Important Issues Regarding Technology Transfer
Office Funding and Operations

Regional High-Level Summit for University Presidents and Senior Policy Makers on EIE

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OSIPP
INPIT
JPO
Agenda

- Staffing issues
- Patent strategy
  - Managing outside law firms
  - Funding patent expenses
- Technology Transfer Office budgeting and funding
- Managing faculty expectations
- Communicating value to stakeholders
Staffing Issues

- The importance of the full-time Director
- Skill sets of staff
- Other staffing requirements
The Full Time Director

- Single most important person
- Needs a unique skill set
  - Comfortable with science
  - Comfortable with business
  - Out-of-the-box thinker
  - Great communicator
  - Multi-tasking
  - Diplomat
The Full Time Director

- In U.S., first generation of Directors were either:
  - From sponsored programs offices
    - Had to negotiate IP clauses for company sponsored research agreements
  - Patent attorneys
    - Understood IP
    - Could negotiate and complete license agreements
- Second generation, typically from business side of high tech companies
  - Understood importance of IP
  - Deal-making experience
  - Understanding of start-ups
- Ph.D. a plus
  - Faculty respect a Ph.D.
  - Or an MBA
The Full Time Director

- In some emerging tech transfer ecosystems, tech transfer initially managed by a faculty committee
  - At some point a faculty member becomes full time Director
  - Benefit is credibility with fellow faculty
   - Need to sell them on this new activity
Skill Set

- Tech transfer people are special people. They need to be:
  - An inch deep and a mile wide
    - They have to be able to have a productive conversation about a wide spectrum of technologies
    - Faculty are a mile deep and an inch wide
  - Our role isn’t to question the science
    - Our job is what can the science do and will it work in the real world
  - Open minded and creative
    - There is no “one-size-fits-all” in technology transfer
      - Different technologies will need very different commercialization models
  - Comfortable operating in the fog of uncertainty of embryonic academic inventions
    - Inventions will likely have only the faintest glimmerings of a product or service
    - Devoid of a value proposition
Skill Set

- Tech transfer people need to be:
  - Diplomats
    - Faculty have tenure
      - We don’t
  - US universities only file on ~50% of invention disclosures
    - Only license ~50% of the inventions we do file on
      - → 25% licensing success rate overall
    - Most of the time, have to be able to tell faculty that their baby is ugly and nobody wants it
      - And live to tell about it
  - Organized
    - Will be overworked
      - High case load
        - A tech transfer office marches on its paperwork / electronic records
        - Have to leave records that others can pick up on when they leave
Skill Set

- Tech transfer people need to be:
  - Skilled negotiators
    - We’re playing a weak hand
      - Unproven, unvalidated technology and markets
      - Generally only a single potential licensee

  "A hot academic technology is one two companies are interested in"
  *Lita Nelsen, MIT*

  - Negotiating theory 101 says “You have to be able to threaten to walk away and mean it.”
  - If you don’t have a plan B you can’t make the threat
    - And mean it
Staff Requirements

- Entry level often grad students
  - Some go on to law school and become IP attorneys
  - Some take their IP and licensing experience and go to companies
- Need to balance executive staff with sufficient administrative support
  - AUTM Survey for 2017 showed 25% more Support FTE’s than Professional FTE’s
Staff Requirements

- Entry level often grad students
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- Need to balance executive staff with sufficient administrative support
  - AUTM Survey for 2017 showed 25% more Support than Professional
  - Free up professional staff to manage inventions and do deals
- Staff numbers will need to grow as activity grows
- Training for entry-level personnel critical
  - Initially through international sources
  - Local tech transfer association should progressively take over
Patent Strategy

- Objectives:
  - Get appropriate protection
  - Minimize cost

- Appropriate protection
  - What sort of invention do you have?
    - Global potential?
    - Need to get global protection
  - Local / regional potential?
    - Local / regional protection sufficient
      - Petit patent / utility model may be adequate
Patent Strategy

- Must file initial patent application before any public disclosure
  - Publication
  - Presentation at a conference
  - Presentation to a meeting with a company
    - Unless a CDA is in place
  - Put on sale
- Otherwise, severely limited options for patent protection
  - US, Canada, Japan
- Need to have procedures in place that are seamless and won’t delay faculty publication
  - Disclose early and disclose often
Patent Strategy

- After initial patent application, 12 months to file a PCT
  - Single filing, through WIPO, that secures the right to file in any country in the world
  - Time to do more evaluation of the technology
- PCT will publish 6 months later
- International Search Report
  - First look at prior art status
- 18 months later, National Phase entry
  - Time to market the technology
  - Obtain licensee
Normal Academic Approach to the Patenting Process

- File provisional Application ($10,000)
- Disclosure
- Initial publication
- Re-visit case
- Patentability / Market evaluation
- Generate Tech Brief
- Marketing / Search for Licensee
- File PCT ($5,000)
- PCT publication
- Additional publications with interesting animal data
- Enter national Phase (> $30,000)
- Rarely enter National Phase outside US without a licensee
Key TTO Operating Issues
TTO Budgeting

