

Important Issues Regarding Technology Transfer Office Funding and Operations

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

Osaka, Japan
November 25-27, 2019

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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"

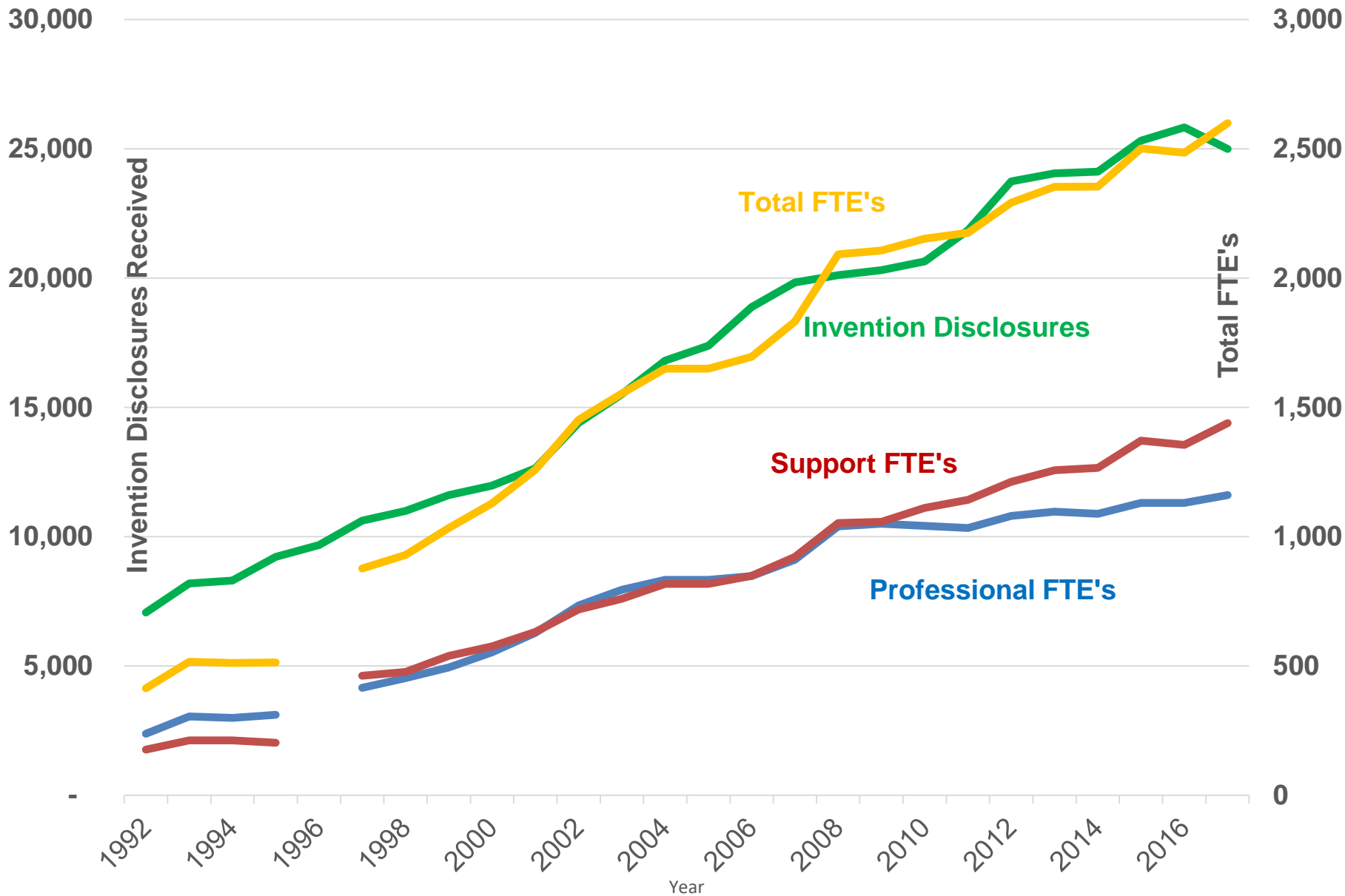
Lita Nelsen, MIT

- ❑ 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

Technology Transfer Employment in U.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



