users)
  - Airbnb (> \$30b valuation)
  - Scribd (>80m active readers)
  - Stripe (> \$5b valuation)
  - Docker
  - Pebble, etc



### 6. Tolerance for risk taking

- › Entrepreneurs take risks by taking on ambitious missions
- › Employees take risks by working for unproven startups
- › Banks take risks by lending to unproven startups
- › Attorneys take risks by doing pro bono work
- › Property owners take risks by offering accommodation to unproven startups

# Silicon Valley success factors

## 7. Creative destruction

Creating new businesses while destroying old ones

### S&P 500 Churn Over the Past Decade

Sample companies that have entered and exited the index since 2002

#### Entered the index:



#### Exited the index:



S&P 500 index is a stock market index of companies listed on Nasdaq and NYSE

<http://www.aei.org/wp-content/uploads/2014/01/Churn.jpg>



## Silicon Valley success factors

### 8. Constructive failure



EO Personal Communicator (originally by Go Corp)

Failed in market but staff went on to form:

**intuit**<sup>®</sup>



## 9. Positive aggregate returns

Many failures so need large successes.

Eg in 1997, Benchmark capital invested \$6.7m in eBay

in 1999, this was worth \$5b

# Silicon Valley Success factors

## 10. Supportive government policy

For example:

- Stock options not treated as taxable income until exercised
- Flexible labour laws
- Tax incentives to encourage new ventures
- Large govt/defence R&D funding

# **Summary: Why is Silicon Valley a successful innovation ecosystem?**

1. Strong research-driven universities (with endowments)
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From Adrian Turner: “Blue Sky Mining: Building Australia’s next billion dollar industries”

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**How does Australia compare?**

From Adrian Turner: “Blue Sky Mining: Building Australia’s next billion dollar industries”

# A little on Sydney's innovation ecosystem

# Some of Sydney's innovation ecosystem

- Co-working spaces: eg Fishburners, BlueChilli, Stone & Chalk
- Accelerators: eg Incubate, Startmate, ON
- Tech business incubators: eg Cicada Innovations
- Government programs: eg R&D Tax Incentives
- Universities
- Government-funded research organisations: eg CSIRO (including Data61)
- Established companies doing software/hardware development  
(Atlassian, Google, Canon, Optiver, Dolby, Freelancer, Canva, etc)
- Hacker spaces, etc

