Technology Licensing at MIT

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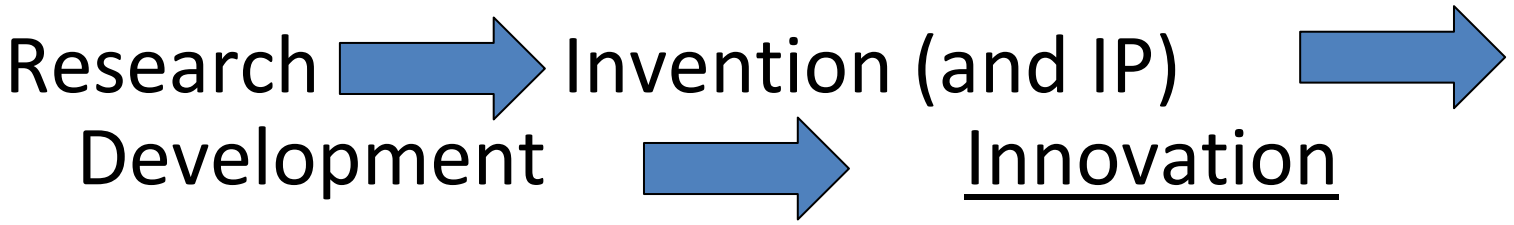
Many forms of "Technology Transfer" from Academia to Industry

- The graduating student
- Publication
- The consulting professor
- Collaborative/sponsored research with industry
- University seminars/courses for industry
- Intellectual Property licensing to
  - **Existing companies**
  - **Spin-Outs**

Formal definition of “technology transfer”

- Purposeful transfer of the results of fundamental research from universities and research institutions into the economy via protection and out-licensing of intellectual property (patents and software copyrights)

Purposes of University Technology Transfer



- New products and medicines
- Bring new technology into industry for economic competitiveness
- Encourage entrepreneurship for local and national economic development

What about revenue for the university from technology transfer?

[to be discussed later, but….]

Technology transfer is usually not a substantial source of revenue for the university

- And usually needs some governmental or other support for up to a decade or more

U.S. Legislative Basis for tech transfer: Bayh-Dole Act 1980

- >90 % of U.S. University research is funded by the U.S. government under competitive grants
- Thus, Federal Government policy on invention ownership dominates U.S. university technology transfer

What the Bayh-Dole Act did…

- Gave universities title to their patents from federally funded research
- Allowed universities to grant licenses
  - enabling tech transfer at the local level!
- Allowed exclusive licenses
- Allowed universities to take royalties (and legislated sharing of royalties with inventors.)

Why Bayh-Dole Law was Needed

- U.S. was leading the world in basic research
- But research results were not being translated into industrial innovation
- U.S. government concerned with maintaining economic competitiveness
- Government owned patents from the research it funded—but very few were licensed out; little impact on industry

Bayh-Dole looked at research and patents in a new way

- University technology is embryonic—neither its feasibility nor market is known
- Development will require high risk investment by industry
- Intellectual property protection can be used as an incentive to make high risk investment
  - motivating the "first mover" by protecting against later competitors

Patent protection is particularly critical for development of pharmaceuticals

- Development of a new therapeutic or vaccine product is a particularly high risk activity
  - Time frames are long
  - Financial investment is very high
  - Clinical trials are very difficult
  - Probability of failure is high
- Patent protection of the final product is necessary before companies (or biotech investors) will take the risk and make the investment

Other truly innovative technologies requiring substantial investment also need patents to induce investment

Examples:

- Superconductors
- Ultra-large liquid metal batteries
- Production of hydrogen through solar energy
- 3-Dimensional printing
- Graphene-based desalination
- Public key encryption

--and many others

Benefits of tech transfer to universities

- Bring fruits of university research to the public

  ("Get the technology developed" and "give the public the benefit of the research they fund")
- Allow investigators to "make their findings real"
- Bring real world problems into the laboratory through relationships with industry
- Opportunities for graduates

Revenue expectations from royalties and spinouts: US Statistics

Data from 200 US universities in FY 2009*

- New Issued US Patents: > **3400**
- New Licenses Agreements: >**4300**
- New Startup Companies: >**596**
- Total Startups (active) : 3400

*Association of University Technology Managers survey

Total royalty and equity returns

- Revenue FY 2009 (US):
  $2.3 Billion
- **BUT…**this is on a research base of:
  $ 54 Billion
- Thus, Licensing revenue averages:
  only 4.8% of research expenditures

The Societal Impact is much Larger!

