
 COLUMBIA | TECHNOLOGY VENTURES

Data Sciences Entrepreneurship class

Feb 2013

 @Columbia_Tech

 Columbia Technology Ventures

 Columbia Technology Ventures
www.techventures.columbia.edu

techventures@columbia.edu

Agenda for Today

- 1. Context on University tech transfer**
- 2. Patents 101**

Increasing Focus on Defensive and Offensive Patenting



Jury Awards \$1.2 Billion in Damages to Apple in Patent Case
NYTimes ...
The jury found that Apple's mobile devices, in



In Technology World, Patents Used as a Sword
Alongside the impact of mobile devices, many see a des

October 7, 2012 - By CHARLES
"The Patent, Used as a Sword"



Clot-Fighting Drug Plavix Set to Lose Patent Protection
The drug, which prevents clots among heart attack patients, will no longer be promoted by Bristol-Myers Squibb because of an influx of cheaper ...
May 16, 2012 - By KATE THOMAS - Business Day - Article - Print Headline: "As Plavix Patent Dies, So Does Promotion"



NTP Takes On More Smartphones
Indeed, R.I.M. settled with NTP. Court refused to hear the Canadian

July 9, 2010 - By STEVE LOHR - Technology - Article - Print Headline: "Challenge Big Makers"

8:31 PM
... upon a series of Apple patents on
Nortel Networks, the Canadian telecommunications equipment maker, says it has agreed to sell more than 6,000 patent assets to an alliance made up of Apple, Microsoft and other technology giants for \$4.5 billion in cash.

Court Reaffirms Right of Myriad Genetics to Patent Genes
By REUTERS
Published: August 18, 2012

A federal appeals court reaffirmed on Thursday the right of Myriad Genetics to patent two genes linked to breast and ovarian cancer, after the Supreme Court told it to take another look at the hotly contested case.

BlackBerry Maker Reaches Deal in Patent Dispute

By IAN AUSTEN
Published: March 3, 2006

OTTAWA, March 3 — The prospect of a shutdown of BlackBerry wireless e-mail service in the United States evaporated today as the two companies in the patent dispute reached a \$612.5 million settlement.



Cancer Patients Challenge Patent on Genetic Test
Genevieve Girard, 39, is suing Myriad Genetics over the granting of a patent on a genetic test ...
May 13, 2009 - By JOHN SCHWARTZ - Health - Article - Print Headline: "Testing Company and Government Over Gene Patents"

Monsanto Wins Big Award in a Biotech Patent Case

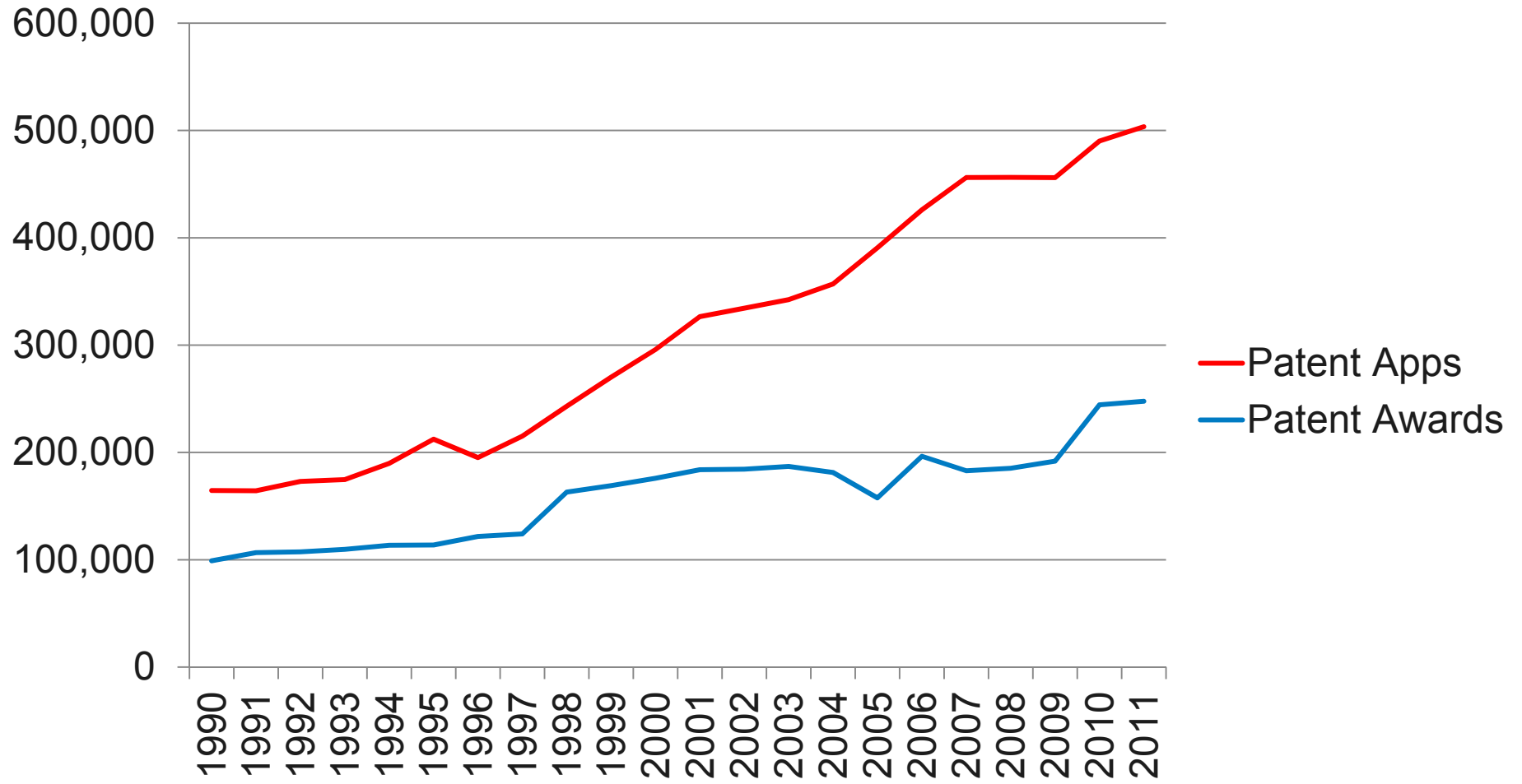
A federal jury awarded \$1 billion in damages to the crop biotech giant Monsanto, saying that its arch rival DuPont had willfully infringed its patent.
August 1, 2012 - By ANDREW POLLACK - Business Day - Article - Print Headline: "Monsanto Wins Big Award in a Biotech Patent Case"



Drug Firms Face Billions in Losses as Patents End
At the end of November, Pfizer stands to lose a \$10-billion-a-year revenue stream when the patent on its blockbuster cholesterol drug Lipitor ...
March 6, 2011 - By DUFF WILSON - Business Day - Article - Print Headline: "Drug Firms Face Billions in Losses in '11 as Patents End"

300% Increase in Patent Applications Since 1990

USPTO Activity, 1990 - 2011



History of University Technology Transfer

Pre-1980

- Early-stage research innovations belonged to federal agencies
- However, government not motivated to actively commercialize
- Result: very few products, jobs or other public benefits

Bayh-Dole Act (1980) gave universities right and obligation to patent and commercialize federally-funded inventions

- Most universities broadened policies to include all inventions made with university resources

Since 1980, rapid adoption among U.S. universities

Wait, Does the University Own Student Inventions?

<http://bit.ly/TDZoIy>



FAQs for Students

1) What is Columbia Technology Ventures (Tech Ventures)?

[Columbia Technology Ventures](#) is the technology transfer office of Columbia University, charged with managing Columbia University's intellectual property. With more than 300 invention disclosures received, 50-60 license deals executed, and 10-12 start-up companies launched each year on average, Columbia Technology Ventures has ranked among the top five leading university technology transfer offices each year for the past decade. We also host ~20 lectures & panel discussions each year on topics related to entrepreneurship and intellectual property, which all students are welcome to attend.

2) I have an idea for a start-up company that I've been kicking-around. Can Tech Ventures help me?

