CTL IP Series

IP Series #1: Understanding the Technology Transfer Process

9/15/2022

CTL CENTER FOR TECHNOLOGY LICENSING AT CORNELL UNIVERSITY

AGENDA

- CTL Overview
- University Technology Transfer & Bayh Dole
- Intellectual Property Primer
- Evaluating and Commercializing Inventions

CORNELL RESEARCH ENTERPRISE

$1,222.9M – FY21 research expenditure

$585.8 M
Federal
Sponsored RE

~58%

Cornell University
Ithaca - 12 Colleges and Schools

CORNELL TECH
Roosevelt Island - NYC

~42%

Weill Cornell Medicine
NYC & Qatar


Ithaca


Geneva, NY


Cornell Tech
NYC

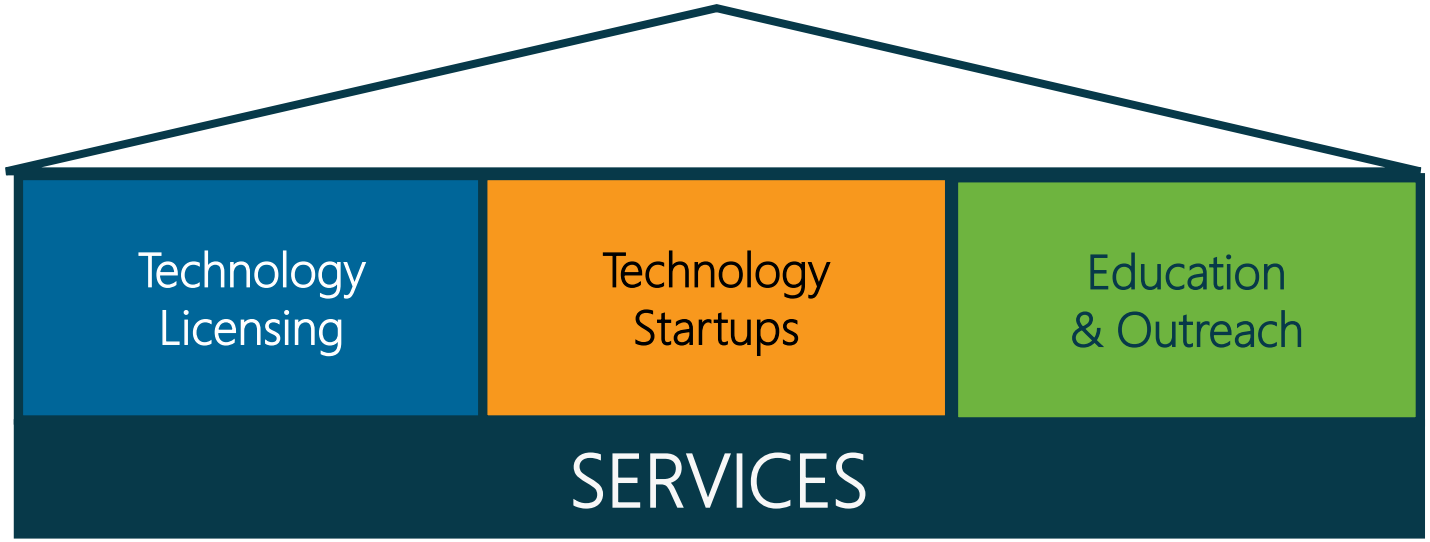

Weill Cornell Medicine
NYC


Weill Cornell Medicine
Qatar

CTL MISSION

- Catalyze technology commercialization to develop products and services from university innovations for societal benefits

- Promote new technology ventures to foster economic development within New York State and across the nation



CTL ACTIVITY OVERVIEW (FY 2022)