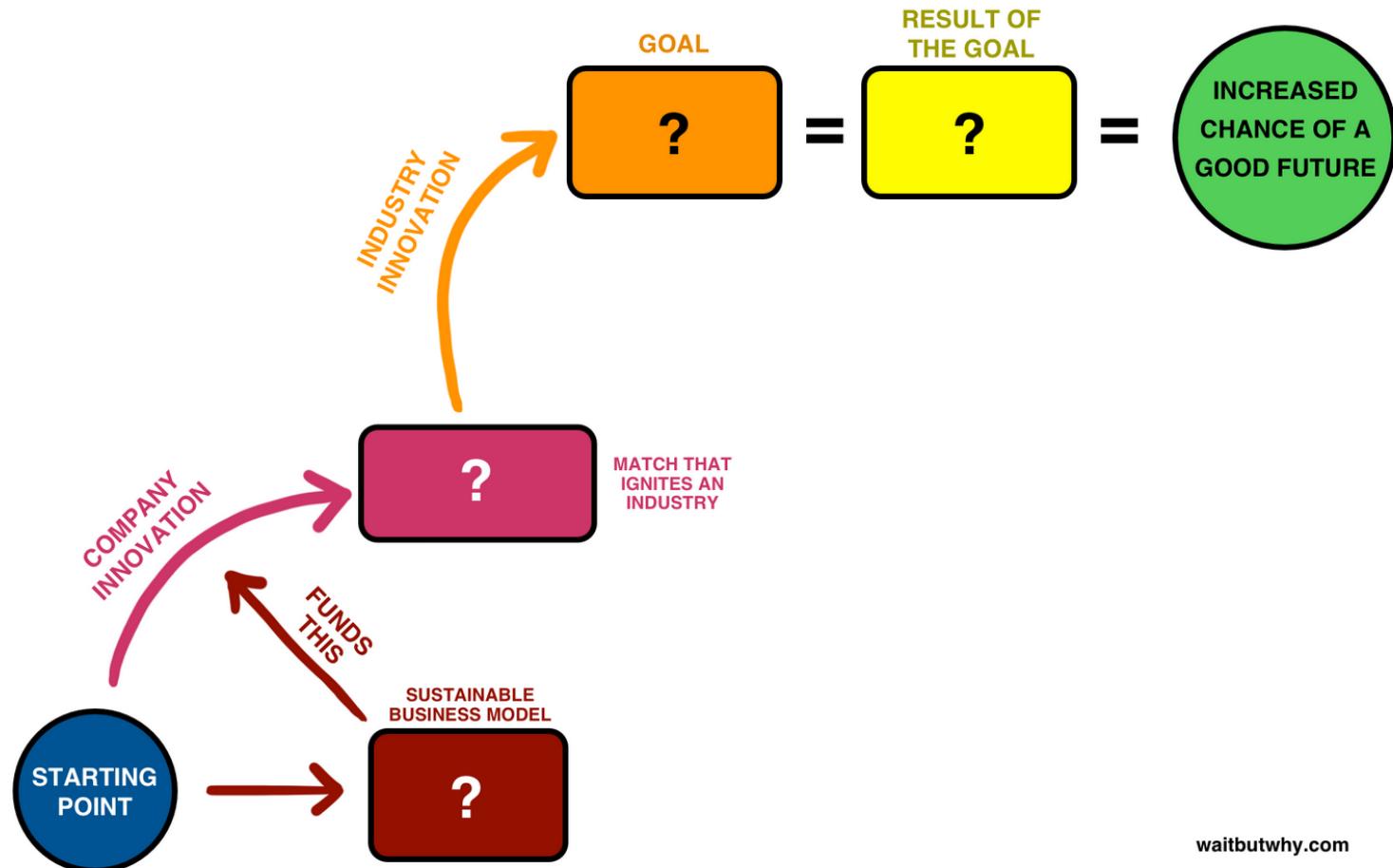
# Helping create a better innovation ecosystem in Australia



<https://vimeo.com/179992315>

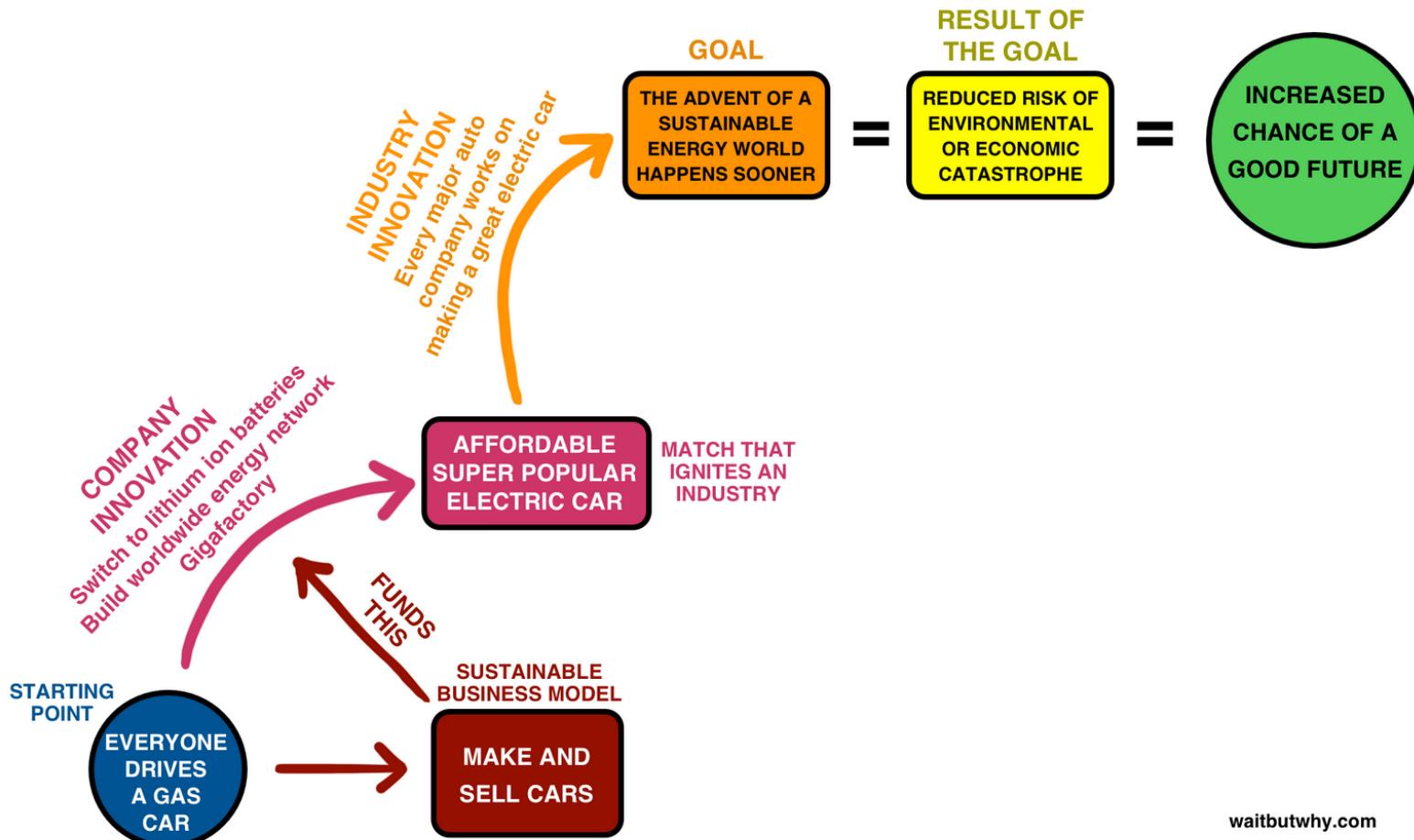
# Elon Musk style Innovation (according to WaitButWhy)