Yes. Whether you have specific questions, would like to brainstorm about a potential business idea, or want to learn more about what it takes to launch a new venture, our [Venture Lab](#) can help you get started and connect you with a wide array of entrepreneurial resources at Columbia and in New York City. We host "[Entrepreneur Office Hours](#)" by appointment throughout the calendar year, dedicated to helping budding entrepreneurs harness, refine and realize their entrepreneurial aspirations.

3) I think I might have a new patentable invention. How can Tech Ventures help me?

When it comes to realizing the commercial potential of a new patentable invention, our seasoned team of business and legal professionals can help evaluate the commercial potential of your idea and advise you on important steps to protect, market, license, and/or otherwise position your idea for commercialization. Contact us at techventures@columbia.edu to set up an appointment, or visit our monthly "[Inventor Office Hours](#)", where we offer guidance on marketability, intellectual property protection, and resources to further develop your invention.

4) Does Columbia have an ownership claim to my invention?

While Columbia may in some instances have an ownership interest in your invention per [Columbia policy](#), Tech Ventures will generally assign whatever Columbia's rights and interests in the invention may be to you if **all** of the following are true:

- All Columbia-affiliated inventors are students;
- None of the Columbia-affiliated inventors is employed by the university in a research setting (e.g., research-related work study, part-time, casual, or temp roles; or research assistant, teaching assistant, fellow, or post-doc positions; or in any other research capacity); and
- The activity from which the invention arose did not make significant use of funding provided by or to the university (e.g., federal grants or industry funding for research), university research materials (e.g., laboratories or technical equipment), or university employee time (e.g., Faculty, technical staff).

Please note that, in keeping with many of our peer universities' practices, Tech Ventures generally does not consider the following to constitute "significant use":

- Advice that a student may receive from a faculty or staff member as may be commonly solicited in the context of an educational experience (i.e., related to a course);
- Use of Columbia resources by students in the context of their coursework (e.g., classrooms, dorms, and email);
- Very small stipends made by departments in an educational context, such as to provide student teams with a budget for components during senior design classes.

5) Can telling others about my invention jeopardize my ability to file a patent application?

Unfortunately, yes. In the U.S., you may have up to one year from the date of your first public disclosure of the invention to file a patent application. This one-year period is commonly called "the grace period." However, outside the US, you generally have no grace period – you must file your application before any non-confidential disclosure of the invention.

Determining whether a disclosure is public (US) or non-confidential (ex-US) can be challenging. But, some general guidance can be given to help avoid inadvertently triggering a filing deadline.

- Conferences and publications (both on-line and in print) are usually public.
- Discussions among Columbia students and Columbia instructors in a class, and discussions between a Columbia student and a Columbia faculty advisor, are usually considered confidential.
- Discussions with non-Columbia personnel (e.g., outside mentors) are usually non-confidential unless there is a non-disclosure agreement in place, though these discussions may be still be considered non-public from the USPTO's perspective.

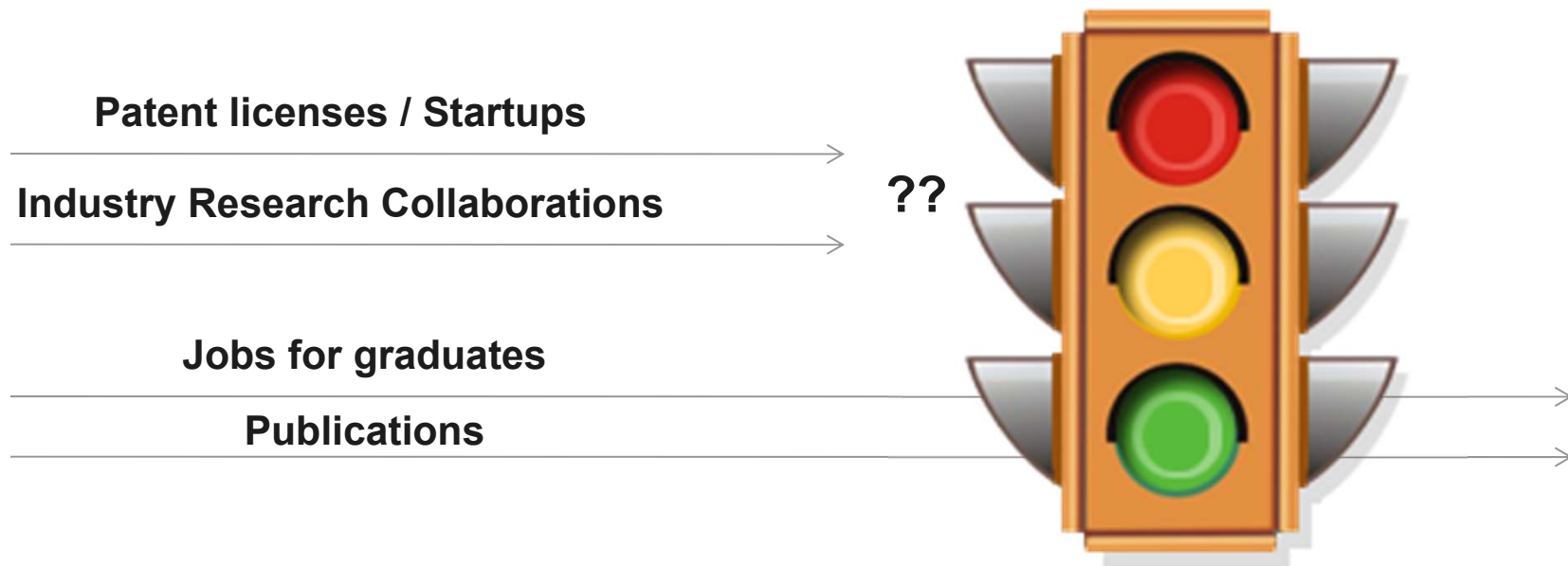
There is no bright line to determine public and non-confidential disclosures. We invite you to contact us if you would like more information on this topic.

6) I'd like to learn more, where can I get more information?

For more information about Tech Ventures, who we are and what we do, please visit our website at www.techventures.columbia.edu or email us at techventures@columbia.edu. We also invite you to [join our mailing list](#) to receive the latest news and events on topics relating to technology transfer, entrepreneurship, and innovation at Columbia.

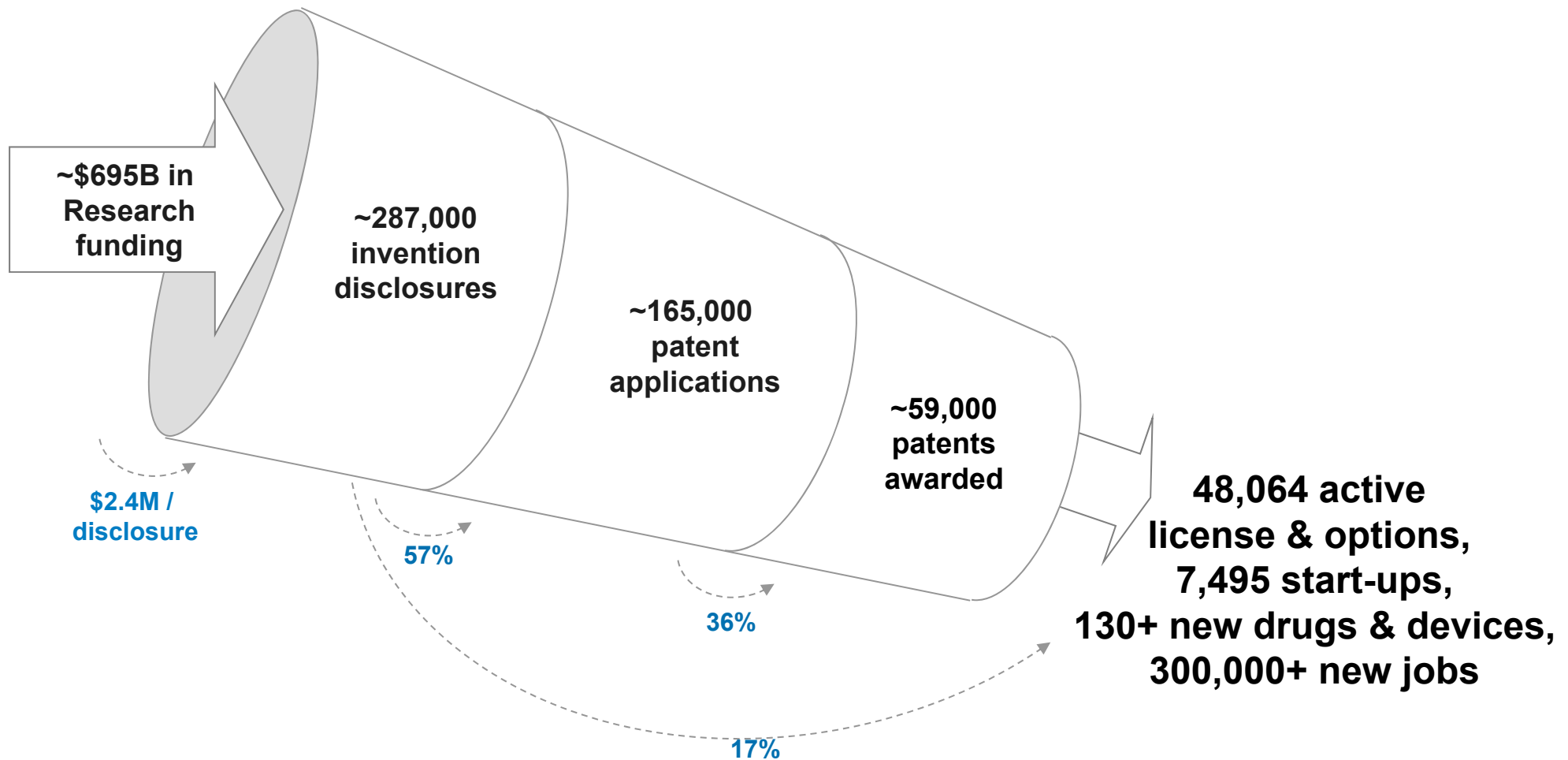
University Technology Transfer Happens in Many Ways