Technology Licensing & IP

- Manage University IP
- Negotiate Licenses

419 IP Disclosures

221 Issued patents

89 Licenses & Options

$36.8 Million in revenue

Technology Startups

- Ignite Cornell R L2M
- FastTrack
- Startup Networking
- VC Relationships

11 Startups
- 8 in NY State

Ignite Cornell research L2M
4 startup projects funded
14 research-lab projects

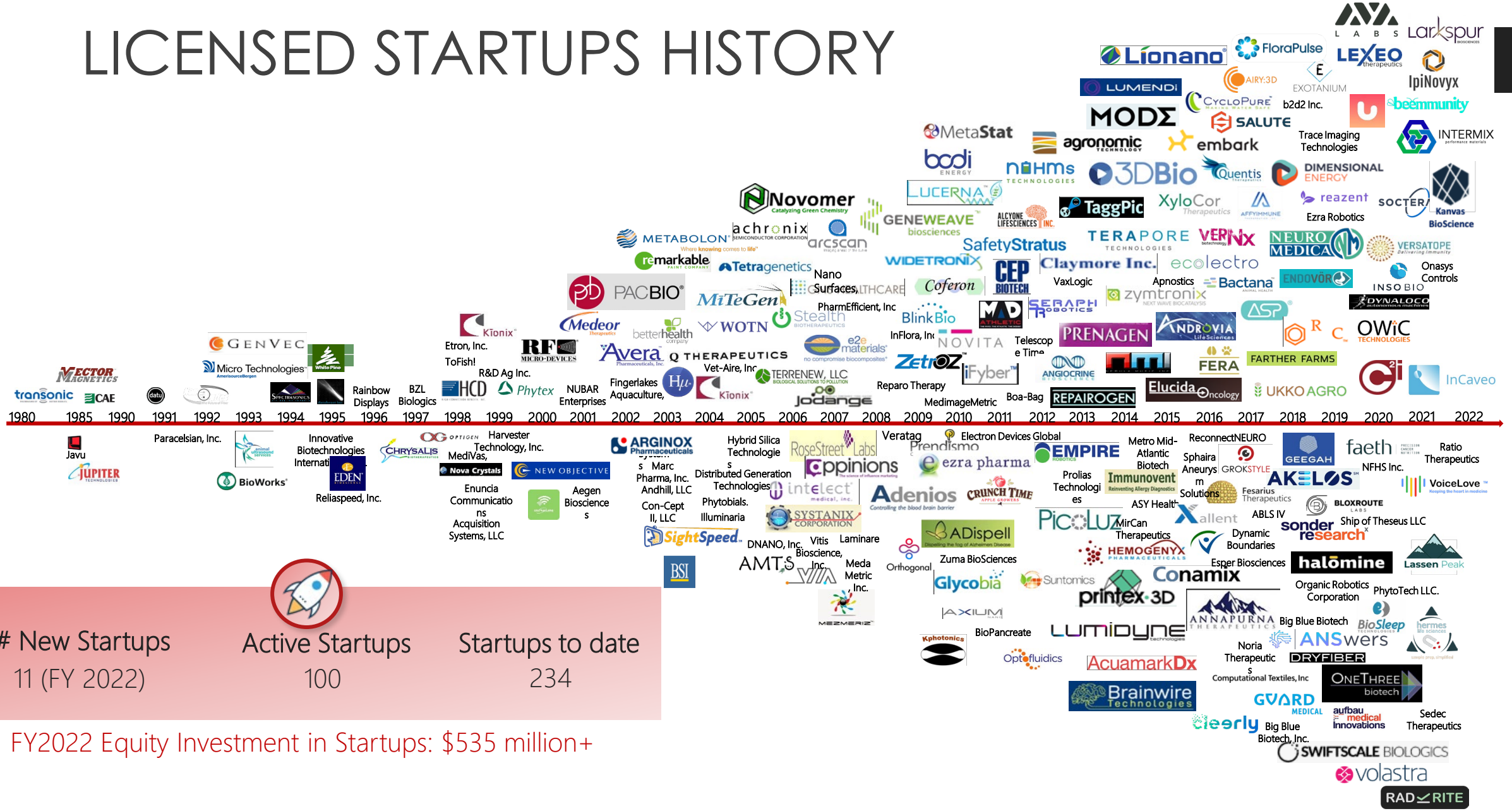
Education & Outreach

- CTL Practicum
- WI2
- Externally focused events
- Internally focused events

10 Practicants

26 outreach events

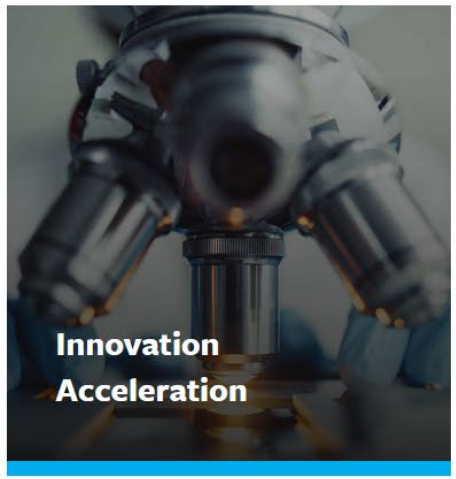
LICENSED STARTUPS HISTORY

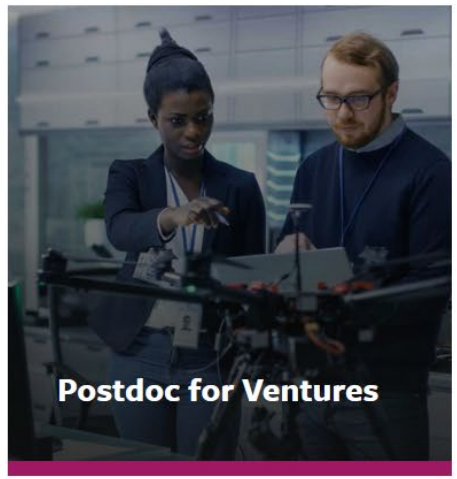


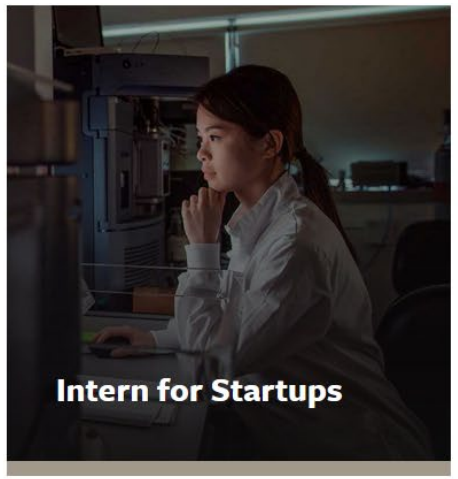
# New Startups	Active Startups	Startups to date
11 (FY 2022)	100	234