## Elon Musk Company Formula



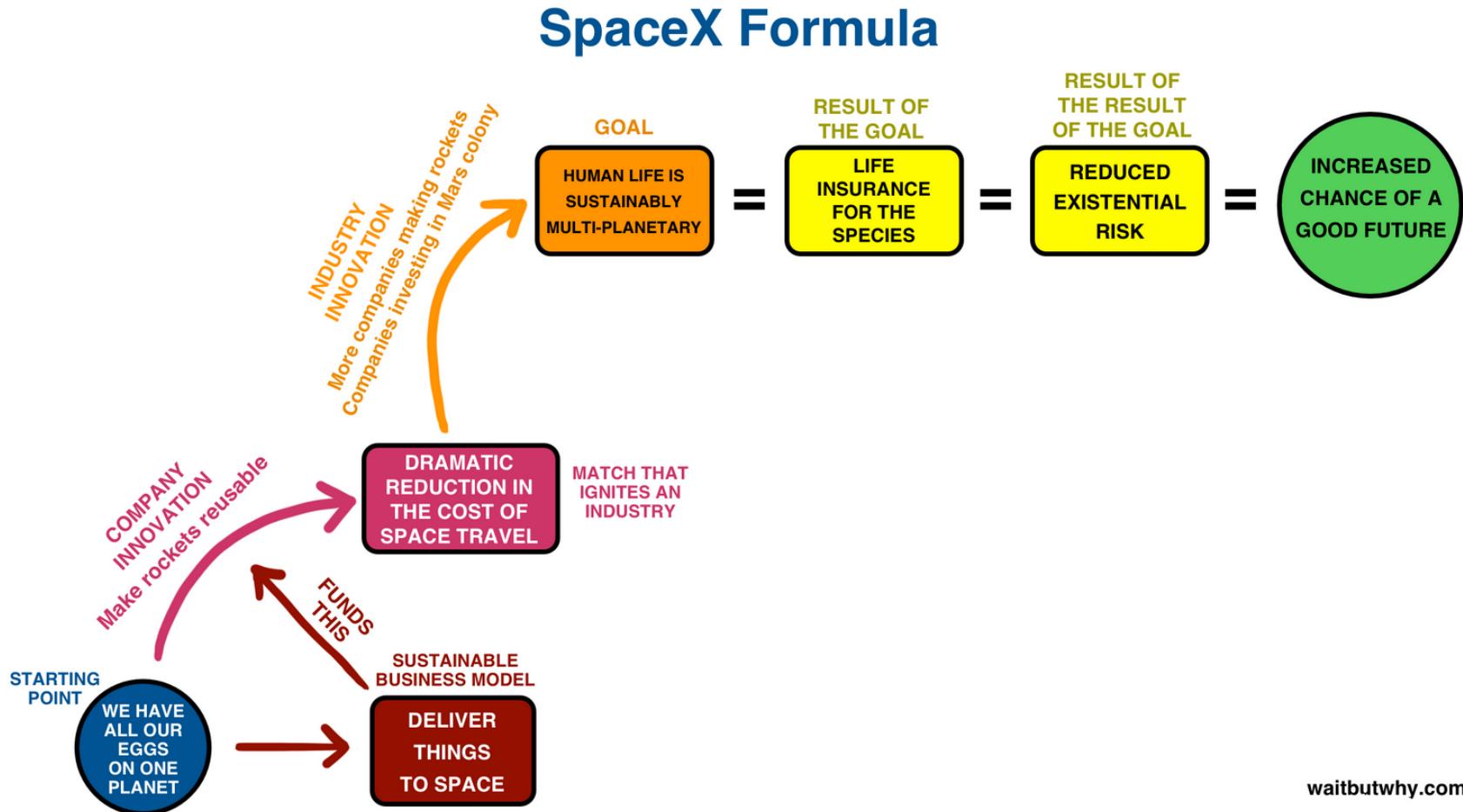
# Elon Musk style Innovation (according to WaitButWhy)

