Harvard University

University Technology Transfer for the 21st Century: The Harvard Model

Michal Preninger, PhD, MBA
Senior Director of Business Development

January, 2009

International & Historical Perspectives in University Technology Transfer

• First university technology transfer program established at the University of Wisconsin (WARF) in 1925 to develop a therapy against childhood rickets
• YEDA was founded in 1955 at the Weizmann Institute of Science, becoming Israel’s pioneering university technology transfer program
• The Bayh-Dole Act of 1980 led to widespread growth of U.S. university technology transfer programs
  – Enabled universities to own and license intellectual property generated from U.S. federally-funded research (e.g., NIH, NSF)
• Bayh-Dole drastically increased the number of U.S. university technology transfer offices and the number of university patents filed
  – Number of university technology transfer offices grew from 21 (FY1980) to over 160 (FY2005), while annual university patent filings grew from 267 to over 8000

Agenda

• Contrasting Cultures Between the University and Industry
• Developing a Vision and Defining the Mission
• Building Value: The Technology Transfer Commercialization Process
• Organizational Success Factors
• Structuring a “Next Generation” Technology Transfer Program
  – Engaging with Stakeholders
  – Building the Team
  – Branding
  – Policy Matters
  – Measuring Success
• Bridging the Development Gap
• Conclusions

Contrasting Cultures

University

• Publications & collaborations
• Sharing of material
• Public mission
• Investigator/inventor interests
• Basic research
• Curiosity-based
• Create new knowledge

Corporate

• Shareholders wealth
• Ownership & secrecy
• Control of material
• Applied research
• Market-driven
• Measurable objectives
• Product focused

Benefits and Challenges Typical of US Environment

• Strong entrepreneurial culture makes startup company path for commercialization a valid option
  – However, cyclical venture funding trends, require strategy for “bridging the gap”
• Strong emphasis on academic freedom
• Bayh-Dole and the tax-free bond financing system dictate certain limitations on interaction with industry
**Agenda**

- Contrasting Cultures Between the University and Industry
- Developing a Vision and Defining the Mission
- Building Value: The Technology Transfer Commercialization Process
- Bridging the Development Gap
- Structuring a "Next Generation" Technology Transfer Program
  - Organizational Success Factors
  - Building the Team
  - Engaging with Stakeholders
  - Branding
  - Policy Matters
  - Measuring Success
- Conclusions

---

**Core Objectives**

- Promote the university’s academic mission
- Enhance the translation of university research into socially beneficial outcomes
- Ensure access to university inventions
- Improve faculty relations and outreach
- Build distinctive reputation as partner of choice
- Expand deal flow & increase revenue returns
- Generate industry funding for faculty-driven research
- Spur formation of new ventures and spin-offs
- Develop new initiatives to bridge the "development gap"

---

**Developing a Vision and Defining the Mission**

**ACCESS**
- Enhance access to University research; ensure society reaps the benefits of new inventions

**VALUE**
- Capture true value for the University
  - (Royalty revenues, etc.)

**SERVICE**
- Provide service to the faculty to ensure technology transfer (research funding, collaborations)

---

**Agenda**

- Contrasting Cultures Between the University and Industry
- Developing a Vision and Defining the Mission
- Building Value: The Technology Transfer Commercialization Process
- Bridging the Development Gap
- Structuring a "Next Generation" Technology Transfer Program
  - Organizational Success Factors
  - Building the Team
  - Engaging with Stakeholders
  - Branding
  - Policy Matters
  - Measuring Success
- Conclusions

---

**Building Value: The Technology Transfer Commercialization Process**

- Front ofNobody Back to Research
-

---

**Building Value into the Commercialization Process: Designing Optimal Agreement Structures**

- Why?
  - Greater Focus on Intellectual Property
  - Early Engagement of the Holder
  - Cost Sensitive (R&D)

- When?
  - Early Application for "Patentable" Technology
  - No "Standing" Technologies
  - Existing Technology

- Concerns
  - Amount of Time Required to Start Company
  - Financial Stability
  - Conflict of Interest Issues
  - Intellectual Property Management
**Agenda**