FY2022 Equity Investment in Startups: $535 million+

IGNITE CORNELL RESEARCH LAB TO MARKET





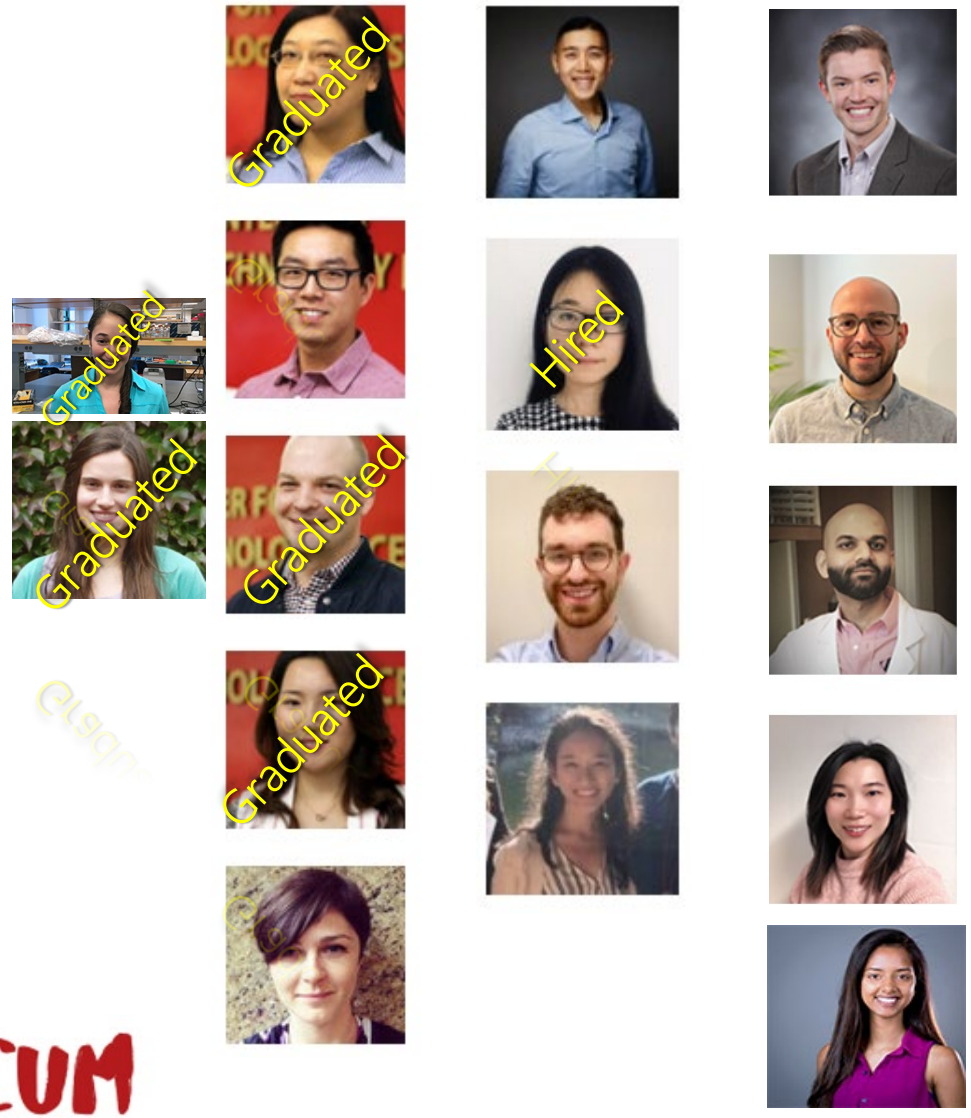


Targeted Audience	PIs with IP	Ph.D. holders & faculty-inventor with IP	Cornell Startups	Cornell Startups
Funding Amount	Up to $50K	$120K/year	Up to $50K	$10K/Ignite Intern
Funding Type	Grant	Compensation + SAFE	SAFE Note	Compensation to interns
Cycle	2 cycles (Spring, Fall)	Annual cycle	On a rolling basis	Spring
Weblink	https://ignite.ctl.cornell.edu/innovation-acceleration/	https://ignite.ctl.cornell.edu/postdoc-for-ventures/	https://ignite.ctl.cornell.edu/startup-projects/	https://ignite.ctl.cornell.edu/intern-for-startups/

CTL PRACTICUM

Internship program

- 9-month commitment (preferably a year)
- Up to 10 hours/week
- A formal onboarding training
- Support of the marketing & IP processes



CTL PRACTICUM

INNOVATION FELLOWSHIP

- Program for Ph.D. graduates and postdoctoral researchers interested in a career in business development, commercialization or entrepreneurship
- Full-time employees
- 3-year contract

Learn more

SCAN ME

Stephen Novak
Innovation Fellow, Life Sciences

Aaron Delahanty
Venture Fellow, Technology Initiatives and Outreach

WOMEN INNOVATORS INITIATIVES (WI2)

Cornell Women Inventor
Invention Disclosures to CTL 2009-2017
(Preliminary)

Women Inventor Rate For Faculty	**23%**

(172 out of 762 faculty inventors)

Cornell Women Founders
In Tech Startups 2009-2017
(Preliminary)

Women founders	**18%**

(10 out of 56, those with Cornell inventor founders)

WOMEN INNOVATORS INITIATIVE
CENTER FOR TECHNOLOGY LICENSING AT CORNELL UNIVERSITY

1. Webinar series
   - "Women Inventors" on 6/25/2020
   - "Women Investors on 9/30/2020
   - "Women Entrepreneurs" on 4/02/2021
   - "Women's Health" on 3/17/2022
2. Mentor Program (Pilot)
3. *(New)* Recognition Awards