## Tesla Formula



[waitbutwhy.com](http://waitbutwhy.com)

# Elon Musk style Innovation (according to WaitButWhy)



[waitbutwhy.com](http://waitbutwhy.com)

Creating an organisational **culture** which  
supports invention and innovation

- “**Invention** is the first occurrence of an idea for a new product or process, while **innovation** is the first attempt to carry it out into practice.”
- Jan Fagerberg, Oxford Handbook of Innovation, 2004

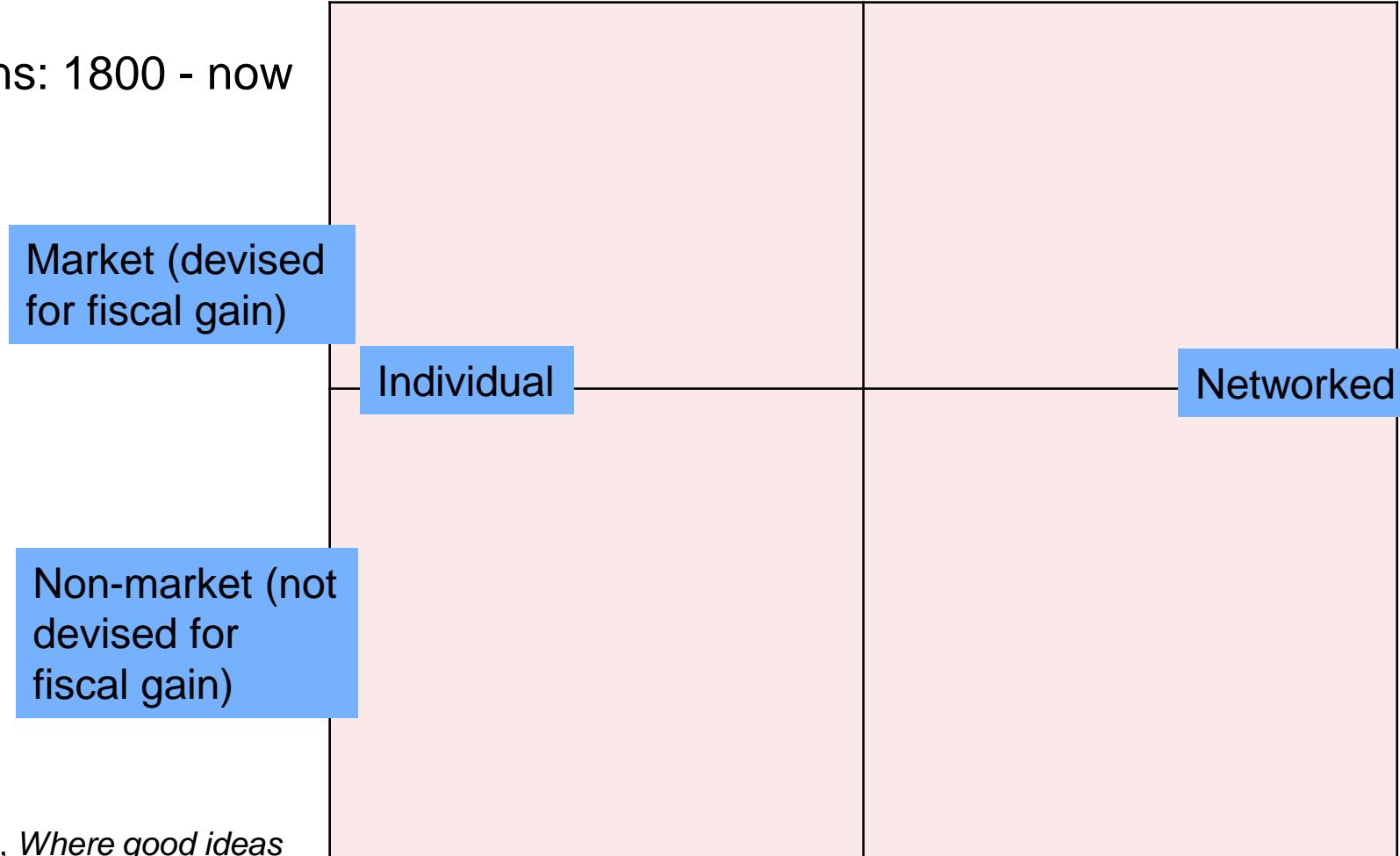
# Creating a culture for generation of new ideas