Some Routes Need a Little Help, Where Incentives Are Not 100% Aligned



US Tech Transfer Productivity “By The Numbers” :

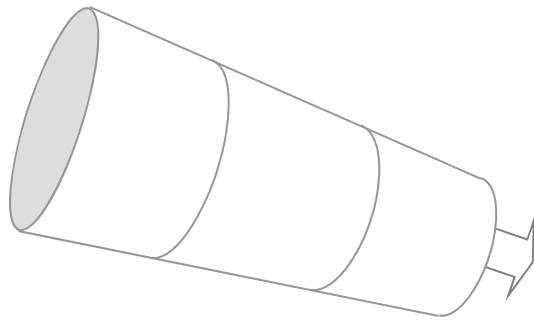
Cumulative Inputs and Outputs, 1991 - 2011



Source: AUTM Licensing Surveys (FY91- FY11)

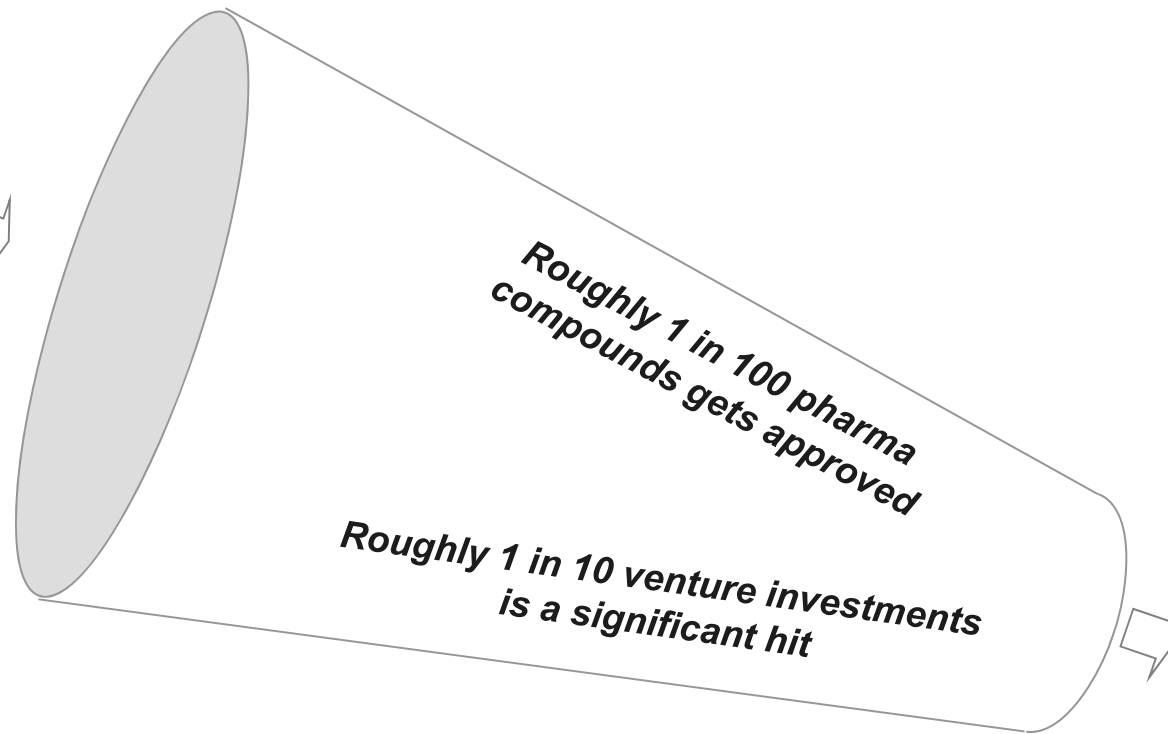
But the End of One Process is Just the Beginning of Another