THE BD & LICENSING – LIFE SCIENCES TEAM

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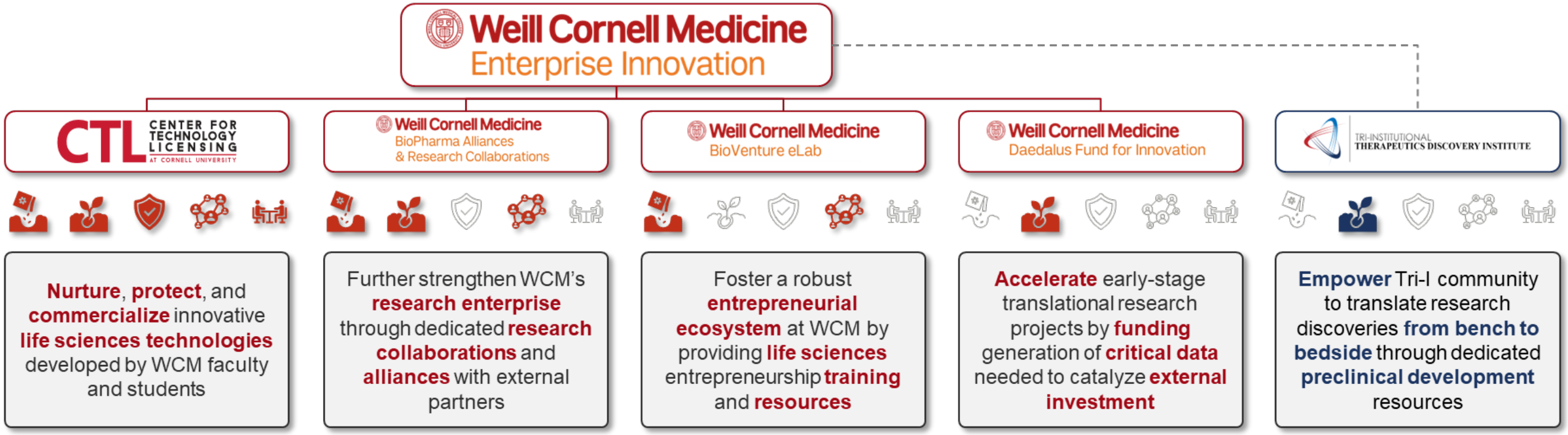
Aaron Delahanty
Venture Fellow

Weill Cornell Medicine Enterprise Innovation (est. 2021):

Accelerating the best of biomedical innovation to market & translating groundbreaking research into revolutionary care



Each branch of WCM EI collaboratively supports key aspects of the innovation lifecycle for the medical school

The Tri-I TDI is an independent organization dedicated to advancing academic projects from Weill Cornell Medicine, The Rockefeller University, and Memorial Sloan Kettering Cancer Center.

Weill Cornell Medicine
Enterprise Innovation

CTL @ Weill Cornell Medicine

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BioVenture eLab

CTL CENTER FOR TECHNOLOGY LICENSING AT CORNELL UNIVERSITY

Weill Cornell Medicine Enterprise Innovation

Programming and Educational Offerings

Accelerating BioVenture Innovation	Biz Plan Competition	IP and Biotech Due Diligence Series	Fundamentals of Academic Biz Dev
Office Hours	InvestConnect Symposium	Workshops and Interest Groups	Matchmaking
Women Innovator Initiatives	IP Series	Start-Up Series	Special Healthcare Innovation Panels

Primary Organizer

- CTL@WCM
- eLabs
- Joint

Weill Cornell Medicine

PHAR 9021; a WCM Graduate School Course provides hands-on training in the management of academic innovations

Module I:
Intellectual Property Protection

- **Lecture 1:** Technology Transfer 101 and WCM EI Overview
- **Lecture 2:** Patents 101 and Claims Construction
- **Lecture 3:** Conducting a Prior Art Search
- **Assignments:**
  - Draft Patent Claims
  - Prior Art Search

Module II:
Technology Evaluation

- **Lecture 4:** Invention Disclosure and Evaluation Process
- **Lecture 5:** Invention Assessment Presentations
- **Assignments:**
  - Invention Assessment #1
  - Invention Assessment #2

Module III:
Partnering Academic Technologies

- **Lecture 6:** Marketing 101 and Industry Biz Dev Panel
- **Lecture 7:** PowerPoint Productivity & Marketing Deck Tutorial
- **Lecture 8:** Presentations & Identifying Potential Partners
- **Lecture 9:** Mock Negotiation
- **Assignments:**
  - Technology Marketing Package

Offered Annually Fall and Spring; TA positions available

University Technology Transfer & Bayh Dole

TECHNOLOGY TRANSFER – WHAT & WHY?

- Process by which a discovery is brought to the marketplace for the benefit of the general public
- The Center for Technology Licensing at Cornell University is the office engaged in technology transfer on behalf of Cornell University
- Almost every University that receives federal research funding has a technology transfer office to assist faculty and staff

- University priorities
- Bayh-Dole Act - 1980

CORNELL POLICIES & PRIORITIES

http://www.ctl.cornell.edu/inventors/cornell-policies.php

Cornell claims ownership of its employee's inventions and most other forms of intellectual property and seeks to develop them:

- for the public good – NY State is first priority
- to get a reasonable return – licensing

As with other universities, licensing is a tool to:

- recruit and retain faculty and students
- increase research sponsorship
- create closer ties to industry