- Contrasting Cultures Between the University and Industry
- Developing a Vision and Defining the Mission
- Building Value: The Technology Transfer Commercialization Process
  - Organizational Success Factors
  - Building the Team
  - Engaging with Stakeholders
  - Branding
  - Policy Matters
  - Measuring Success
- Conclusions

**Bridging the Development Gap**

- The development gap is THE limiting factor in technology transfer
  - Exists between the typical early stage academic discovery and the “proof of concept” required by industry for commercialisation
  - Technology is too early and investment entry points have moved further downstream
  - University technologies suffer from inadequate resources and expertise to advance sufficiently
  - Promising new technologies lie fallow, and are never developed, or are transferred to industry prematurely

**Problem: most innovations are stuck**

<table>
<thead>
<tr>
<th>Type of Innovation</th>
<th>Path to Commercialisation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>“Dead” — low hanging fruit</strong></td>
<td>Frequently commercialized (e.g., industry)</td>
</tr>
<tr>
<td><strong>“Promising, if only...”</strong></td>
<td>Valuable assets missing proof of concept required by market</td>
</tr>
<tr>
<td><strong>“Dogs”</strong></td>
<td>These assets need Technology Development to generate market pull</td>
</tr>
<tr>
<td><strong>No interest in market</strong></td>
<td>Minimal commercial potential</td>
</tr>
</tbody>
</table>

**Bridging the Gap**

- Early collaborations with industry under new models
- Creative deals with Contract Research Organizations (CROs)
- Accelerator Fund

**OTD’s Model for Industry Collaborations**

- Broader collaboration in strategic areas – multiple projects over multiple years (vs. one-off, ad-hoc)
- Faculty proposes projects based on company’s areas of interest – “pull” vs. “push” approach
- Reaches deeper into the University – also taps into junior faculty and not just the well known, the connected, or the ones with IP
- Encourages and facilitates generation of new, creative project ideas – stretches beyond what’s on the table today
- Faulty (our clients)

**Collaboration Example – Vertex Pharmaceuticals**

*Field: Therapeutics (Cancer, Immunology, Neurodegeneration)*

| Vertex Pharmaceuticals | OTD
|------------------------|------------------|
| **Title** | **Vertex** Pharmaceuticals*
| **University** | **University**
| **Cancer Immunology** | **Cancer Immunology**
| **Neurodegeneration** | **Neurodegeneration**

*The E-mail account, the name, the information, and the photo was created for illustration purposes only and is not a real account.*

**Chief Executive Officer**

*The collaboration commenced today with the support of Dr. Jennifer A. Gilbert, President and COO of Vertex Pharmaceuticals, and the University’s Technology Transfer officer, Dr. Matthew Branscome.*

*The development gap is THE limiting factor in technology transfer.*
Collaboration Example – BASF
Field: Bioengineering, Material Science

PRES RELEASE

BASF and Harvard University announce exclusive research collaboration to pioneer new frontier of materials and technology.

- Makes possible the joint advanced research initiative of Harvard Climate and Innovation Lab.
- Collaboration includes Harvard’s School of Engineering and Applied Sciences, Harvard University, and the University of California, Berkeley.

**University Investment in Technology Development**
- Signals Heftened Commitment to Public Service Through Technology Transfer
- Elevates Credibility and Presence in the Marketplace
- Enhances Faculty Relations
- Generates Added Value
- Creates More Investment Grade Technologies and Investment Opportunities
- Enables Optimal Deal Valuations
- Managed Through an Independent External Advisory Committee and Professional Team, consultant and CRO network

Agenda

- Contrasting Cultures Between the University and Industry
- Developing a Vision and Defining the Mission
- Building Value: The Technology Transfer Commercialization Process
- Bridging the Development Gap

Organizational Success Factors

- Organization History and Culture
  - History of academic entrepreneurship and incentives, supported by policy
  - Strong institutional commitment and investment in technology transfer

- The Research Enterprise
  - Positive faculty perception of technology transfer and industry collaboration
  - Perception of technology development as reinforcing the academic mission
  - Well-funded research base comprising public and private sources (including industry sponsored research funding)

- Fields of Research: Leveraging Excellence
  - Focus on areas of research excellence within the university, leveraging existing resources and research infrastructures