University's Funnel



*Only 1 in 6 inventions
ever gets licensed*

Industry / VC's Funnel

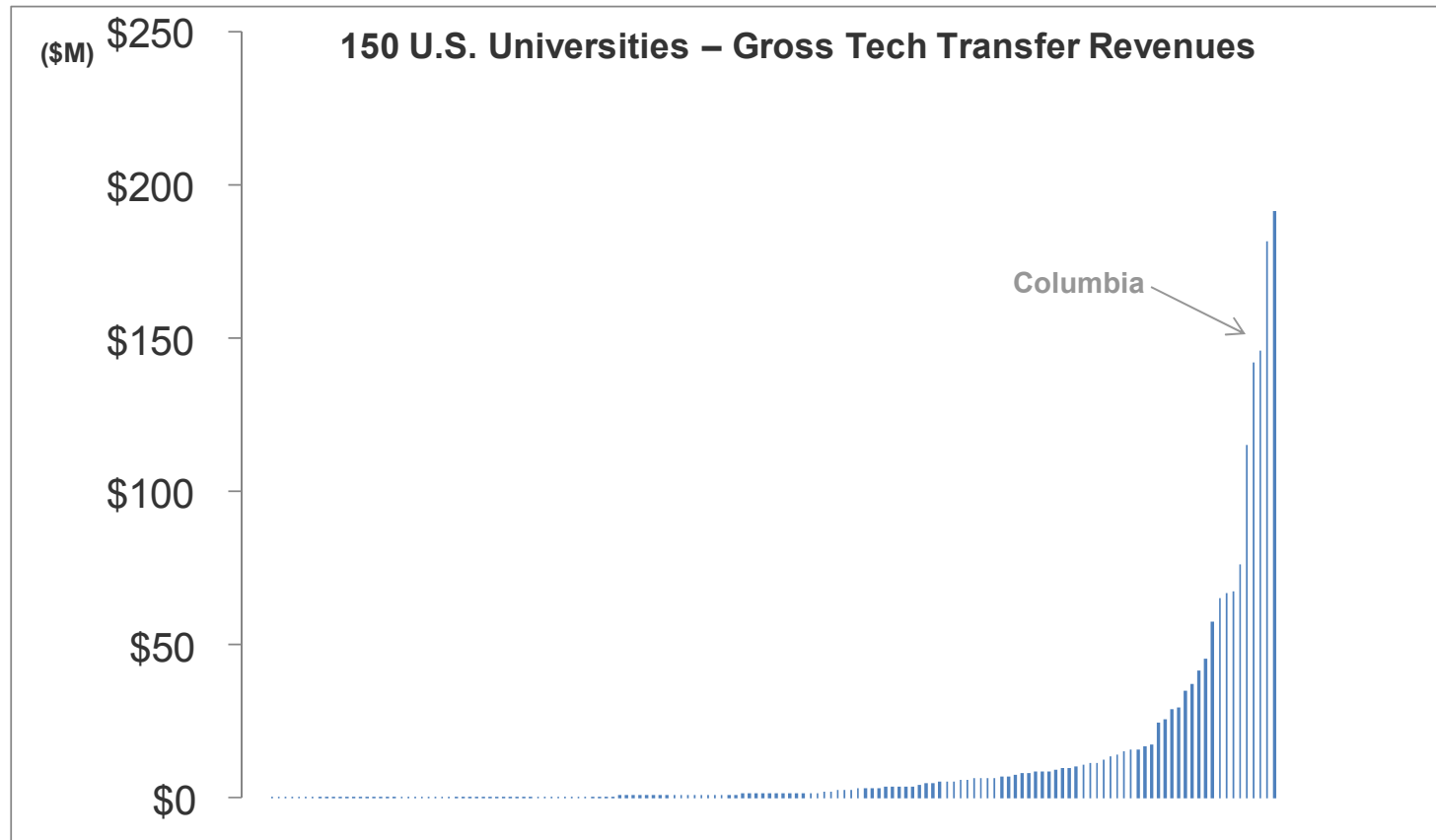


*Roughly 1 in 100 pharma
compounds gets approved*

*Roughly 1 in 10 venture investments
is a significant hit*

**Successful
product
on the market**

Commercial Success is Not Easy



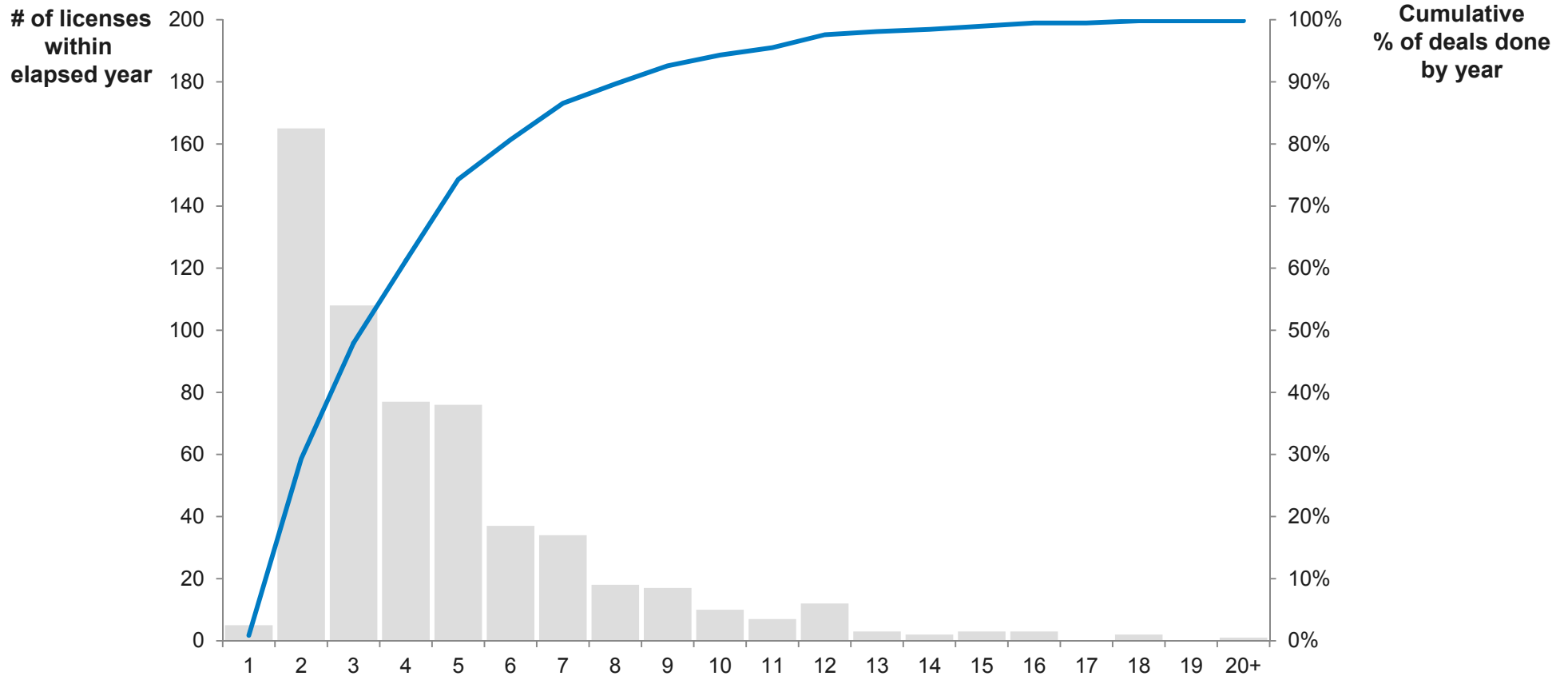
Who Else Does Well, Commercially?

(FY2011) <u>Name of Institution</u>	<u>License Income</u>	<u>Research Expenditures</u>	<u>Invention Disclosures</u>
Northwestern Univ.	\$192 M	\$484M	195
Univ. of California System	\$182 M	\$5,419M	1,581
Columbia Univ.	\$146 M	\$714M	335
New York Univ.	\$142 M	\$431M	167
Mass. Inst. of Technology (MIT)	\$76 M	\$1,490M	603
Univ. of Washington	\$67 M	\$967M	356
Stanford Univ.	\$67 M	\$806M*	504
UW-Madison/WARF	\$58 M	\$1,112M	357
Wake Forest Univ.	\$46 M	\$188M	70
Univ. of Minnesota	\$10 M	\$808M	250

Source: AUTM 2011 data except * AUTM 2010 data

Inventions Often Take Years to Get Licensed: Only ~50% of Deals Done by Year 3, only 70% by Year 5