Steven Johnson (popular science author):  
“Where good ideas come from” (TED Talk)

[http://www.ted.com/talks/steven\\_johnson\\_where\\_good\\_ideas\\_come\\_from.html](http://www.ted.com/talks/steven_johnson_where_good_ideas_come_from.html) Starting from 7:00

## Innovations: 1800 - now



Steven Johnson, *Where good ideas come from: The natural history of innovation*. ePenguin, 2010.

# Innovations: 1800 - now

Market (devised  
for fiscal gain)

Non-market (not  
devised for  
fiscal gain)

Steven Johnson, *Where good ideas come from: The natural history of innovation.* ePenguin, 2010.

Mason Jar  
Tesla Coil  
Gatling Gun  
Nylon  
Vulcanized Rubber  
Programmable Computer  
Revolver  
Dynamite  
AC Motor  
Air-Conditioning  
Transistor

Airplane	Lightbulb
Steel	Automobile
Induction Motor	Radio
Contact Lenses	Welding Machine
Moving Assembly Line	Motion Picture Camera
Locomotive	Vacuum Cleaner
Electric Motor	Washing Machine
Refrigerator	Vacuum Tube
Telegraph	Helicopter
Sewing Machine	Television
Elevator	Photography
Steel	Jet Engine
Typewriter	Tape Recorder
Plastic	Laser
Calculator	VCR
Internal Combustion Engine	Personal Computer
Telephone	Bicycle

Individual

MARKET/INDIVIDUAL

NON-MARKET/INDIVIDUAL

Spectroscope	Hormones
Bunsen Burner	$E = mc^2$
Rechargeable Battery	Special Relativity
Nitroglycerine	Earth's Core
Liquid Engine Rocket	Radiometric Dating
Uncertainty Principle	Cosmic Radiation
Electrons in Chemical Bonds	General Relativity
Absolute Zero	Universe Expanding
Atomic Theory	Ecosystem
Stethoscope	Double Helix
Uniformitarianism	CT Scan
Cell Nucleus	Archaea
Benzene Structure	World Wide Web
Heredity	Continental Drift
Natural Selection	Superconductors
X-Rays	Neutron
Blood Groups	Early Life Simulated

