

# Academic Research and Entrepreneurship

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# What is CSAI L?

## Formed in July 2003



- Merger of former Artificial Intelligence Laboratory and the Laboratory for Computer Science (= Project Mac July 1963)
- About 820 members
  - 93 principal investigators
    - » 72 active teaching faculty
    - » EECS, Math, Brain and Cognitive, Aero/Astro, Ocean Eng, Planetary Sciences
  - 450 graduate students
  - 90 research staff and research visitors
  - 80 postdoctoral fellows
  - 60 staff
  - 50 undergraduates

# Conditions for Entrepreneurial Activity in an Academic Institution



1. The very nature of academic research itself must be an entrepreneurial culture
2. The research or environment must be pushing on the limits of current possibility
3. There must be a culture of institutional tolerance of external entrepreneurial activity -- while preserving the key educational mission
4. There must be support structures in place for spinning up new companies
5. There must be ultimate exit strategies in the economic infrastructure -- for individuals and for the academic institutions

# Today's Examples



- Practices and companies at
  - Stanford University
  - Carnegie Mellon University
  - Massachusetts Institute of Technology
- US Centric Viewpoint

# 1. Entrepreneurial Academic Culture



- The successful academic entrepreneurial institutions in the US are mostly private rather than government (UC Berkeley is the exception)
- These institutions do not provide research support
- Faculty and students are used to extreme competition in all aspects of funding and projects
- Research agendas are not driven top-down but rather come bottom-up from faculty and students
- Challenging the status quo within these institutions is revered and encouraged (and often uncomfortable for those challenged...)

# Example at MIT CSAIL



- MIT provides 9 month salaries for ~65 teaching faculty
- MIT provides building, power, telephones, libraries, contracting office, external network connectivity
- MIT provides <0.3% of operating budget
- CSAIL sends >25% of its operating budget to MIT as overhead and tuition payments
- CSAIL pays salaries and benefits of ~600 people
- CSAIL provides computational/network infrastructure, plus fiscal office, facilities, specialized laboratories
- Faculty at CSAIL raise 99.7% of operating budget through proposals
- Less than 20% of proposals are successful
- **Everyone is used to being entrepreneurial and competing**

## 2. Pushing Limits of Possibility



- The value added for entrepreneurship at academic institutions is the novelty of what is being attempted
- It is rarely a “follow” play
- It is usually doing something that has not previously been done
- It might be from new deep research
- It might be from building tools that had not previously been built

# Examples of Systems, not Research



- Leonard Bosack, a mid-level sysadmin at Stanford, decided to build a network bridge so he could send email to his wife in another department
  - turned into Cisco
  - market cap: \$128B
- Andy Bechtolsheim, a 24 year old graduate student at Stanford, tried to build a personal computer from commodity parts with bit-map display and network interface
  - turned into Sun Microsystems (Stanford University Network = SUN)
  - market cap: \$12B

# Examples of Research



- Larry Page and Sergey Brin, graduate students at Stanford, had an idea for using the structure of the web to improve on keyword search engines
  - turned into Google
  - market cap: \$28B
- Ronald Rivest, a professor at LCS (CSAIL), developed a public key encryption algorithm
  - turned into RSA Data Security
  - market cap: \$1B

# 3. Institutional Tolerance



- Academic institutions must expect and understand that both faculty and students will be starting companies
- They must realize that trying to push too hard for a share of the pie will disincentivize the the faculty and the institution may end up with less
- They must have appropriate and encouraging IP policies in place
- They need to be tolerant as the transition between lab and company happens
- They need to protect students and staff against inappropriate behavior
- **This is all a delicate balancing act**

# Examples of Tolerance



- Extended leave for faculty while they start a company
  - e.g., Tom Leighton is on leave from MIT while he is still the CEO of Akamai
- Allowing faculty and students to use facilities within the academic structure, as long as there is no incurred marginal cost, as the ideas for a company are fleshed out
  - Google was first run out of dorm rooms at Stanford
  - Stockmaster was Web's first stock quote service
    - » consumed 2/3 of AI Lab (CSAIL) bandwidth
    - » later became biggest Web advertiser before being bought but Red Herring

# Needs for Protection



- As things transition from the lab to a company the institution must ensure
  - everyone's contribution is recognized so that no-one's work is unfairly exploited without compensation
  - the primary educational mission is not compromised as relationships change
- At MIT we have
  - strong sanctions against financial relationships between people who also have a hierarchical relationship within the university
    - » if a faculty and a student want to start a company together then they must do it after the faculty/student relationship is ended



## 4. Support Structures in Place

- There need to be mechanisms which help people get companies started
  - easy incorporation
  - flexible office space leasing
  - angel capital
  - venture capital
  - other forms of finance
  - mentoring and guidance
- Everyone needs to be forgiving of failures

# Example: Support within MIT



- Sloan School runs entrepreneurship competitions
  - Akamai won the \$1K competition
  - final six of the \$50K competition
- Engineering School runs Deshpande Center
  - research grants of \$50K to \$250K to develop ideas towards commercialization
  - highly competitive!
- CSAIL sponsors Springboard to mentor women graduate students and faculty in entrepreneurship
- MIT provides many social events where VCs and faculty and students get together to discuss entrepreneurial ideas

# Examples: Support Outside



- Pittsburgh has the Robotics Foundry
  - representatives from many Universities
  - city and state funding
  - lobbies federal government to send contracts to local startups
  - provides mentoring
- Cambridge has many startup mentoring companies and consultants
- Boston and Silicon Valley have large number of Venture Capital firms
- There are banks, such as Silicon Valley Bank, which specialize in banking services for small to medium startups

# Federal Encouragement



- Small Business Innovation Research (SBI Rs)
  - provide a source of funding to very small companies
    - » \$50K in first instance
    - » \$750K follow ups
  - percentage of federal programs has to go to SBI Rs
  - many companies use this to bootstrap up to the point where they have enough IP and internal structure to approach VCs
  - many companies survive on SBI Rs for years
  - some companies never get beyond this...

# 5. Payoff: Individuals & Institutions



- There need to be ways for people to exit
  - most academic founders do not go on to run the companies as they grow, so they need to know they can come back
  - there must be multiple ways to exit
    - » IPOs
    - » sale to larger companies
- The institutions need to be patient
  - encourage a favorable relationship
  - largely to rely on largesse rather than contractual arrangements

# *MIT: The Impact of Innovation\**



“If the companies founded by MIT graduates and faculty formed an independent nation, the revenues produced by the companies would make that nation the **24th largest economy** in the world. The 4,000 MIT-related companies employ 1.1 million people and have annual world sales of \$232 billion. That is roughly equal to a gross domestic product of \$116 billion, which is a little less than the GDP of South Africa and more than the GDP of Thailand.”

**\* 1997 Report by BankBoston**