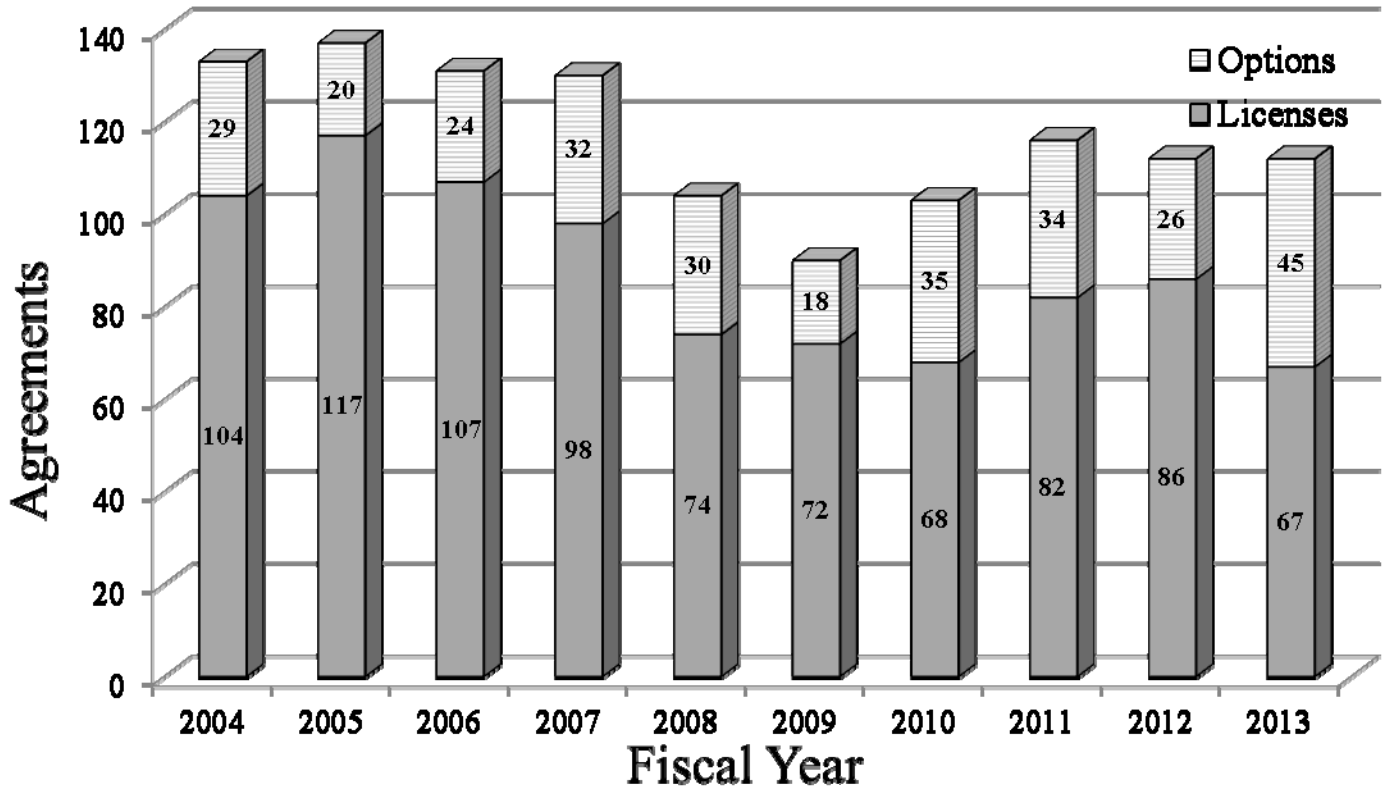
- More than 4000 new companies formed from US university technology licensing
- Estimate over 500,000 jobs in development and production of new products based on university licenses
- Significant tax returns to the government
- Many new medicines developed based on patents from university research

- Significant number of new startups have developed into large, successful companies (e.g. Google! from Stanford)
- Biotech and Information Technology (IT) clusters in a number of cities with large research universities (Boston, San Francisco, San Diego, North Carolina, etc.)
  - Majority of new biotech companies spin directly out of university research