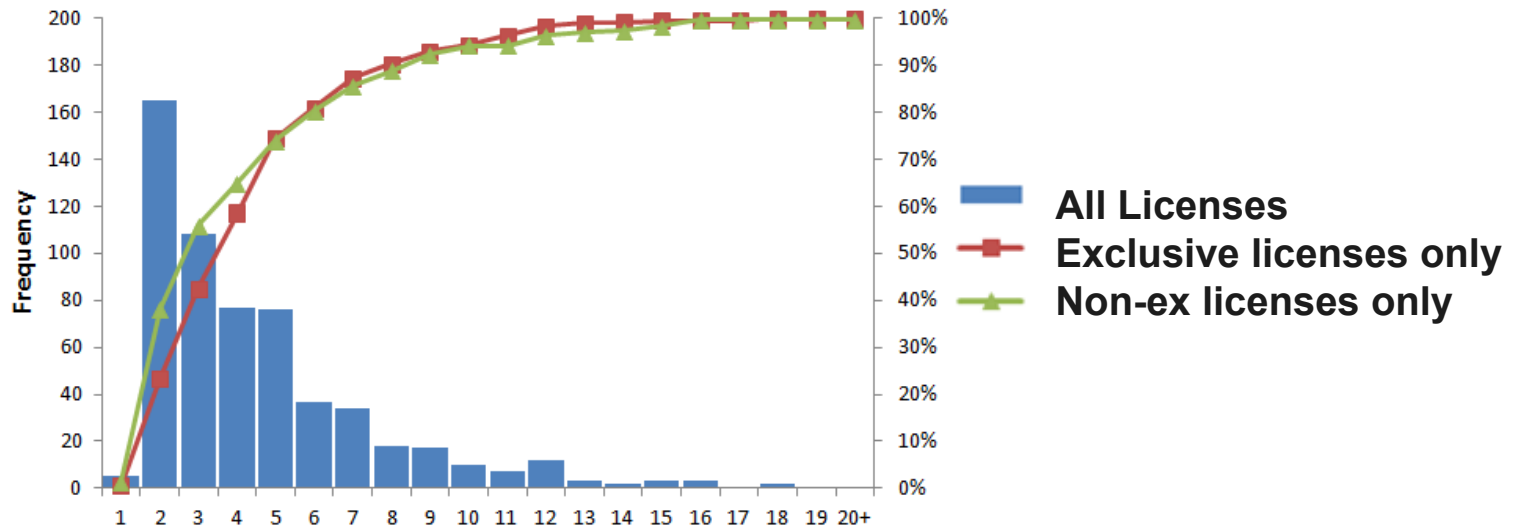
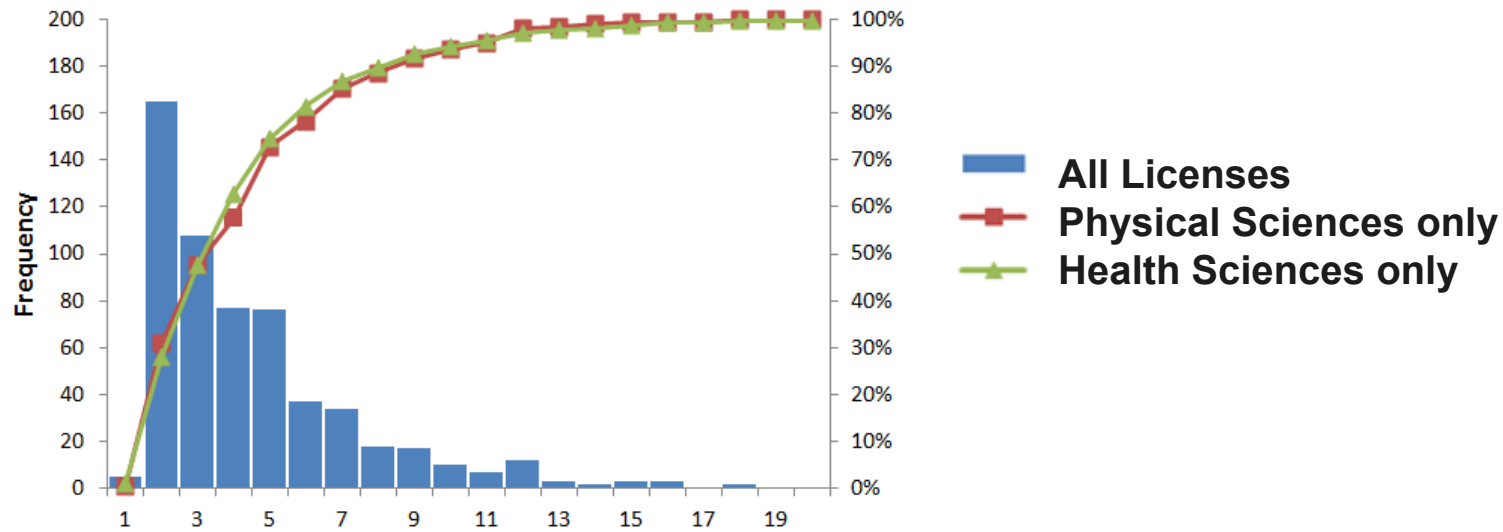
Columbia University: # of Years from Invention to First License



Source: Review of elapsed time from invention submission to executed license, for all 580 of Columbia's executed licenses from 1982 until 2011 (29 years)

Elapsed Time from Invention to License Relatively Constant

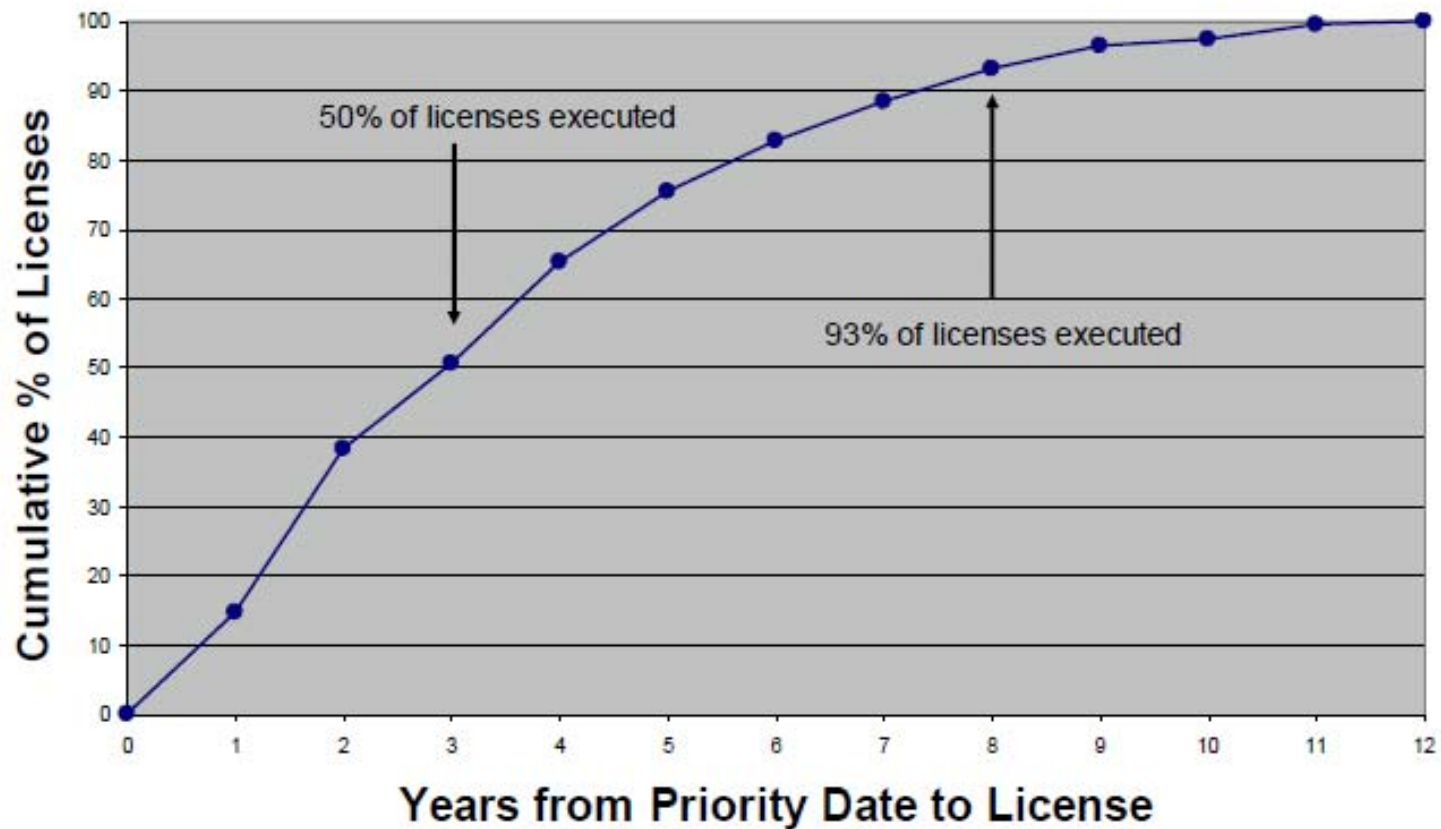
Only Slight Variation by Health Science vs. Phys Sci; Exclusive vs. Non-Exclusive



