Agenda for Today

1. Context on University tech transfer

2. Patents 101
Increasing Focus on Defensive and Offensive Patenting

NTP Takes On More Suits

Indeed, RIM settled with N1 Court refused to hear the Can

BlackBerry Maker Reaches Deal in P

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.

Monsanto Wins Big Award in a Biotech Patent Case

A federal jury awarded $1 billion in damages to the crop biotech Monsanto, saying that its arch rival DuPont had willfully infringed...

Cancer Patients Can... Genae Girard, 39, is suing... the granting of a patent on a gene test...

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...

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...
300% Increase in Patent Applications Since 1990

USPTO Activity, 1990 - 2011

- Red line: Patent Apps
- Blue line: Patent Awards
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?

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 30-12 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, redefine 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 cases 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 U.S., 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 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

Patent licenses / Startups
Industry Research Collaborations
Jobs for graduates
Publications
US Tech Transfer Productivity “By The Numbers”:
Cumulative Inputs and Outputs, 1991 - 2011

~$695B in Research funding

~287,000 invention disclosures

~165,000 patent applications

~59,000 patents awarded

$2.4M / disclosure

57%

36%

17%

48,064 active license & options,
7,495 start-ups,
130+ new drugs & devices,
300,000+ new jobs

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

150 U.S. Universities – Gross Tech Transfer Revenues

Source: AUTM 2011 Survey Data
## Who Else Does Well, Commercially?

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

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)

50% of licenses executed

93% of licenses executed
“Blockbusters” Drive Most of the Revenue, But are Rare

Less than 1% of licenses generate > $1M / year

Source: AUTM Licensing Survey (FY04)
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

Columbia Technology Ventures

~70 licenses & options
~15 start-up companies
~$140M in gross IP revenues
Products Using Columbia Technology

Zolinza®

Remicade®

Xalatan®

acclerys®

DISCOVERY STUDIO

Reopro®

Xalcom
latanoprost/imipol maleate

acer

Activase®

Alteplase

Arrow Catheter

Pulmozyme®
dornase alfa

INHALATION SOLUTION

Tysabri®
(natalizumab)

Remodulin®
(treprostinil sodium) Injection

Herceptin®
Toleran™

EPOGEN®
(EPoETIN ALFA)

Synagis™

Thyrogen®

EPOGEN®
(Interferon beta-1a)

Active Living Longer

Gonal-f

Enbrel®

Rebif®
(Interferon beta-1a)

CS5

Adobe

Blu-ray Disc

Columbia | Technology Ventures
149 Startups Spun Out of Columbia in 19 Years
Of those, 90 still active, 42 VC-backed, 9 gone public, 18 acquired

Health Analytics
- Schrödinger
- Health Fidelity
- MERS IT

Communications
- CounterPath
- CellroX

Pharma & Devices
- AngioLast Sciences
- Aton Pharma
- Alkeus Pharmaceuticals INC.
- Time Medical

Cybersecurity & Corporate Computing
- System Management ARTS (SMARTS)
- Silverlining

Media & Fashion
- ThunderLily
- MPEG LA
- mim

Cleantech
- Calm Energy Inc.
- Radiator Labs
- Kilimanjaro Energy
Entrepreneurship@Columbia: Many Resources Available!

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

Student & Alumni
Columbia Venture Community
Application Development Initiative

http://entrepreneurship.columbia.edu
What Is a Patent?

**National legal protection for an invention**

\[
\text{Invention} = \text{solution to a real-world problem that works for its intended purpose}
\]

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 \textit{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: \( \leq $1,000 \rightarrow $15,000+ \)
- a U.S. provisional patent application

At 12 months: add $8,000 \( \rightarrow 30,000+ \)
- a U.S. non-provisional patent application
- P(atent) C(ooperation) T(reaty) application

If PCT, at 30 months: “national stage”
- Add $5,000 \( \rightarrow $20,000 \) 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

Key question: how much to invest?
### Factors That Drive Successful Commercialization

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

CTV makes ~1000 such decisions each year!
How to Decide?
Tunable Light Source That Repels Mosquitos
How to Decide?
Modeling of Flexible Fibers

Meandering

Figure eight

Coiling
How to Decide?
More Precise Surgical Robotics
Thank you

techventures@columbia.edu

www.techventures.columbia.edu