- Two areas of expense
  - Patent costs
  - Personnel costs
    - In U.S., ~ 50% : 50%
- Biggest challenge is patent budgeting
  - Must manage tightly
    - Cost can rise asymptotically if not tightly managed
  - Significant % of expenditures reimbursed by licensees
    - Sunk costs incurred prior to the license
      - Generally paid at closing
    - On-going costs of prosecution
      - Generally best for university to pay the law firm bills and immediately bill the licensee
- Budget should be based on net expenses after all reimbursements
Patent Cost Budgeting

- Two types of patent costs
  - Law firm costs
    - The majority of the costs
  - Patent office costs
Law Firm Management

- At a major OTL, there will be hundreds of law firm actions per year
  - Each one has a cost
  - Minimum billing time is generally 6 minutes (0.1 hours)
    - For a lawyer charging $600/hour, a short phone call costs $60
- Most OTL’s negotiate either:
  - Fixed fees for each specific type of action; or
  - “Not to exceed”
    - Hourly rate up to a limit
Law Firm Management

- Biggest costs of patenting are:
  - Preparation and filing of initial patent application
    - Generally ~50% of total cost of getting a patent
    - USPTO office fees generally reasonable
  - PCT fees reasonable
  - National phase entry
    - 30 months after filling initial application
      - EPO
        - Substantial filing fees
        - Substantial annual maintenance costs
  - Japan, China
    - Substantial translation costs
Expense Budgeting

- Patent actions are reasonably predictable
  - Once a patent application is filed, there are predictable deadlines
    - e.g., If initial application is a US provisional application, one year later:
      - Conversion of US provisional application to US utility application and / or
      - PCT filing
  - Biggest variable is time to initial office action
    - The “Backlog”
      - Currently ~3 years in the US
    - When examination starts, examiner sets a time to respond
      - Can be extended by payment of late fees
        - Avoid at all costs
Patent Budgeting Process

- Iterative
  - What would we spend if we did everything?
  - What will the university let us spend?
  - Which cases do we want to spend it on?

- Continuous
  - Set budget and priorities prior to start of the budget year
    - Update monthly
    - Reset priorities

- Labor intensive
  - Requires substantial efforts by all members of the TTO
  - Requires substantial effort by law firms
    - Get them to agree to not charge for annual budgeting in Engagement Letter
Budgeting Other Operating Cost

- Generally straightforward and predictable
  - Salaries
    - Evaluations and raises before start of budget year
  - Operating costs
    - Travel
    - Tools and databases
      - Predictable
Sustainability

- Yesterday we talked about how 95% of the economic impact of tech transfer is in the private sector
- Later today I’ll talk about how business model of tech transfer is even worse than that
  - And why your government should support your tech transfer efforts
The Bottom Line – Red Ink

<table>
<thead>
<tr>
<th>Financial Contribution</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss making</td>
<td>68</td>
<td>52.3%</td>
</tr>
<tr>
<td>Gross profitable</td>
<td>27</td>
<td>20.8%</td>
</tr>
<tr>
<td>Net profitable</td>
<td>14</td>
<td>10.8%</td>
</tr>
<tr>
<td>Self sustaining</td>
<td>21</td>
<td>16.2%</td>
</tr>
<tr>
<td>Total</td>
<td>130</td>
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Source: Abrams, Leung & Stevens, 2010
Sustainability

- The path to sustainability will be long and slow
- Government support will be necessary
  - Even in Developed countries, governments have supported tech transfer for 10+ years
Managing Faculty Expectations
Managing Faculty Expectations

- Why should faculty get involved in commercialization?
- Managing their expectations
- Benefit sharing
There’s a Lot in it for Them

- It’s highly satisfying to see science have an impact beyond academia
  - Giving back to society
- It can bring additional resources into their scientific enterprise
  - New funding
  - Access to new technical capabilities
  - New collaborators
- It can create new avenues of research
  - Identify new problems that need to be solved
- It can create job opportunities for their grad students
  - Existing companies
  - Start-up companies
- And, finally, they may just get really, really rich
  - Shmuel Cabilly (City of Hope), Synthetic antibodies: Royalties $2 billion
  - Richard Silverman (Northwestern), Lyrica: Royalties $2.9 billion
  - 33% * $3 billion = $1 billion!
Will Involve Changing the Culture

- Only the culture
  - Not the type of research they do
    - Breakthrough inventions come from basic science
      - Not from applied science
  - They’ll need to start thinking about the implications and applications of their science
    - Spend time with TTO
      - Patent attorneys
      - Companies
  - Important that senior management is seen to be supportive
    - In some U.S. universities, commercialization is a factor in tenure and promotion
Culture