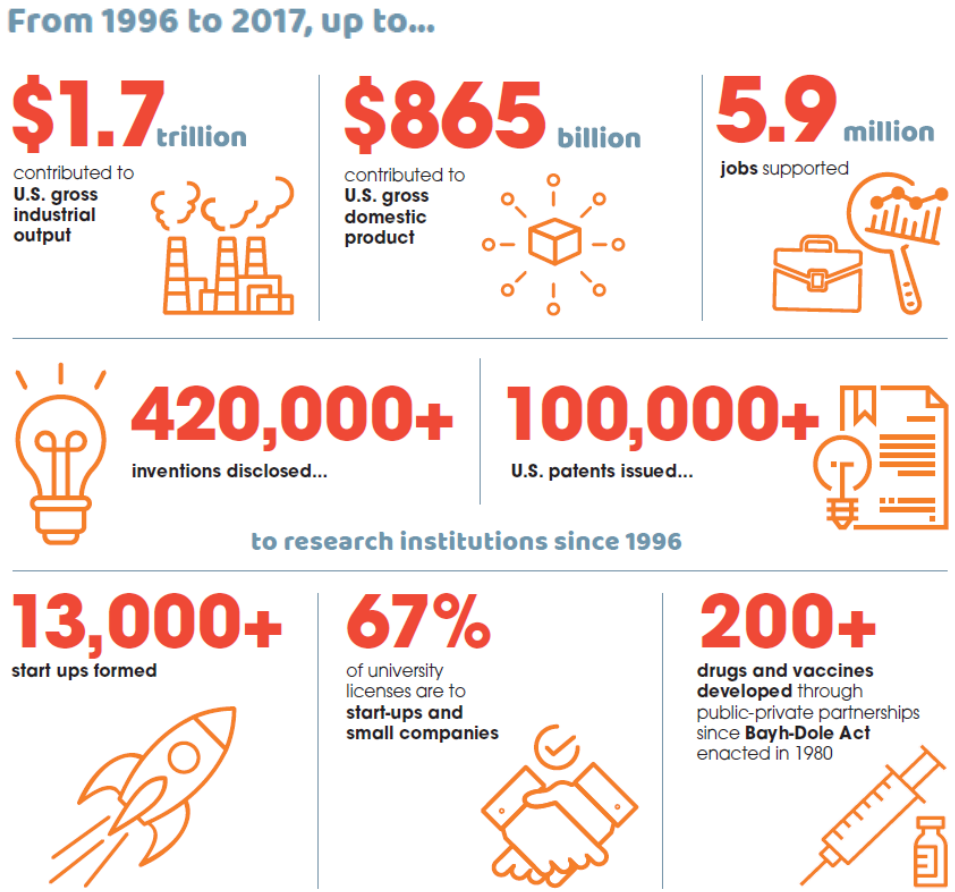
Zero financial risk in working with CTL for faculty, staff and students

BAYH-DOLE ACT

The Economist (2002):
Possibly the most inspired piece of legislation to be enacted in America over the past half-century was the Bayh–Dole act of 1980

Pre Bayh-Dole:

- less than 5% of the 30,000 patents owned by govt' from federal research was licensed to commercial entities
- Only about a dozen institutions (Cornell was one) had commercial technology transfer offices



CORNELL IMPACT

BAYH-DOLE ACT

Transferred right of ownership of intellectual property developed from federally funded research from the US Gov't to the academic research institution

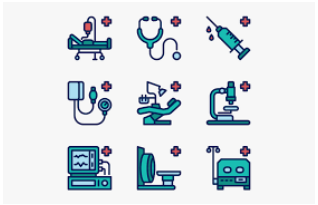
1. Must try to commercialize
2. Preference for licenses to US companies
3. Preference for small business over large
4. US manufacturing requirements
5. Distribution of $ to inventors

NOTE -- University must also:

1. Grant non-exclusive rights to US Gov't
2. Allow "march-in" rights (never used)

Intellectual Property Primer

ASSETS WE'RE LOOKING FOR…



Therapeutics:

- Small Molecules
- Biologics
- Cell/Gene Therapy
- Novel Targets

Medical Devices:

- Imaging Equipment/Methods
- Surgical Devices/Implants
- Equipment

Diagnostics:

- Molecular
- Histological
- Imaging
- mAb based

Ag & Food

- Crops & seeds
- Precision Ag
- Food Packaging & Processing
- Ingredients

Hi Tech:

- Robotics and Autonomy
- Materials
- Renewables
- Energy & Storage
- Software (AI/ML, Cyber security, crypto
- Transportation & Infrastructure
- Quantum Eng., Comp & Communication
- Sensors
- Semiconductor & Electronics

Research Tool:

- Mouse models
- Research mAbs
- New research methodologies

Data:

- Clinical care models/workflows
- Unique structured data sets
- INDs

Digital Health:

- Therapeutics
- "alerts"
- Clinical work-flow aides
- AI/Machine Learning Algorithms

…*IP THAT CAN IMPACT SOCIETY*

TYPES OF INTELLECTUAL PROPERTY

PATENTS

- **Legal monopoly** granted in return for public disclosure of an invention
- Gives the right to **exclude others** from practicing the invention
- Only enforceable once issued
- Patents **valid from 20 years** from application date (not issue date)
- Inventorship is **legally defined** and distinct from authorship

(12) **United States Patent**
Abruña et al.

(10) **Patent No.: US 11,417,884 B2**
(45) **Date of Patent: Aug. 16, 2022**

(54) **TITANIUM DISULFIDE-SULFUR COMPOSITES**

(71) Applicants: **CORNELL UNIVERSITY**, Ithaca, NY (US); **WUHAN UNIVERSITY**, Wuhan (CN)

(72) Inventors: **Héctor D. Abruña**, Ithaca, NY (US); **Yao Yang**, Ithaca, NY (US); **Fu-Sheng Ke**, Wuhan (CN); **Xiao-Chen Liu**, Wuhan (CN)

(73) Assignees: **CORNELL UNIVERSITY**, Ithaca, NY (US); **WUHAN UNIVERSITY**, Wuhan (CN)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 247 days.