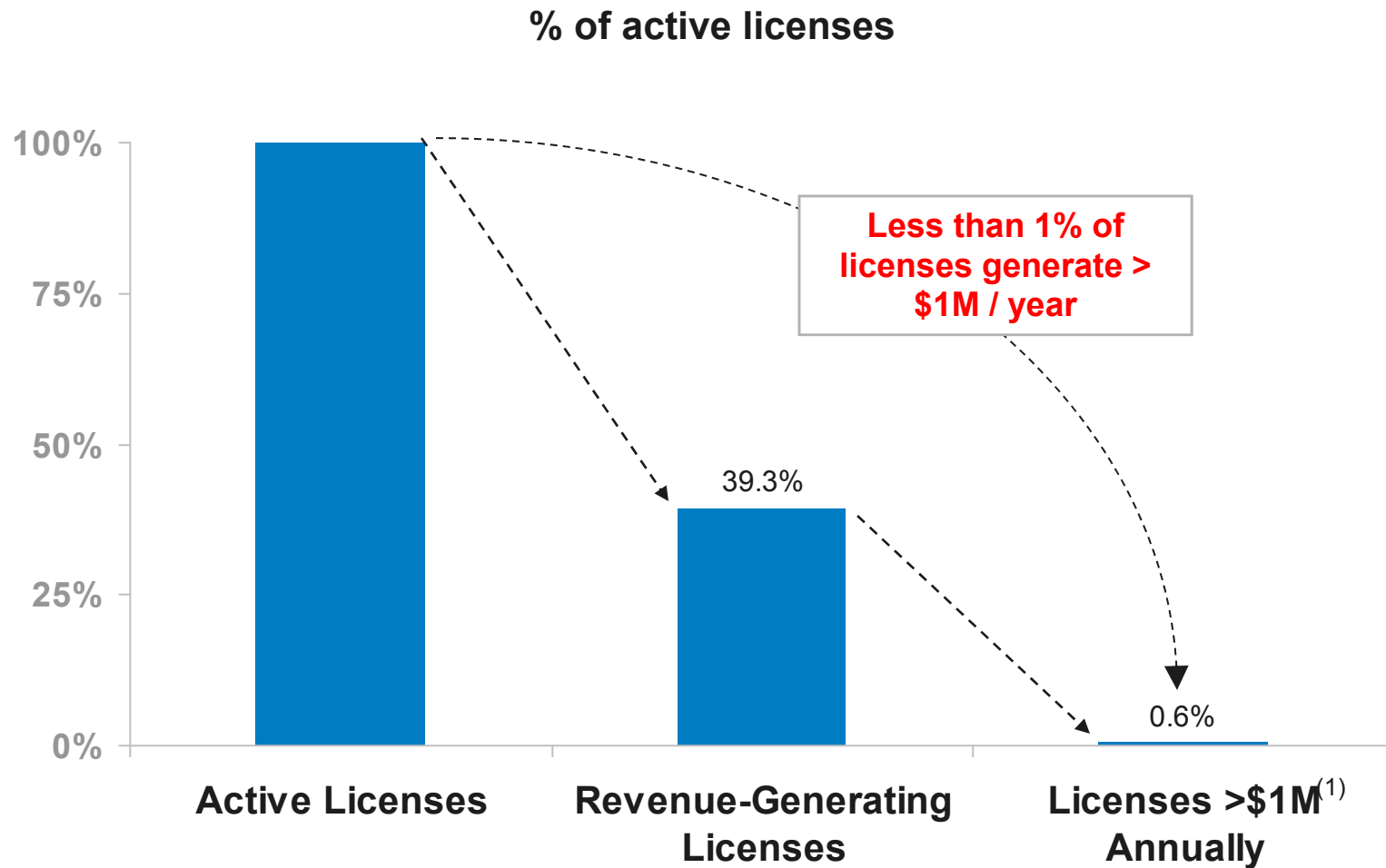
Source: Review of elapsed time from invention submission to executed license, for all 580 of Columbia's executed licenses from 1982 until 2011 (29 years)

Columbia's Experience Mirrors that of Other Institutions

National Cancer Institute's Licenses
of Years from Patent Filing to License (1995 – 2009)

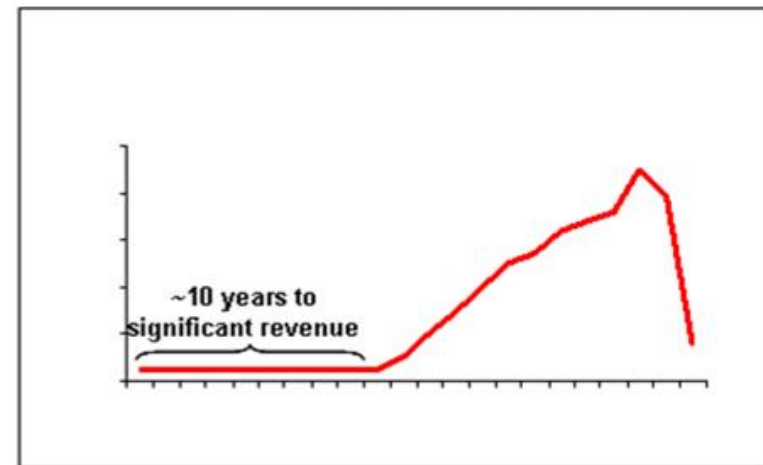
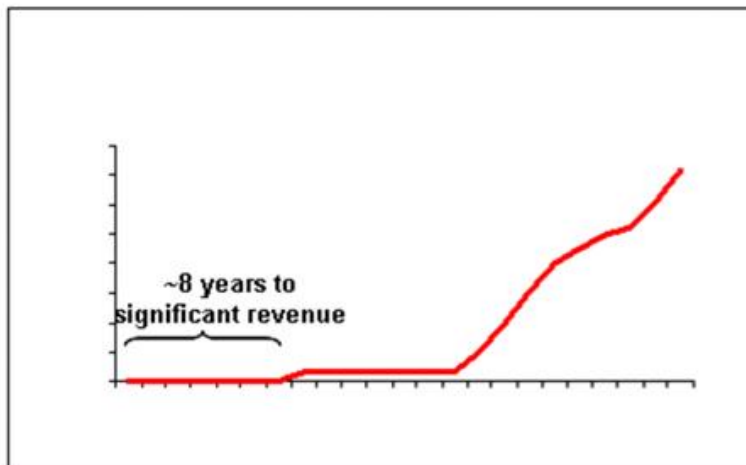
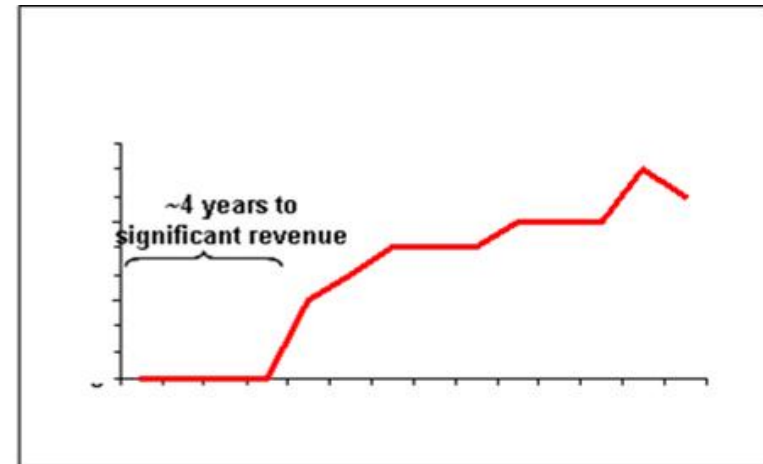
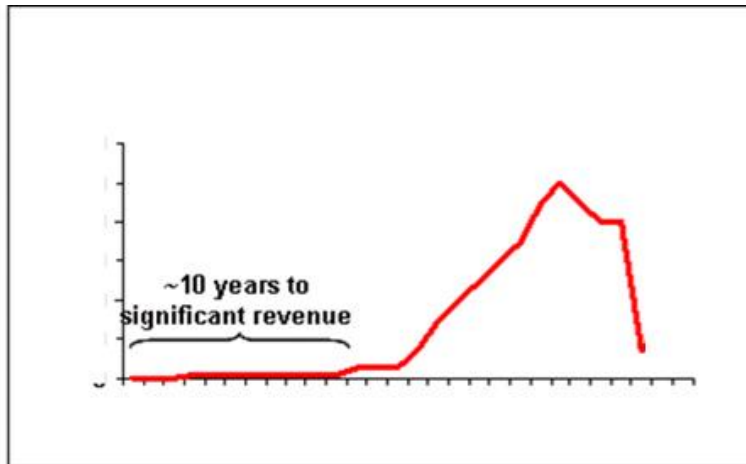


“Blockbusters” Drive Most of the Revenue, But are Rare



And “Big Winners” Take Many Years To Develop ... And Aren’t Always Obvious at the Time

**Columbia’s Four Biggest Revenue Producers
(Revenue per Year)**



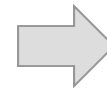
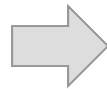
Columbia's Tech Transfer Mission

- To facilitate the **translation of academic research** into practical applications, for the benefit of society on a local, national and global basis
- To **support the research of Columbia faculty** by generating funding for the University and facilitating partnerships with industry where appropriate
- To **educate and serve as a resource for the Columbia community** on matters relating to entrepreneurship, intellectual property, and technology commercialization

Columbia Technology Ventures

Annual Activity Metrics

**~300 new inventions
from Faculty research**



**~70 licenses & options
~15 start-up companies
~\$140M in gross IP revenues**

Products Using Columbia Technology

Zolinza
 [vorinostat] capsules
 Reactivate Expression.