Entrepreneurship awareness

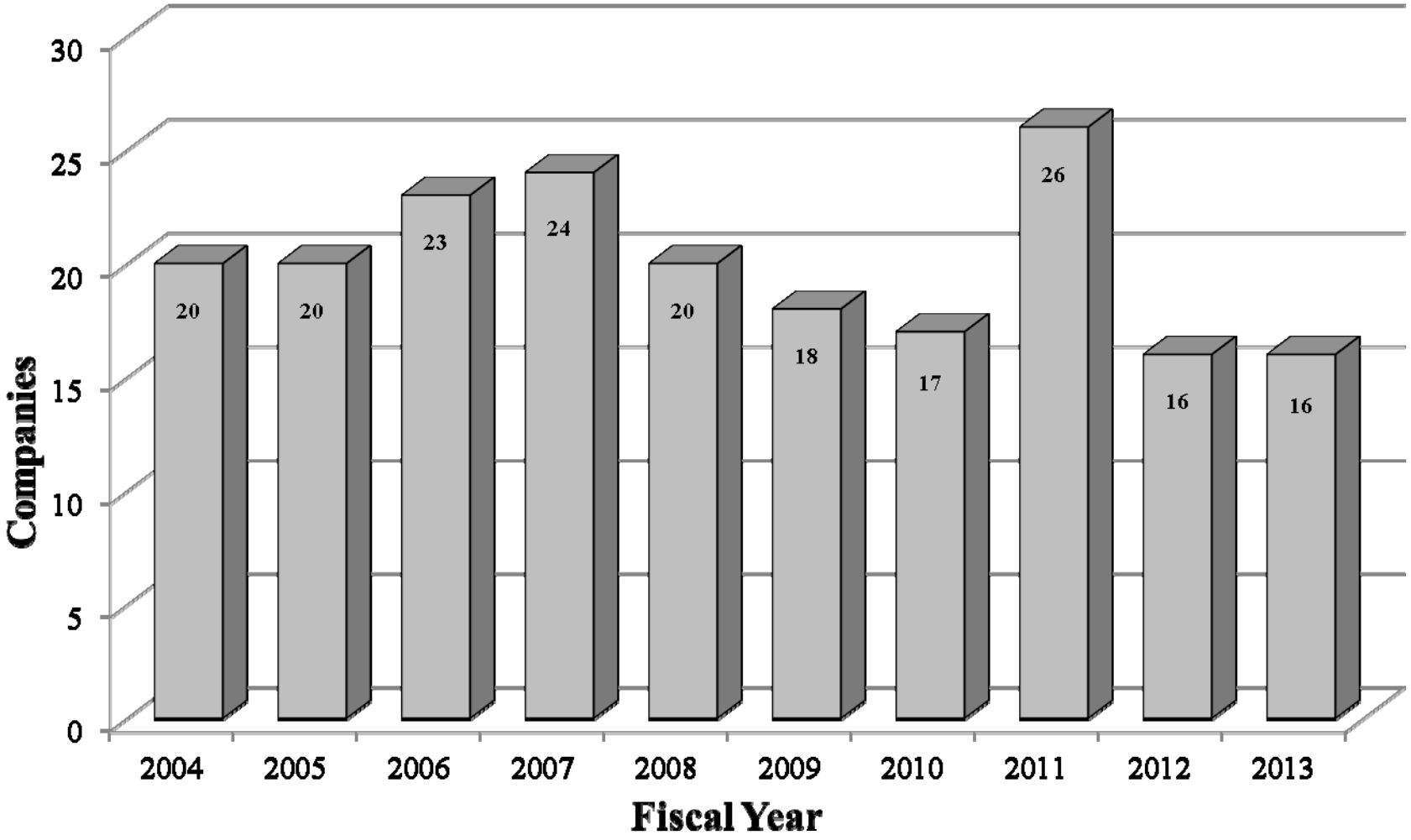
- Awareness of spin-outs is now pervasive in many universities—both in the science and engineering schools and the business schools
- Many successful role models—leading to a multiplying effect
- Business school curriculum changes
- Business plan contests, venture clubs, etc.
- Venture capital and angel investors seeking out new opportunities in universities

Licenses and Options
by Fiscal Year, 2004-2013



Note: The license numbers have been updated to include SW-EU licenses with consideration >$1,000

Number of Companies Started by Fiscal Year, 2004-2013



Existing companies vs. spinouts?

Emphasis on spinouts is partly a reaction to the reluctance of large companies to invest in "university stage" technologies:

- Stock market values short-term results
- University-stage technologies are:
  - Too risky
  - Require specialized resources to develop
  - Too long a time to market

BigCo wants “New” but not “Early”

- Spinout companies have been filling the gap between university-stage technology and large companies
- Lessen the risk, and lessen the time to market
- Large companies—with cash and marketing strength-- provide “exit strategy” for investors in spinouts (in the absence of a robust IPO market.)

The Chain of Value: Bringing Innovation From Basic Research to Industry

Why is MIT able to do so much?

- LOTS of world-class technology—dependent on government support of basic research
- Good IP protection
- Consistent and consistently enforcedTech Transfer policies
  - IP Ownership
  - Conflict of Interest
  - Publication
- "Impact not Income" drives the program
- An experienced Technology Licensing Office

A pervasive entrepreneurial eco-system is a key ingredient

- Well networked in a highly entrepreneurial geographical area with managers, capital, support services
- Many activities where the university, its students and faculty mix on a continuing basis with the business community
  - Companies
  - Venture capitalists
  - Angel investors

MIT components of the "entrepreneurial eco-system"

- Deshpande Center: sponsors research "with startup potential"—with business "catalysts"
- $100 K Student Business Plan Contest
- Venture Mentoring Service
- MIT Enterprise Forum
- Martin Trust Entrepreneurship Center at Sloan School of Mgmt.
- Student Venture Capital and Entrepreneurship Clubs
- The Technology Licensing Office

- And lots of role models!
  - Both faculty and students
- Students and faculty are continuously exposed to people who have started companies—and to people who fund them
- Students graduate with a sense that “I can do it too”. Changes life-time expectations

Entrepreneurship is in the air!

Thank you!