(21) Appl. No.: **16/771,776**

(22) PCT Filed: **Dec. 20, 2018**

(86) PCT No.: **PCT/US2018/066797**
§ 371 (c)(1),
(2) Date: **Jun. 11, 2020**

(87) PCT Pub. No.: **WO2019/126499**
PCT Pub. Date: **Jun. 27, 2019**

(65) **Prior Publication Data**

US 2021/0194004 A1 Jun. 24, 2021

Related U.S. Application Data

(60) Provisional application No. 62/608,230, filed on Dec. 20, 2017.

(51) **Int. Cl.**
H01M 4/00 (2006.01)
H01M 4/58 (2010.01)
(Continued)

(52) **U.S. Cl.**
CPC ***H01M 4/5815*** (2013.01); ***H01M 4/0404*** (2013.01); ***H01M 4/366*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC H01M 4/366; H01M 4/1391; H01M 2004/028; H01M 4/134; H01M 4/0404; H01M 4/622; Y02E 60/10
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,007,055 A 2/1977 Whittingham
4,233,377 A 11/1980 Haering et al.
(Continued)

FOREIGN PATENT DOCUMENTS

CN 106935796 A 7/2017
EP 3203567 A1 8/2017
(Continued)

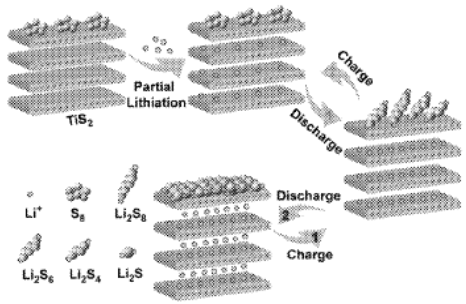
OTHER PUBLICATIONS

International Search Report and Written Opinion of the International Searching Authority for International Application No. PCT/US2018/066797 dated Mar. 28, 2019.
(Continued)

Primary Examiner — Cynthia H Kelly
Assistant Examiner — Monique M Wills
(74) *Attorney, Agent, or Firm* — Heslin Rothenberg Farley & Mesiti P C.

(57) **ABSTRACT**

A titanium disulfide-sulfur (TiS_2—S) composite particle contains a titanium disulfide (TiS_2) substrate having solid elemental sulfur (S) disposed directly on a surface of the TiS_2. The TiS_2 substrate has a layered crystalline hexagonal structure of space group P-3 ml and includes at least 100 distinct layers. The TiS_2 and S are present in the composite in a weight ratio (TiS_2:S) of 20:80 to 50:50. Cathodes and
(Continued)



COPYRIGHT

- Copyright protects "original works of authorship fixed in a **tangible medium** of expression."

- Copyright protects computer software as a "literary work." Copyright law does not protect the functional aspects of a computer program, such as the program's algorithms, formatting, functions, logic, or system design and merely protects its

- Data itself is not copyrightable, but a creative arrangement, annotation, or selection of data (a compilation) can be protected by copyright.

TRADEMARK

- A trademark can be any word, phrase, symbol, design, or a combination of these things that identifies an origin for a particular good or service.
- Standard character-only trademarks

RUBYFROST® SNAPDRAGON®

- Special form trademarks include trademarks that are stylized, have designs, or are in color.

REQUIREMENTS OF PATENTABILITY

What can be patented?

35 U.S.C. §101 – Subject Matter to be protected is limited to one of the four statutory categories:

- "Whoever invents or discovers any **new and useful** process, machine, manufacture, or composition of matter, or any new and useful improvement thereof . . . ."

What can't be patented?

Judicial exceptions: laws of nature, products of nature, *abstract ideas*, natural phenomena

REQUIREMENTS OF PATENTABILITY

- 35 U.S.C. §102 – "**Novelty**" - No one has done the same thing previously

- 35 U.S.C. §103 – "**Non-Obvious**" - A person of ordinary skill in the relevant art would not reasonably have been expected to have modified or combined known prior art to arrive at the claimed invention.

REQUIREMENTS OF PATENTABILITY

- 35 U.S.C. §112 – Requires that the specification include the following:

  (A) A ***written description*** of the invention;

  (B) The manner and process of making and using the invention (the ***enablement*** requirement); and