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

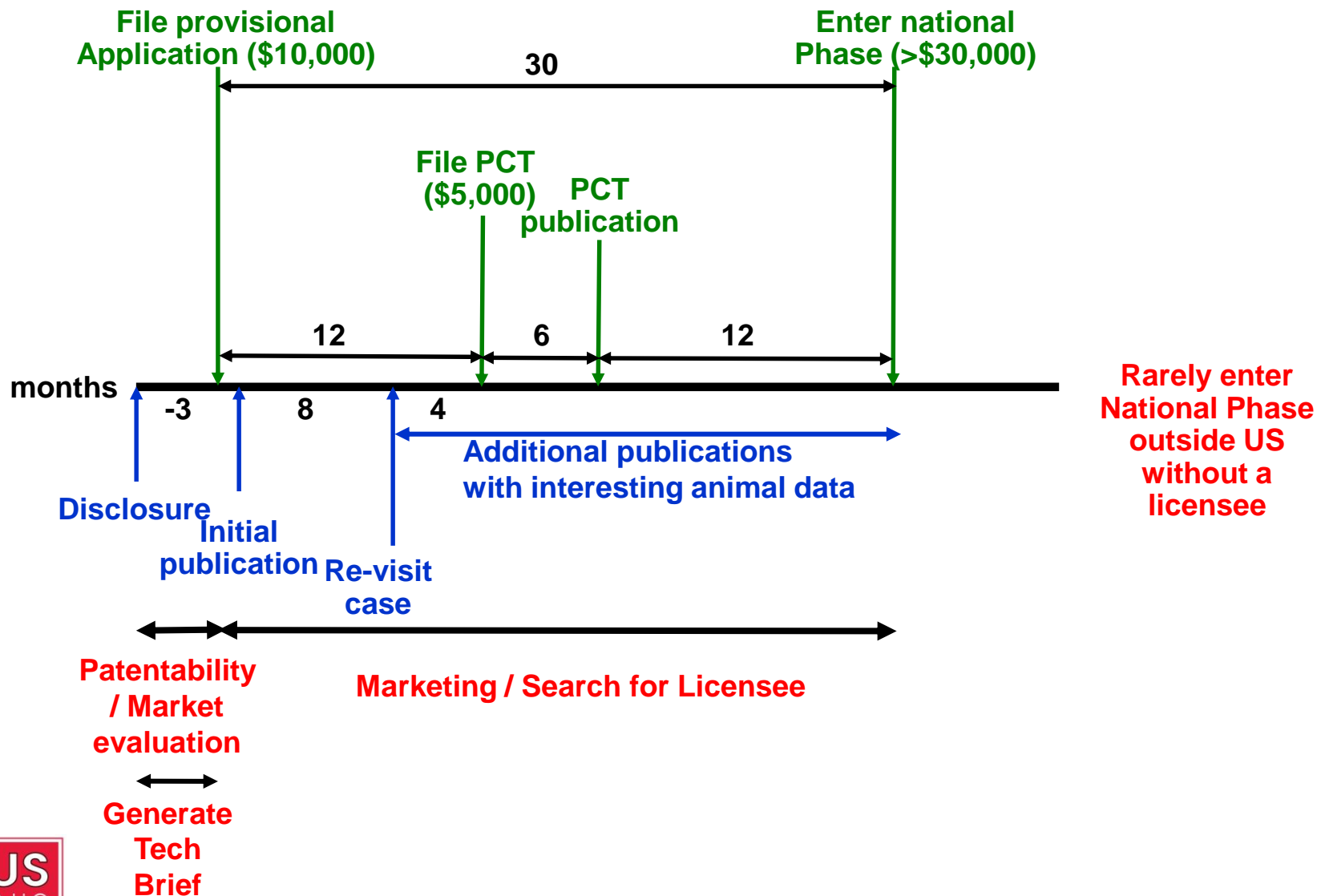
Patent Strategy

- ❑ 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



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 filing 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

<u>Financial Contribution</u>	<u>Number</u>	<u>%</u>
Loss making		
Gross profitable		
Net profitable		
<u>Self sustaining</u>		
Total		

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 process¹

<u>Career Disclosures</u>	<u>%</u>
Never	64.2
Once	14.8
Twice	7.6
Three to five	11.4
Six or more	2.0

¹ Thursby, J. G. and M. C. Thursby (2003). Patterns of Research and Licensing Activity of Science and Engineering Faculty. Working Paper. Atlanta, GA, Georgia Institute of Technology., available at: <http://hdl.handle.net/1853/10723>

But the Best Scientists Do

<u>Nobel Prize Winners* with Patents</u>	<u>%</u>
Physics	44%
Chemistry	77%
Physiology or Medicine	78%

* 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 Pathway

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 patent¹
 - ❑ 33% of biotech papers in *Science* and *Nature* had a corresponding patent²

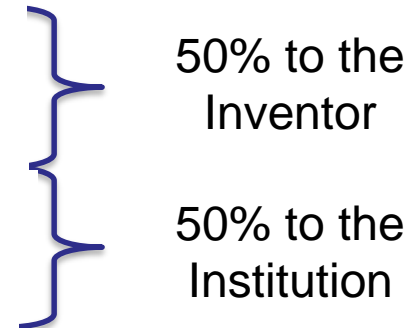
- 1 Murray, F., Stern, S., Do Formal Intellectual Property Rights Hinder the Free Flow of Scientific Knowledge? An Empirical Test of the Anti-Commons Hypothesis, *Journal of Economic Behavior and Organization* (2007), doi:10.1016/j.jebo.2006.05.017
- 2 Lebovitz, R. M. (2007). "The Duty to Disclose Patent Rights." *Northwestern Journal of Technology and Intellectual Property* 6 (Fall 2007): 36-45.

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:



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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