Remicade[®]
 INFLIXIMAB

Xalatan[®]
 latanoprost ophthalmic solution

accelrys[®]
 DISCOVERY STUDIO

DIRECTV.

ATI RADEON[™]
 PREMIUM GRAPHICS

Xolair[®]
 Omalizumab
 FOR SUBCUTANEOUS USE

REOPRO[®]
 abciximab

Xalcom
 latanoprost/timolol maleate

acer

Herceptin[®]
 Trastuzumab
 Targeted on HER2. Focused on living

ACTIVASE[®]
 ALTEPLASE
 A RECOMBINANT TISSUE PLASMINOGEN ACTIVATOR

Arrow Catheter

TYSABRI[®]
 (natalizumab)

Pulmozyme[®]
 dornase alfa
 INHALATION SOLUTION

iPod touch

REMODULIN[®]
 (treprostinil sodium) Injection

EPOGEN[®]
 (EPOETIN ALFA)
 RECOMBINANT

AVONEX[®]
 (Interferon beta-1a)
 IM Injection
 Active Living Longer

dish NETWORK

zimmer

SYNAGIS[™]
 PALIVIZUMAB

Thyrogen[®]
 thyrotropin alfa for injection

ROKU[®]

GONAL-f[™]
 (PITROPIN ALFA FOR INJECTION)

Enbrel[®]
 etanercept

Rebif[®]
 (interferon beta-1a)
 sc injection

CS5

Adobe

Blu-ray Disc[™]

149 Startups Spun Out of Columbia in 19 Years

Of those, 90 still active, 42 VC-backed, 9 gone public, 18 acquired

Health Analytics



Communications



Pharma & Devices

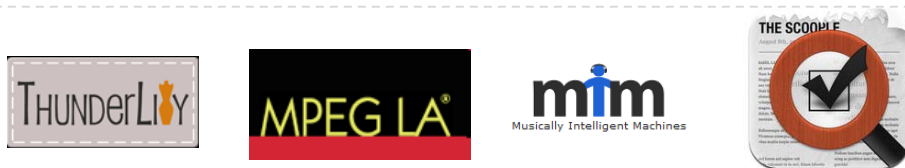


Cybersecurity & Corporate Computing

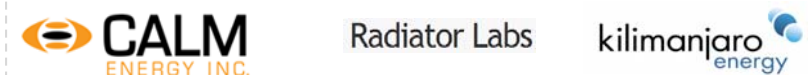
System Management ARTS (SMARTS)



Media & Fashion



Cleantech



Entrepreneurship@Columbia: Many Resources Available!

Upcoming Events

- Thu, Nov 18, 2011 11:59 pm
Mar. 29 2012: Deadline for 2012 New York State Business Plan Competition Application Submission
- Thu, Dec 08, 2011 09:00 pm
Dec. 8 2011: SFB Industry Speaker: Dr. Milena Adamian
- Tue, Dec 13, 2011 08:00 pm
Dec. 13 2011: Riverside Chats: Speakers Series - Technology Transfer
- Thu, Dec 08, 2011 12:00 pm
Dec. 8, 2011: Founding a Life Sciences Company: Legal and Accounting Aspects of Starting a Business
- Tue, Nov 15, 2011 09:30 pm
Infinite Vision: How Aravind Became the World's Greatest Business Case for Compassion

News

- Nov 22, 2011 09:23 pm
Nov. 22 2011: A Day in the Life of CBS Student David Lerman
David Lerman, current Columbia Business School freshman, takes the time to speak with Business Insider's War Room correspondent Aimee Groth as well as provide a photo-essay of life as a Columbia Business School student and board member of Columbia's Entrepreneurship Organization ... [more](#) —
- Oct 28, 2011 04:52 pm
Amazon Web Services and Columbia Tech Ventures planning to host Technical Office Hours: Your Help Needed w/ Survey
Columbia Technology Ventures and Amazon Web Services are planning to sponsor and host a Technical Office Hours. In order to determine the level of knowledge and areas of interest, the following survey needs to be filled out by Columbia folks ... [more](#) —
- Oct 28, 2011 04:30 pm
Codecademy Receives \$2.5 Million in Venture Financing
Congratulations to Codecademy, a web site founded by Columbia Computer Science alumni, for receiving \$2.5 million in a Series A round of venture financing. Codecademy currently teaches people how to program for free using an interactive challenge and reward method. See more in this ... [more](#) —

Entrepreneur Speaker Series

[Click here for upcoming talks.](#)

<http://entrepreneurship.columbia.edu>

Columbia Departments
Columbia Tech Ventures
Columbia Business School
Columbia Engineering
Center for Advanced Technology
Columbia Journalism

Student & Alumni
Columbia Venture Community
Application Development Initiative

What Is a Patent?

National legal protection for an invention



**Invention = solution to a
real-world problem that
works for its intended purpose**

**Exclusive right to prevent others from practicing the invention for 20
years**

Could I Theoretically Get A Patent on My Idea?

- **Patentable subject matter**
- **Utility**
- **Novelty**
- **Non-obviousness**

**Just because you could doesn't mean you will...
ultimately, up to the USPTO,
and how much \$ you have to spend**

When and How Should I File?

Certain events jeopardize patent rights.

- public disclosures; non-confidential disclosures; sales and offers for sale; public uses

Grace periods may be available, but –

- US law is changing, and
- ex-US law is still draconian.

Recommended practices

- File *before* disclosing or marketing!
- Avoid obfuscation about prior art, inventorship, ownership
- Find a good patent attorney

How Much Am I Going to Spend?

First filing: ≤\$1,000 → \$15,000+

- a U.S. provisional patent application

At 12 months: add \$8,000 → 30,000+

- a U.S. non-provisional patent application
- P(atent) C(oooperation) T(reaty) application

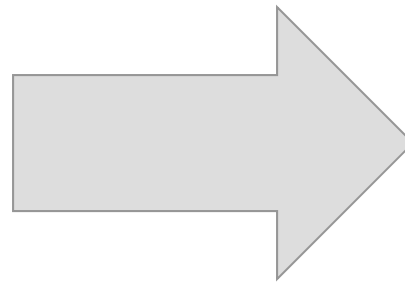
If PCT, at 30 months: “national stage”

- Add \$5,000 → \$20,000 per country

Remember, “You Can Get Almost Always Get a Patent”

How Do You Get Strong Protection?

More claims
Broader claims
Better written patents
More patent families
Hold for longer



More \$\$\$

Key question: how much to invest?

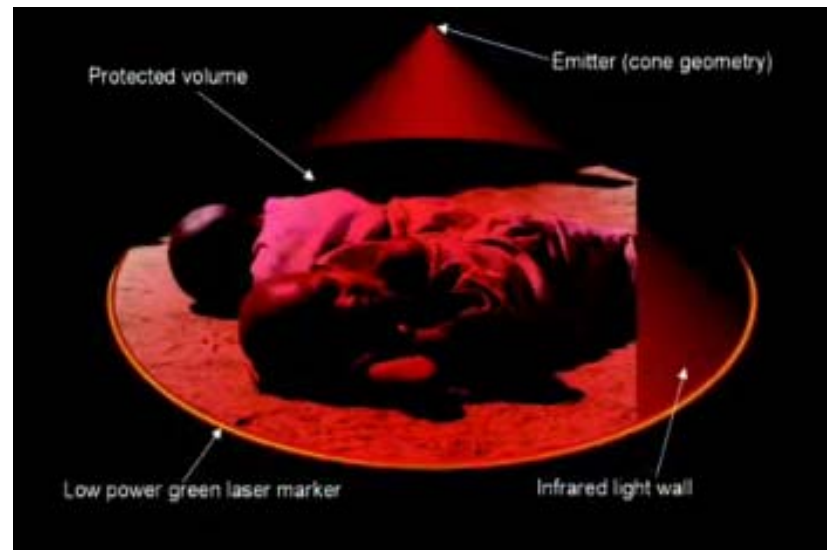
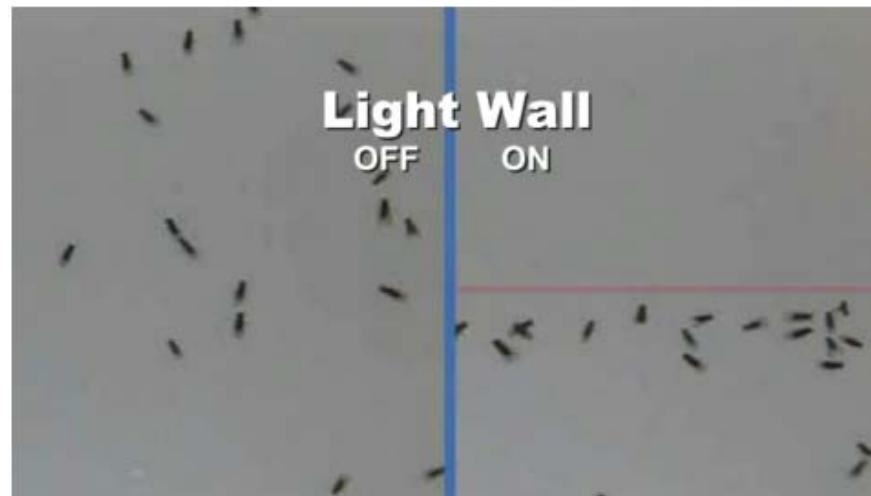
Factors That Drive Successful Commercialization