MARKET/NETWORKED

NON-MARKET/NETWORKED

Braille	Periodic Table	RNA Splicing
Chloroform	EKG	Cosmic Microwave Background Radiation
Aspirin	Cell Division	Global Warming
Enzymes	Cell Differentiation	MRI
Stratosphere	Radioactivity	DNA Forensics
Cosmic Rays	Electron	Plate Tectonics
Modern Computer	Mitochondria	Atomic Reactor
Artificial Pacemaker	Vitamins	Nuclear Forces
Radiocarbon Dating	Oral Contraceptive	
Graphic Interface	Neurotransmitters	
Endorphins	Genes on Chromosomes	
Infant Incubator	Chemical Bonds	Restriction Enzymes
Oncogenes	Penicillin	Universe Accelerating
Atoms Form Molecules	Quantum Mechanics	
Punch Cards (Jacquard Loom)	Radar	GPS
Suspension Bridge	Liquid-Fueled Rocket	
Second Law	DNA (as Genetic Material)	Internet
Anesthesia	Krebs Cycle	RNA (as Genetic Material)
Germ Theory	Computer	Asteroid K-T Extinction

Networked

# Organisational culture: “Scientific Management” (Taylorism)



- Standardise work into separate tasks
- Scientifically study each task
- Continually measure performance of task
- Compensate workers based on performance

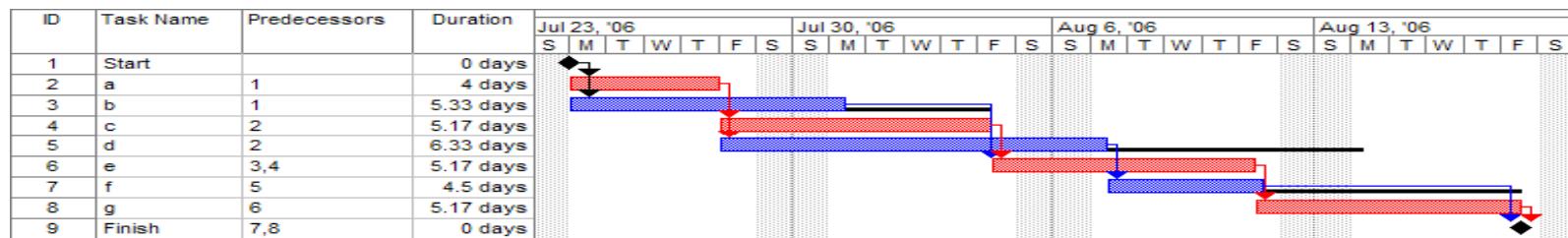
“In the past, the man was first.  
In the future, the system will be first.” (1911)

Frederick Winslow Taylor  
Mechanical engineer  
Efficiency expert  
Management consultant  
1856-1915

<https://www.youtube.com/watch?v=sIfFJXVAepE>

# Influence of Taylorism in organisations

- Scientific management used not just in factories, but in most organisations
- Gantt charts (by Henry Gantt who worked with Taylor)



- Scientific management in education and government
- Industrial psychology
- Using budgets for accountability and performance measurement
- Key performance indicators

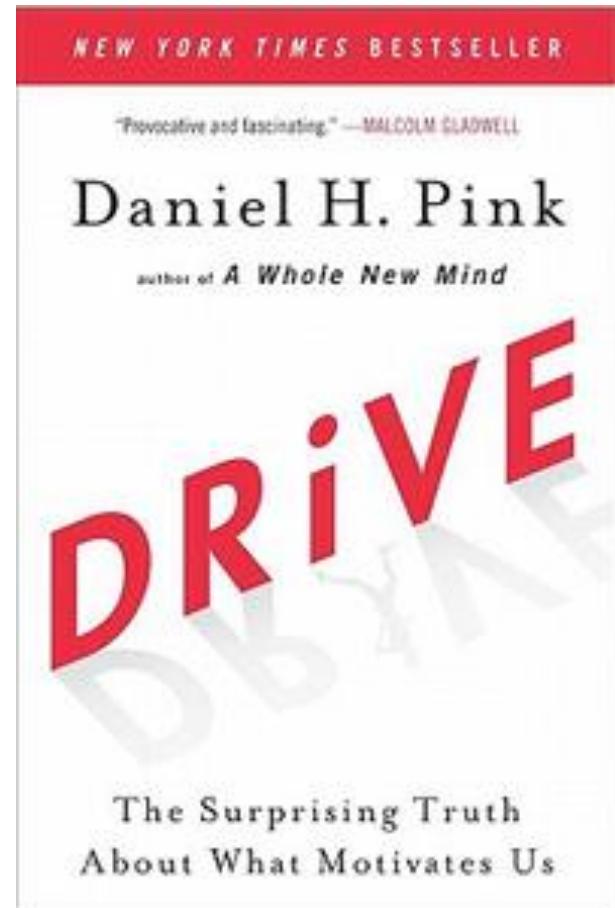
But designed for repetitive work with known function  
(eg production of known item in factory)