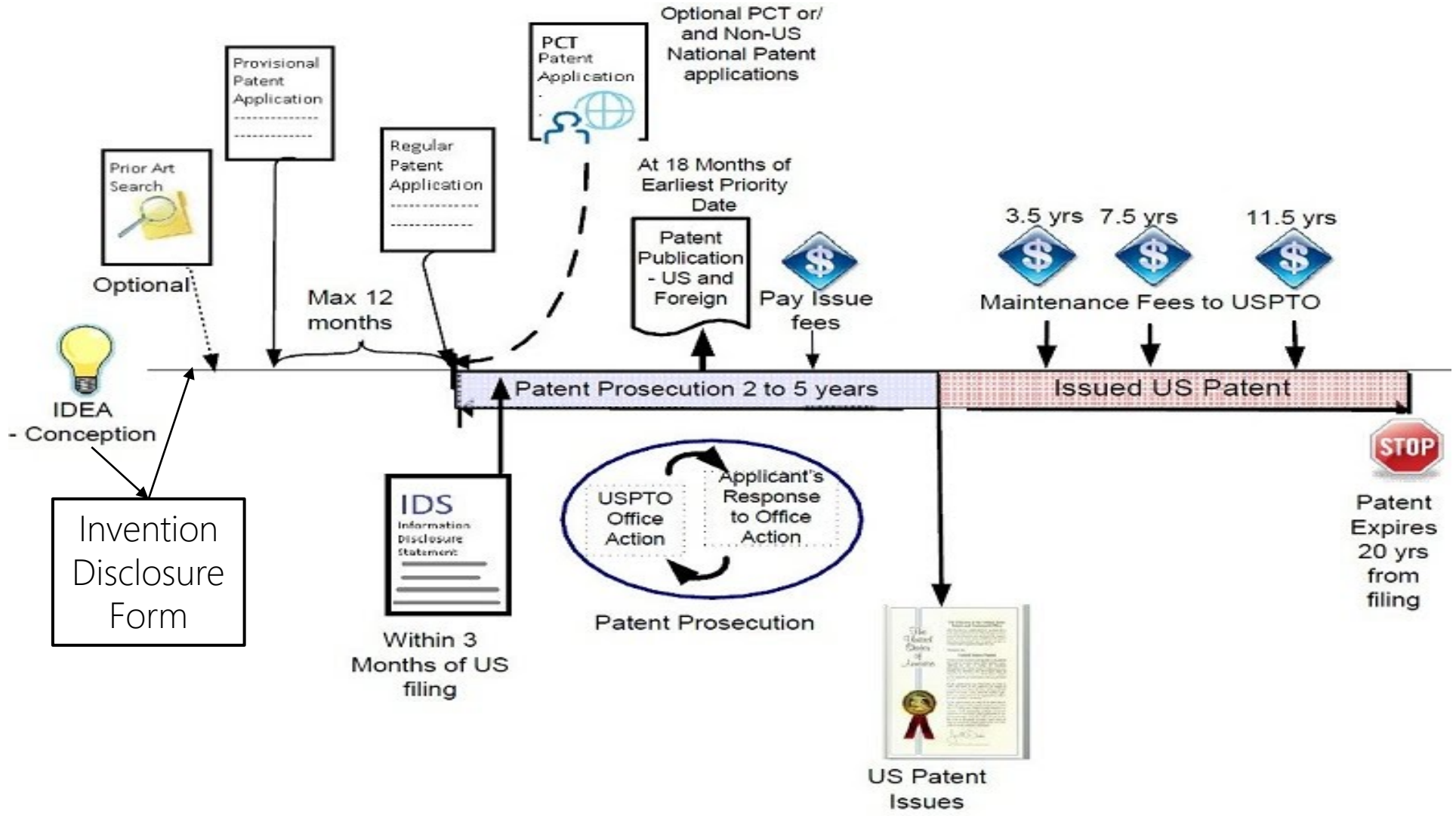
  (C) The ***best mode*** contemplated by the inventor of carrying out the invention.

TYPES OF PATENTS

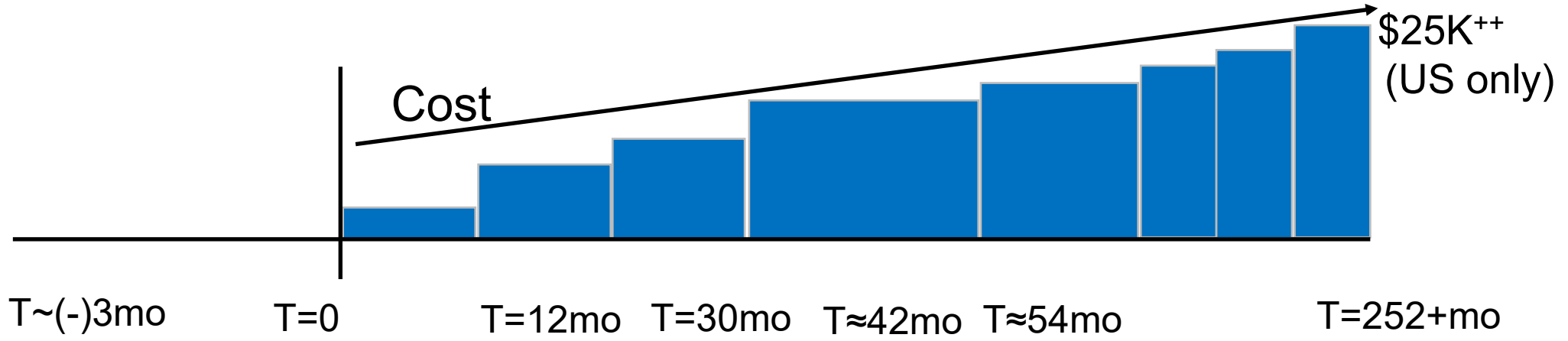
- Provisional Patent Applications
  - Informal Application
  - Can be filed relatively quickly
  - Not Examined – Priority "placeholder" for subject matter that is disclosed and enabled
  - Expires automatically after one year

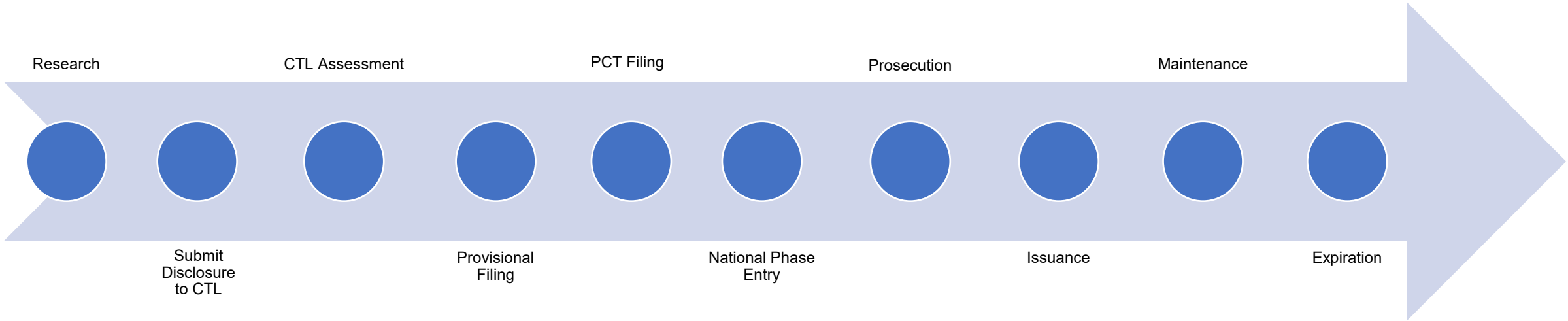
- Non-Provisional /Patent Cooperation Treaty (PCT) Applications
  - Formal applications
  - Must be filed within one year of provisional application(s)
  - Must **fully describe** the invention in sufficient detail to **enable** a person of ordinary skill in the art to make and use the invention (35 USC 112).