- Most faculty DON’T participate in the technology transfer process

<table>
<thead>
<tr>
<th>Career Disclosures</th>
<th>%</th>
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<tbody>
<tr>
<td>Never</td>
<td>64.2</td>
</tr>
<tr>
<td>Once</td>
<td>14.8</td>
</tr>
<tr>
<td>Twice</td>
<td>7.6</td>
</tr>
<tr>
<td>Three to five</td>
<td>11.4</td>
</tr>
<tr>
<td>Six or more</td>
<td>2.0</td>
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</table>

But the Best Scientists Do

<table>
<thead>
<tr>
<th>Nobel Prize Winners* with Patents</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics</td>
<td>44%</td>
</tr>
<tr>
<td>Chemistry</td>
<td>77%</td>
</tr>
<tr>
<td>Physiology or Medicine</td>
<td>78%</td>
</tr>
</tbody>
</table>

* Winners of Nobel Prize from 2001 to 2013

Source: Qingzhi Zhang, Collette LaFlamme, Trent Merrell and Ashley J. Stevens, Unpublished Data
Has The Nature of Academic Research Been Changed?

- Publication rate doubled over course of study
- Disclosure rate went from 1% to 10% of faculty per year
- No change in “basic” vs. applied” balance of research, as measured by journals published in

*Thursby and Thursby, ibid*
The Traditional Scientific Paradigm

The scientific pathway

The commercial pathway
The New Scientific Paradigm

- The “Patent-Paper-Pair”
  - Fiona Murray, MIT
    - 50% of papers in *Nature Biotechnology* 1997-1999 had a corresponding patent\(^1\)
    - 33% of biotech papers in *Science* and *Nature* had a corresponding patent\(^2\)

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Will Involve Changing the Culture

- Incentives will be very important
  - Revenue sharing
  - The ability to start a company
    - And own shares in it
      - While staying a professor
  - Mechanism to do this is to have a formal consulting policy
    - In U.S. and U.K.
      - Faculty get 1 day per week to consult
        - Keep the compensation for themselves
        - Can’t use university facilities, staff or students
          - That needs a sponsored research agreement
        - If they start a company, commit their 1 day / week to the company for some period of time
          - Get shares in company in lieu of cash payments
Revenue Sharing

- IMHO, the ideal revenue sharing formula is Partners Healthcare in Boston
  - Massachusetts General Hospital and Brigham & Women’s Hospital
    - Two biggest teaching affiliates of the Harvard Medical School
      - $1.7 billion research funding in 2018
        - (~2x Harvard)
  - Distribution formula:
    - 50% to the Inventor
    - 50% to the Institution
Revenue Sharing

- Other approaches:
  - Tiered distribution
    - Give more / all of first income to faculty
    - Less of higher amounts
    - e.g.:
      - 100% upto $100,000 (cumulative)
      - 50% $100,001-$250,000
      - 25% $250,000 and up
  - Higher percentage in early years
    - e.g., Chinese law of October 2015 distributes 70% to faculty
    - Many U.S. universities distributed 50% in early years
      - Now 25-40% is the norm
  - Changing in favor of the institution down the road may not be popular
    - Grandfather – disclosures before the change get the old rate
Revenue Sharing

- Important to protect students and research staff who contribute to inventions
  - An inventor is someone who contributes to at least one claim of a patent
    - Patent attorney should make determination
      - Not all authors of a paper make inventive contributions
  - Many universities have a policy of equal shares unless all inventors sign a piece of paper agreeing to an unequal split.
Perception of TTO

- Must be seen by faculty as making a contribution and helping them
  “I’m from administration and I really am here to help you”

- Technology evaluation
  - Ten Pont Technology Scoring Template is a core principle of the EIE Mentoring process
    - The vehicle by which we tell faculty their baby is ugly
    “Here’s what I found, and it doesn’t look good. What did I miss or not understand?”
      - Allows us to make intelligent filing decisions
      - Manage patenting costs
    - If we decide not to move forward, offer it back to them
      - They develop at their own expense and keep all revenues

- The Tech Brief
- Marketing the technology
Communicating Value to Stakeholders
Communicating Value to Stakeholders

- Claim every victory
  - Early ones will be small
    - We received a patent for [invention]. Here’s what it has the potential to do for people
    - We’ve started [StartUp] to develop our [invention]. It’s located in our incubator. Here’s what [invention] has the potential to do for people
  - Then they’ll get bigger
    - [BigCo] has signed a license to develop our [invention]. Here’s what it has the potential to do for people.
    - [StartUp] has received [$x million] to develop our [invention]. It’s located in our incubator. Here’s what [invention] has the potential to do for people
Communicating Value to Stakeholders

- Claim every victory
  - Then they’ll get even bigger
    - BigCo has started selling [product] based on our [invention]. Here’s what it does for people.
    - [StartUp], which was developing our [invention] has been bought for [$yy million] by [BigCo]. It started its life in our incubator and now employs [z] people. Sales of [product] which does [aa] for people, were [$bb million] in 2019
- Focus on the stories
  - Not the numbers
  - Focus on how you’re helping people and the economy
- A Professional Association will collect data and stories and will be a vehicle to publicize individual institutional success stories
Thank you for listening

Questions?

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