Not suitable for creative work with many unknowns  
(eg technological innovation)

# Organisational culture: Motivation

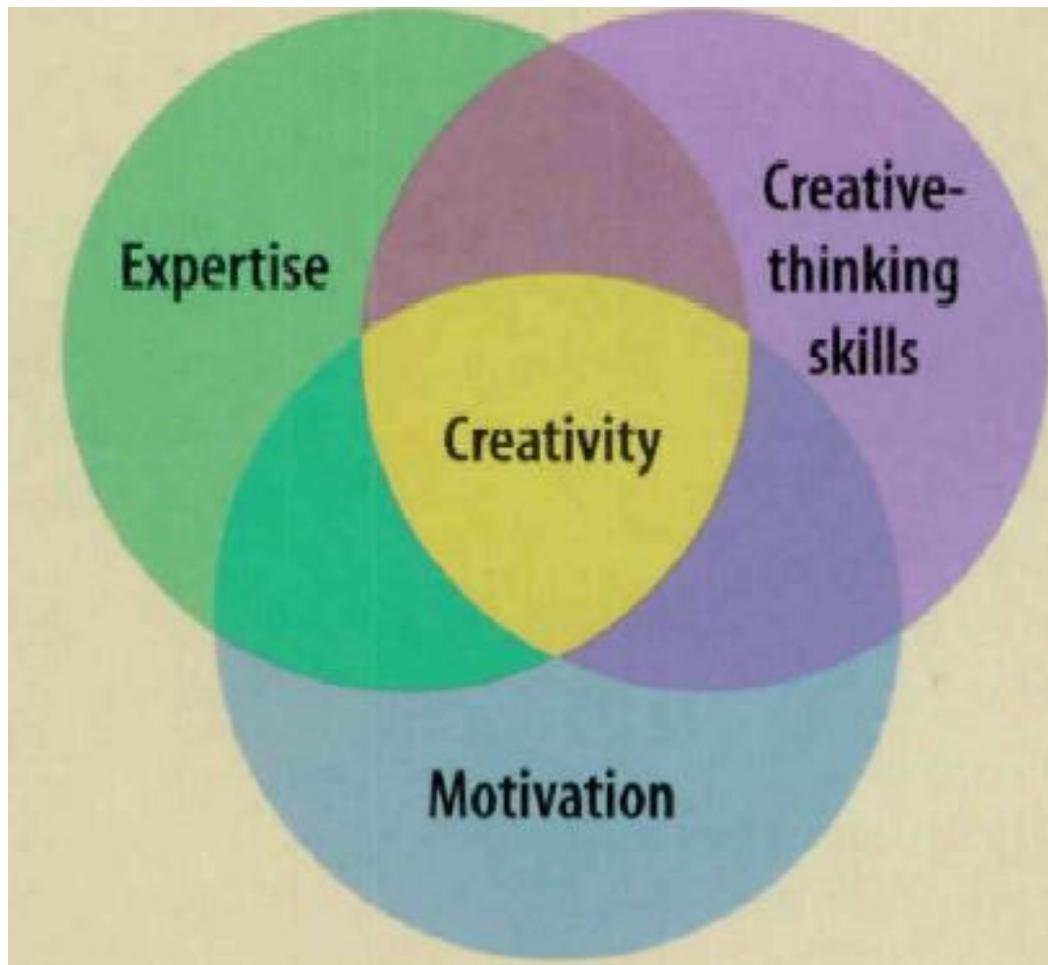
According to Pink:

- True motivation does not come from traditional incentives (like reward and punishment)
- Motivation comes from:
  - Autonomy: Our desire to be self directed.
  - Mastery: Continually improving our skills toward a goal.
  - Purpose: Our desire to do something that has meaning and is important.





