Communicating the Value of Academic Technology Transfer

MARYLAND
An Innovation University

Ken Porter, PhD
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UM Ventures, College Park
StartupUMD Business Fundamentals Workshops

MAY 2020
Financial Projections, Part 2
Virtual Lunch & Learn: A Founder's Guide to Sales
Work from Home Round Table Discussion
Startup Funding for UMD Faculty and Graduate Students
Patents 101
    Presenter, Raymond Van Dyke, Van Dyke Intellectual Property Law
Market Research 101
Investment Prospective from a VC Fund
Startup Guide for Faculty/Researchers at UMD
Business Lingo for Scientists
Creating Momentum for Change
Copyrights 101
Mechanisms for knowledge dissemination

1. Hiring students
2. Publication
3. Presentation
4. Corporate sponsored research
5. Cooperative research centers
6. Consulting
7. Entrepreneurship without university IP
8. Licensing university IP to established firms or startups
First Academic Technology Transfer

Johns Hopkins University

Ira Remsen (prof) and Constantin Fahlberg (post-doc), through toluene research, discovered saccharin (1879)

Toluene

\[ \text{CH}_3 \]

Saccharin

\[ \text{O} \]

\[ \text{NH} \]

\[ \text{S} \]

\[ \text{O} \]
First License
University of Toronto licensed insulin to Eli Lilly in 1923
First TTO

WARF licensed vitamin D-enriched milk to Quaker Oats, 1925
Over the past 95 years, $2B returned to the University of Wisconsin
First Industry: Biotechnology

Stanford/UCSF licensed the Cohen-Boyer patents to 468 companies, which generated 2442 known products and $265M license revenue from $35B in sales, 1974-1997

- Genentech
- AMGEN
- MERCK
- Lilly
- CHIRON
- Johnson & Johnson
- Abbott
- Schering
- Novo Nordisk
Foundations for Technology Transfer

• Western Tradition

• US Constitution
  – Article 1, Section 8, 1788
    To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries
    T Jefferson, as Secretary of State led the first patent review board and personally reviewed every patent for the first 3 yrs

• US Government Sponsored Research
  – Science the Endless Frontier, 1945

• Bayh-Dole

• University Policy
  – UMD Intellectual Property Policy, 2018
Patents through Time

A patent confers a right to exclude others for a set period of time

Economic Policy ➔ Individual Rights

- **Sybaris, Greece, 500 BC**
  - encouragement was held out to all who should discover any new refinement in luxury, the profits arising from which were secured to the inventor by patent for the space of a year

- **England, Letters of Patent, 1331**
  - a grant to John Kempe and his Company is the earliest authenticated instance of a royal grant made with the avowed purpose of instructing the English in a new industry (textiles)
  - all cloth-workers of strange lands, which will come into England ..., shall come safely and surely and shall be in the King's protection...; and to the intent that the said clothworkers shall have the greater will to come and dwell here
Thoughtful Observations on Patents

- **Immanuel Kant**
  - “the presentation of a service rendered to Society. The former supply the noble products of their intelligence and Society grants to them in return the advantages of an exclusive exploitation of their discovery for a limited period”

- **Abraham Lincoln**
  - “The Patent System added the fuel of interest to the fire of genius”

- **Mark Twain**
  - “a country without a patent office and good patent laws was just a crab and couldn't travel anyway but sideways or backwards”
US Government-Sponsored Research

- **Science – The Endless Frontier** *(1945)*  
  Vannevar Bush  
  Director Office of Scientific Research and Development  
  Prof EE, VP, Dean of Engineering MIT, founder of Raytheon

Scientific progress, *i.e., from basic research*, is one essential key to our security as a nation, to our better health, to more jobs, to a higher standard of living, and to our cultural progress, *i.e., innovation*

- **ONR:** defense  
- **NSF:** basic science  
- **NIH:** health

Eventually 26 granting agencies with 26 with IP policies  
In general, US govt assignment, licensed non-exclusively; waivers permitted, but process cumbersome. Many patents, few licensed, fewer products
A recognition by Congress that:

- Imagination and creativity are a national resource
- The patent system is the vehicle for delivery of the resource to the public
- Stewardship best managed by contractors, e.g., universities
- Existing federal policy was placing the nation in peril at a time when IPR and innovation were becoming the preferred currency in foreign affairs
Bayh-Dole Act Impact

University patents

- Prior to 1980  250 issued per year
- FY 2018  7,625 US patents issued

Economic impact (FY 2018)

9,350 licenses/options executed
1,080 startup companies created
6,518 startups operating
828 new products introduced
Economic impact of technology transfer from 1996 to 2017:

• Supported up to 5.9 million jobs
• Bolstered US GDP by up to $865 billion
• Boosted US industrial gross output by up to $1.7 trillion
Academic Technology Transfer Successes
COVID-19
Potential Vaccines and Therapies

- University of Oxford
- Moderna, Harvard
- Symvivo Corporation, UBC, Dalhousie
- University of Pittsburgh
- University of Cambridge
- Imperial College of London
- Arcturus, Duke-NUS
- Cobra Biologics, Karolinska Institute
- Janssen, Beth Israel Deaconess
- Univ Wisconsin, FluGen, Bharat Biologics
- Altimmune, UAB
- Emory, Ridgeback, Merck
Trapped Ion Quantum Computers
2019: $53M investment
Chris Monroe (CMNS)

June 2019: FDA Breakthrough Status Designation
Matthew Dowling, Srinivasa Raghavan (ENGR)

June 2019: $8M investment to top $12M funding from DOE,
NASA and Lockheed Martin
Eric Wachsman (ENGR)
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AUTM Guidelines: time-limited, non-exclusive royalty-free licenses, in exchange for the licensees’ commitment to rapidly make and broadly distribute products and services
35 USC §203. March-in rights

(a) With respect to any subject invention in which a small business firm or nonprofit organization has acquired title under this chapter, the Federal agency ... shall have the right ... to require the contractor, an assignee or exclusive licensee of a subject invention to grant a ... license ..., upon terms that are reasonable under the circumstances, and if the contractor, assignee, or exclusive licensee refuses such request, to grant such a license itself, if the Federal agency determines that such—

(1) action is necessary because the contractor or assignee has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of the subject invention in such field of use;

(2) action is necessary to alleviate health or safety needs which are not reasonably satisfied by the contractor, assignee, or their licensees;

(3) action is necessary to meet requirements for public use specified by Federal regulations ...; or

(4) action is necessary because the agreement required by section 204 has not been obtained or waived (US manufacture).

The term “practical application” means to manufacture in the case of a composition or product ... to establish that the invention is being utilized and that its benefits are ... available to the public on reasonable terms.
Bayh-Dole did not intend that government set prices on resulting products. The law makes no reference to a reasonable price that should be dictated by the government. *This omission was intentional...*


Francis Collins (House Energy and Commerce Committee, 2017): march-in rights are only intended “to cover a circumstance where a drug is simply not available to the public under any circumstance.”