Patent strength	→	Prior art; freedom-to-operate; data to support claims; breadth of claims; specificity of claims
Market dynamics	→	Size; concentration; growth; licensing prevalence; competitiveness; margin
Relative importance of technology	→	Competitive approaches; incremental vs. disruptive; likelihood of adoption; cost / revenue impact from adoption
Development stage	→	Availability of R&D funding; ability of team to focus human resources; willingness to collaborate; time until commercialization
Budget	→	“What’s your bankroll?”

CTV makes ~1000 such decisions each year!

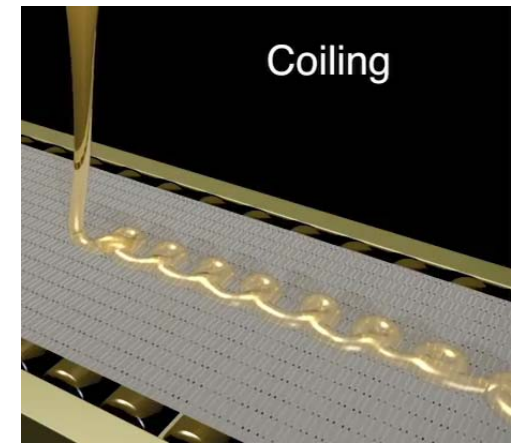
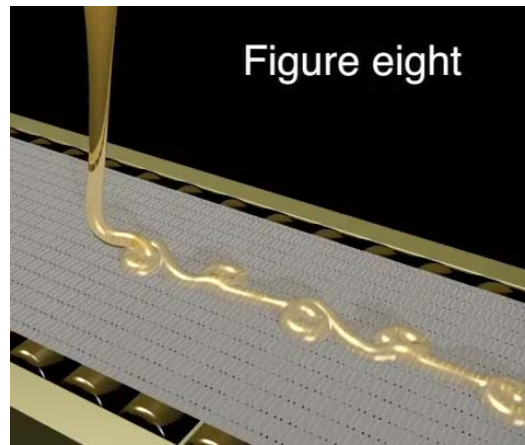
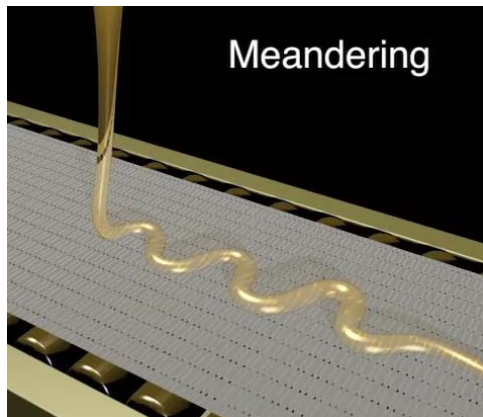
How to Decide?

Tunable Light Source That Repels Mosquitos



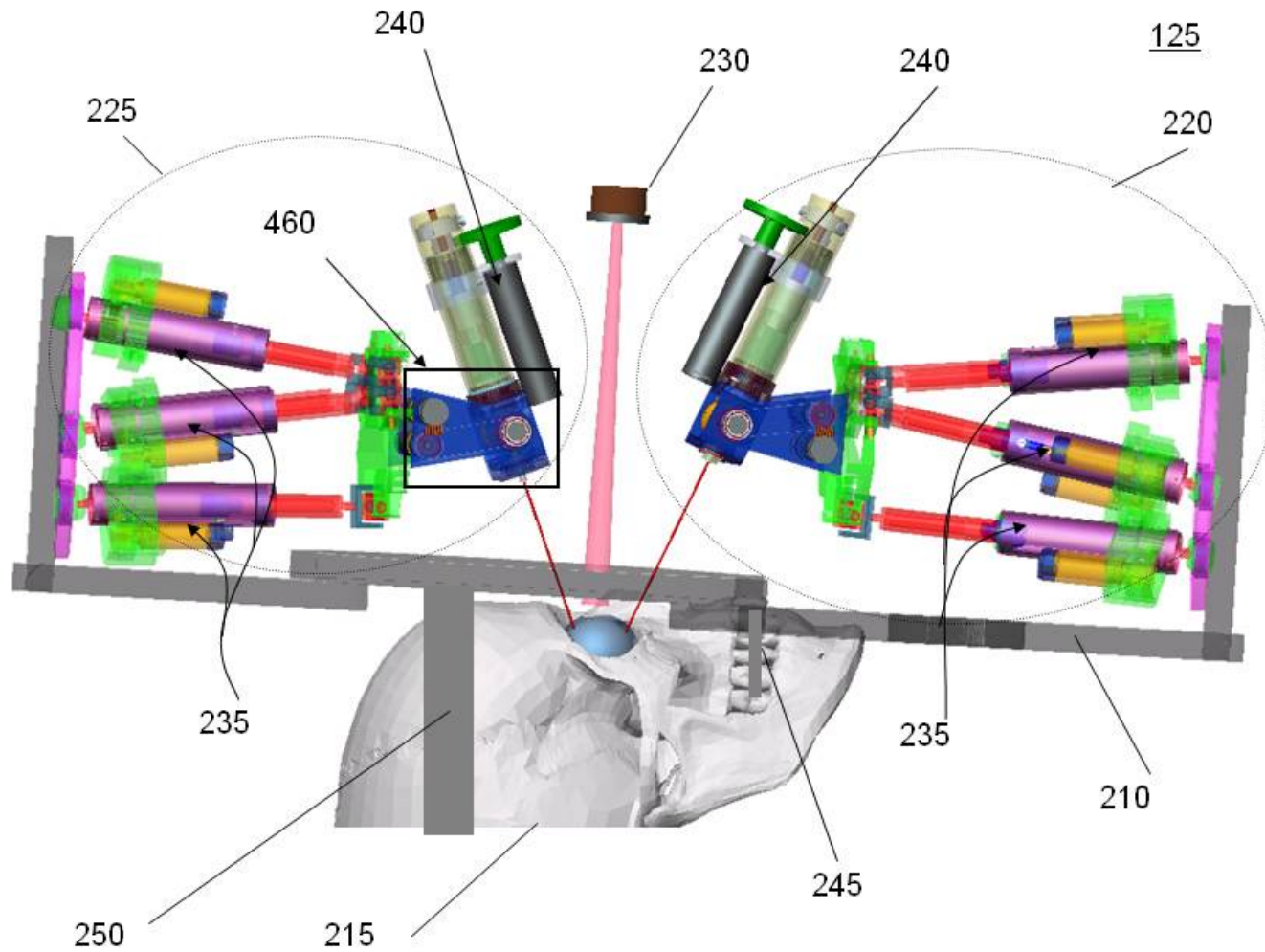
How to Decide?

Modeling of Flexible Fibers



How to Decide?

More Precise Surgical Robotics



Thank you

techventures@columbia.edu

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