Teresa Amabile,  
Harvard Business School



Source: Amabile, *How to Kill Creativity* (1998)

# Fostering creativity, productivity and innovation



Teresa Amabile,  
Harvard Business School

<http://www.nytimes.com/2011/09/04/opinion/sunday/do-happier-people-work-harder.html>

- One of her studies:
  - Workers took notes during working day:
    - 12,000 electronic diary entries, 238 professionals, 7 companies
  - In 1/3 of entries, worker was unhappy and/or unmotivated (often frustrated)
  - Found workers far more likely to have new ideas on days when they felt happy
  - Found the factor that most led to engagement of workers was:
    - “Making progress in meaningful work”
    - More important than bonuses, raises, etc
    - More likely to lead to ideas/breakthroughs

# The dynamics of “Inner Work Life”

- Emotions:
  - Sharply-defined reactions and more general feelings
  - Joy, disappointment, pride, etc
  - Vary by pleasantness and intensity
- Perceptions:
  - From immediate impressions to theories of what is happening
  - Eg of causes of actions in the work environment
- Motivations:
  - Extrinsic motivations
  - Intrinsic motivations (more important than extrinsic for creativity)
  - Relationship or altruistic motivations



Teresa Amabile,  
Harvard Business School

## Forces supporting “Inner Work Life”

1. “Making **progress** on **meaningful work**”
2. “Receiving **catalysts** (things that directly help get the work done)”
3. “Benefitting from **nourishers** (interpersonal events that uplift people as they work)”



Teresa Amabile,  
Harvard Business School

# Forces supporting “Inner Work Life”

1. “Making progress on meaningful work”
2. “Receiving catalysts (things that directly help get the work done)”
  - Setting clear goals
  - Allowing autonomy
  - Providing resources
  - Giving enough time – but not too much
  - Helping with the work
  - Learning from problems and successes
  - Allowing ideas to flow
3. “Benefitting from nourishers (interpersonal events that uplift people as they work)”
  - Respect
  - Encouragement
  - Emotional support
  - Affiliation



Teresa Amabile,  
Harvard Business School

# Creating a culture for empowering individuals



Prof Sumantra Ghoshal  
1948 – 2004  
Strategic and international Management,  
London Business School

<https://www.youtube.com/watch?v=UUddgE8rlOE>

**“The smell of the place”**

Constraint

-> Stretch

Compliance

-> Self-discipline

Control

-> Support

Contract

-> Trust

Prof Sumantra Ghoshal

1948 – 2004

Strategic and international Management,  
London Business School

## **Creating a creative and innovative workplace**

- So... some keys to a creative and innovative workplace:
  1. Workplaces have many opportunities for people to **interact** in their work
  2. Staff work on **meaningful** work
  3. Staff have visibility of their **progress**, have “**catalysts**” and “**nourishers**”
  4. Environment for **stretch, self-discipline, support and trust**

**Does your workplace support  
creativity and innovation?**

# Summary

- **Creating a good ecosystem for innovation**
  - Successful areas (eg Silicon Valley) are successful because of the ecosystem, not just the people and companies
  - We can learn from successful innovation ecosystems
  - Helping and sharing is essential for a successful ecosystem
- **Culture for innovation**
  - The importance of networked individuals for generating new ideas
  - The importance of “Making progress on meaningful work”
  - Effective management of people requires:
    - More focus on: stretch, self-discipline, support and trust
    - Less focus on: constraints, compliance, control and contract

# References

- Amabile, Teresa M. *How to kill creativity*. Harvard Business School Publishing, 1998.
- Amabile, Teresa, and Steven Kramer. "Do happier people work harder." *New York Times*, 2011.
- Amabile, T., & Kramer, S. *The progress principle*. Harvard Business Review Press, Boston, MA, 2011.
- Blank, Steve. *Innovation, Change and the Rest of your Life*,  
<https://steveblank.com/2017/05/09/innovation-change-and-the-rest-of-your-life/> , May 2017.
- Johnson, Steven. *Where good ideas come from: The natural history of innovation*. ePenguin, 2010.
- Pink, Daniel H. *Drive – The Surprising Truth about what motivates us*. Canongate Books, 2010.
- Turner, Adrian. *Blue Sky Mining: Building Australia's next billion dollar industries*. Self-published. 2012.
- Urban, Tim. *Neuralink and the Brain's Magical Future*.  
<http://waitbutwhy.com/2017/04/neuralink.html> , April 2017.