PATENT LIFE CYCLE



PATENT LIFE CYCLE COST





INVENTORSHIP

Inventorship

- Different than *authorship*.
- Legal determination analyzed in view of case law and the facts presented.
- Defined relative to *claimed* subject matter of the invention.
- Inventorship can *change* during prosecution if claims are amended, cancelled or added.
- One must contribute to the *conception* of the *claimed invention* to be an inventor.
- *Merely assisting* implementation, being on a team, or supervising a team does not automatically make a person an inventor.
- Co-inventorship requires *more* than a mere contribution of well-known concepts and/or the current state of the art.

CORNELL IP POLICIES

- Policy **1.5** Inventions and Related Property Rights
- Policy **4.10** Use of Cornell's Name, Logos, Trademarks, and Insignias
- Policy **4.15** Copyright

PUBLIC DISCLOSURE CAN JEOPARDIZE PATENT RIGHTS

- Manuscript publication
- Pre-print postings (e.g., BioRxIV; early online access)
- Published Abstracts
- Open thesis defense
- Posters/Talks
- Awarded federal grant applications
- Speaker engagements
- Social media postings
- Commercial use/sale

*when in doubt contact CTL well before any such disclosure to discuss *

Evaluating & Commercializing Inventions

THE (CONTINUAL) ASSESSMENT PROCESS:
- An Iterative Dialog Between CTL And Inventor -

Factors Considered When Deciding to Invest in an Asset

- What problem does the technology address?
- How can the intellectual property be protected and leveraged?
- Can the invention be policed? Are there freedom-to-operate concerns?
- What are the competing solutions (both existing and in development)?
- What advantages and distinguishing features does the technology have
- Is it a platform technology or improvement? What is its initial application, or indication?
- Who is the ultimate customer and who will pay for it (and pay for what)?
- What is the market size and is it large enough to support commercial development costs?
- Who are the commercial partners in the field (corporate and investor)?
- What is the development status - What are the immediate and longer-term "next steps" for further validation (timeline and funding)?
- Will manufacturing be difficult?
- What will the regulatory pathway look like?
- What data are needed to support intellectual property strategy and commercial outreach?

Invention / Technology

Market

Commercialization

CTL CENTER FOR TECHNOLOGY LICENSING AT CORNELL UNIVERSITY

MARKETING INVENTIONS – COMMERCIAL OUTREACH

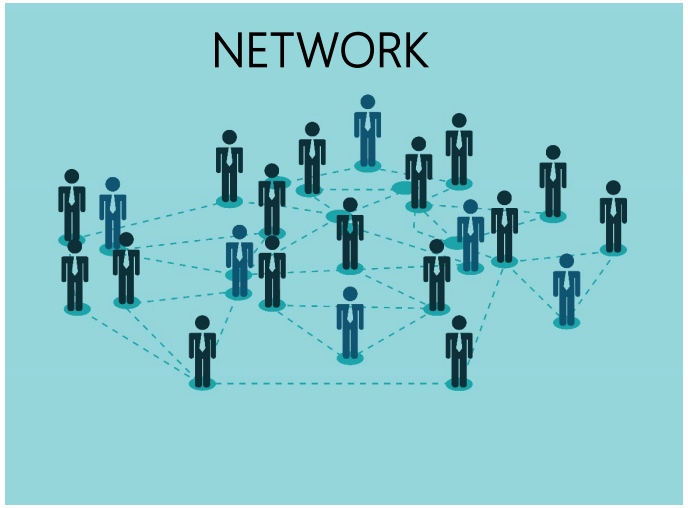
- An Iterative Dialog with CTL, the Inventors, and (hopefully many) Potential Partners

CTL PRACTICUM

- In consultation with inventors CTL will:
  - Generate marketing materials (focus on commercial value proposition)
  - Identify and contact target companies, entrepreneurs, investors
- Web postings, cold calls, email campaigns, social media
- Technology Showcase Events
- Network, network, network!
  - Seek recommendations, information, referrals
  - Alumni & Friends of Cornell with various backgrounds, expertise and industry experience
  - Cornell and Ithaca ecosystem – E@C, Rev:Ithaca, eLab, UNY iCorps, McGovern, Praxis incubators, etc.

THE INVENTOR'S ROLE

- Technology Transfer – an ongoing iterative process in consultation with the inventors
- Inventors are critical to commercial marketing success!
- Anecdotal: 80% of university licensing deals are with startups and/or begin with the researcher's existing industry relationships (CTL's hit rate higher)
- Make industry contacts at conferences and let CTL know about them
- You are not "just" a scientist at the conference; you are also "selling" your inventions



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QUESTIONS?

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@CornellTechTransfer

@Cornell_CTL

https://www.youtube.com/channel/UCIiV8Q746KpmRgy2Ret6gLw

https://ctl.cornell.edu/