Building the Team:
Designing an Innovative Human Resource Strategy

- Recruit a Seasoned Business Development Team
- Proven business development professionals with industry experience
- Capability to leverage significant professional networks
- Nurture entrepreneurial spirit, sense of purpose, “urgency”

- Specialized Teams and an Integrated Portfolio Management Approach
- Industry specialized teams (e.g., Life Sciences, Engineering & Physical Sciences)
- Dedicated contract and IP teams
- Portfolio management by integrating expertise in business development, contract negotiation, and IP strategy

- Design and Implement an Incentive Program to Retain Top Talent
Branding: Becoming a Partner of Choice

- Developing Key Relationships with Internal and External Stakeholders
  - Proactive outreach and collaboration with faculty and industry
- Creating a Transparent and Efficient Technology Transfer Practice
  - Rapid turnaround times on deals
  - Clear policies around technology development and licensing practices
- Staffing with Industry-Experienced Business Development Professionals
  - Leverage professional networks and prior industry reputation
  - Business-savvy, professional, “tough but fair” approach
- Generating Deals and Success Stories
  - Building a track-record of excellence
  - Strategic marketing plan
  - Media and public relations strategy

Policy Matters: Reinforcing the Mission

- Intellectual Property Policy
- Protecting Academic Freedoms and Publication Rights
- Conflict-of-Interest Policy
- Income Distribution Policy: Incentives to enhance the level of technology transfer, consistent with the university mission
  - Inventor Share
  - Inventor Research Share
  - School Share
  - Department Share
  - Office of the President Share

Measuring Success

- Increased Rate of Invention Disclosures
- Increased Number of Patent Applications
- Growth in Royalty Revenues
- Enhanced Level of Service to the Faculty
- Expanded Number of Technology Transfer Transactions
- Increased New Venture Formation
- Growth in Industry Sponsored Research
- Increased Number of Inventions Available to the Public
Impact of University Tech Transfer: Success Stories

- Columbia: Drugs for T-cell lymphoma (Vorinostat), gliomas (Latanoprost) and prevention of respiratory syncytial virus (Palivizumab)
- University of California: Recombinant DNA technology launching the biotech industry, artificial lung surfactant for newborns
- MIT: World’s largest internet traffic management platform (Akamai), RNAi technology, artificial arm for burn-victim
- NYU: Therapy for rheumatoid arthritis (Remicade)
- Stanford Google, chimeric antibody technology, industry platform for audio synthesizing devices (Yamalez Sontias)
- Weizmann Institute of Science (Israel): Therapy for multiple sclerosis (Copaxone), interferons for multiple sclerosis and cancer, EGFR receptor-related therapies (e.g., Eribulin)
- University of Wisconsin-Madison: Solution for organ preservation and transplantation
- Yale: Sildenafil treatment for HIV/AIDS
- MGH: Therapy for Neutropenic arthritides (Osteoporosis), therapy for age-related macular degeneration (Vitadapt)
- Harvard University, MIT: Cardiomyocyte accelerate SPECT imaging agent

Recent Successes – New Venture Formation

- Alzheimer's disease: The first kit to detect beta-amyloid plaques in the brain, spinoff of the University of Rochester.
- Cancer: A new type of chemotherapy drug that reduces the side effects of conventional chemotherapy, developed by the University of Michigan.
- Engineering: A new type of solar panel that converts sunlight into electricity more efficiently, developed by Stanford University.
- Environmental: A new method for cleaning up oil spills, developed by the University of California.
- Genetics: A new gene editing technology that can be used to cure genetic diseases, developed by the University of Cambridge.
- Nanotechnology: A new type of nanomaterial that can be used to create stronger and lighter materials, developed by the University of Stanford.
- Telecommunications: A new type of fiber optic cable that can transmit data at a much faster rate, developed by the University of California.

Startup Example – Sirtis Pharmaceuticals

Sirtis Pharmaceuticals is a biotechnology company that develops drugs for the treatment of cancer. The company was founded in 2015 by a team of researchers from the University of California, Los Angeles. The company’s lead drug candidate is a small molecule that targets the Sirtuin enzyme, which is involved in the regulation of cellular metabolism and cell survival. The drug candidate has shown promising results in preclinical studies and has been granted orphan drug status by the FDA. The company is currently seeking investors to fund further development of the drug candidate.