INTELLECTUAL PROPERTY

Professor David H. Hsu

Why is IP important for entrepreneurs and entrepreneurial ventures?

- Appropriability and incentives for investment
  - Example of the drug business and patents
  - Example of reproducing digital files and copyright protection

- IP as akin to "real" property, with associated rights: exclude others from using; sell / lease or license / lien
  - From the U.S. Constitution (1787), Article I, Section 8, Clause 8: "The Congress shall have Power To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writing and Discoveries…"

Entrepreneurship

What are the various forms of IP?

- Patents: allows inventors to exclude others from using the protected property for a period of time before it enters the public domain (e.g., light bulb)

- Copyright: allows authors to control the duplication and distribution of their creative works (e.g., musical lyrics; photographs)

- Trade secrecy: allows firms to safeguard commercially valuable information (e.g., KFC)

- Speed: example from the semiconductor industry

Patents

- Right to exclude others for 20 years from date of patent application
  - *Quid pro quo*: right to exclude in exchange for *disclosure*
  - Traditional justification: incentives for innovation

- US Standards for patentability
  - First to file
  - Three criteria
    - Non-obviousness (to someone schooled in the art)
    - Novelty (beyond what already is patented)
    - Utility (is potentially useful)
  - Excluded: laws of nature, natural phenomena, and abstract ideas
  - Inventor makes specific claims to define the scope or space of invention that is to be protected
  - These standards also apply for business method patents

U.S. patent milestones

Patent #	Yr of issue	# Yrs elapsed	Invention
1	1790	-	Process of producing potash for fertilizer
1M	1911	121	Tubeless vehicle tire
2M	1935	24	Process of improving pneumatic tires
3M	1961	26	Automatic conversion to data processing code (GE)
4M	1976	15	Process of recycling asphalt aggregate compositions
5M	1991	15	Process of efficiently producing fuel ethanol
6M	1999	8	Palm Computing Hotsynch (3Com)
7M	2006	6	Process of producing polysaccharide fibers (DuPont)
8M	2011	5	Prosthesis to enhance visual perception
9M	2015	4	System converting rain water to windshield wiper fluid

Source: http://www.uspto.gov/learning-and-resources/ip-motion/millions-patents and web searches

Entrepreneurship

What explains this acceleration?

- The pace of invention in society has increased

- The utility of patents (offensive, defensive, bargaining chips) has increased

  - Startup signaling value to investors and partners in addition to patent exclusionary role

    - Reference: D.H. Hsu and R.H. Ziedonis (2013). "Resources as Dual Sources of Advantage: Implications for Valuing Entrepreneurial-Firm Patents," *Strategic Management Journal*, 34 (7), pp. 761-781

IP: good or bad for innovation?

- "Patent assertion entities", "Non-practicing entities", "patent trolls": focuses efforts solely on enforcing patent rights

- "The fact that no one controlled sudoku's intellectual property rights let the game's popularity grow unfettered..." – *New York Times*, 3/21/07

- Another example: the Black-Scholes financial option pricing formula (Black, F. and Scholes, M., 1973, "The Pricing of Options and Corporate Liabilities", *Journal of Political Economy*, Vol. 81, pp. 637-654.)

Trade secrets

- Information, including a formula, program, method, technique, or process that (a) derives independent economic value from not being generally known, and (b) is the subject of reasonable efforts to maintain its secrecy.

- Differences with patents: State level regulation, indefinite coverage, a lesser standard (but does not protect against backward engineering, independent invention, or accidental disclosure)

- Two contractual provisions can protect commercially valuable information:
  – Non-disclosure agreements: direct protection of information
  – Covenants not to compete: limits former employees from working for competitors within a specified geography for a specified amount of time

Speed: an example from Intel

Table 2. Intel's Desktop Chip Families, 1985-1999

	Chip Families				
	386	486	Pentium I	Pentium II	Pentium III
1. Introduction Date	1985	1989	1993	1997	1999
2. Number of Chips	10	12	15	20	9
	----------------averages over all chips in chip family----------------				
3. Prices (dollars)					
4. Introduction	268	656	753	739	608
5. Exit	90	102	119	153	154
6. Lifespan (years)	3.00	2.75	2.50	1.75	1.50
	----------------------compound annual growth rates----------------------				
7. Price Change Over Lifespan	- 36	- 68	- 74	- 90	- 91
Growth from previous chip family:					
8. Number of Transistors	27	36	24	22	58
9. Speed of chip (megahertz)	33	11	22	34	38

Source: Aizcorbe and Kortum (2005). "Moore's Law and the Semiconductor Industry: A Vintage Model," *Scandinavian Journal of Economics*.