

Developing & Commercializing Intellectual Property at UC Berkeley



OTL Office of Technology Licensing
UNIVERSITY OF CALIFORNIA, BERKELEY

Michael Cohen
mike.c@berkeley.edu
510-643-7201

Objectives:

- ❑ Holistic, Big Picture Perspective on IP at UCB
 - Presentation focuses on concepts
 - Document & website adds factoids (IPIRA.berkeley.edu)

- ❑ What are the IP-related responsibilities & opportunities for UCB inventors & software authors ?

- ❑ General Understanding of
 1. Disclosures (inventions & software)
 2. Patents & copyrightable software
 3. IP rights agreements
 4. Commercialization innovations developed at UCB

Agenda:

- ✓ Objectives for this University IP Seminar
- 2. How UCB Leverages IP to Catalyze Commercialization
- 3. Case Studies on How UCB IP Commercialized (the 4M's)
- 4. Overview of Licenses, Patents, Disclosures
- 5. The Berkeley Way: A Research-Oriented Approach to IP
- 6. Q & A

UC Berkeley IP Management: *Objectives*

Leverage the University's Intellectual Property (IP) rights to **Catalyze** (not just facilitate or “transfer technology”):

1) The Commercializing of UC Berkeley Innovations – quickly & broadly to:

- 1.1) Benefit the regional economy & society at large
- 1.2) Fund research & education on campus
- 1.3) Reward researchers for their ingenuity*

1) The Funding of UC Berkeley Research by –
Reconciling the IP needs of sponsors
with the IP policies of the University

* Depending on the circumstances, inventor rewards can vary and for example range from licensing income (typically 35%), to attribution and recognition, to the personal satisfaction of developing technology that has been successfully commercialized.

Partial List of >100 Start-ups with IP Rights

This is a list of the over 100 start-ups that have leveraged UC Berkeley intellectual property rights (i.e. patentable inventions and copyrightable software) since about the mid 1990s.

These start-ups have used UC Berkeley's intellectual property (IP) rights to strengthen their business plans and thereby improve their prospects for obtaining the venture capital or other funding needed to pursue the commercialization of Berkeley innovations.

Note that this list does not include the numerous start-ups that have commercialized UC Berkeley innovations but did not leverage any UC Berkeley IP rights (because the innovations don't have associated IP rights).

Acacia Biosciences	Ecoprene	Lumiphore	Receptron
Adura Technologies	Euclid Media	Luminus Devices	Redwood Biosciences
Alien Technologies	EscharaX Medical	Medifuel	Renovis
Ambrx	Excellin Life Sciences	Mendel Biotechnology	RHA Technology
Amyris Biotechnologies	Exelixis	Mercator Medical	Rubicon Digital Mapping
Arkal Medical	Filgen Biosciences	Microchip Biotechnology	Secured Streams
Aurora Biofuels	FLX Micro	Micro Climates / Aptility	SenSys Networks
Bandwidth9	Fluxion Biosciences	MicroFab Biosystems	Silicon Basis
Berkeley Bionics	Fuel FX	MicroReactor Systems	Silicon BioDevice
Berkeley Biosciences	Genocea Biosciences	Mimesyn	Silicon Clocks
Berkeley Madonna	Gold Mountain Research	Modulus Video	Silicon Genesis
Berkeley Microinstruments	Goodguide	Molecular Dynamics	Similix
BeThere	Harmonic Devices	MOR Innovations	Solexel
Biomangement Group	Covarium/Heath Interactive	NanoGripTech	Solidus Biosciences
Bioscale	HFTA	NanoNerve	SpectruMedix
BPS	iMedd	NanoRay	Stressmarq Biosciences
Calimetrics	Inktomi	NanoSys	Sunesis Pharmaceuticals
Calisolar	Integrated Diagnostics	NanoVasc	Symyx Technologies
CellASIC	IntelliOne	Neomorphic Software	Target Analytics
Ceres	International Energy	nPrint	Thuris
Chiron	InVino Sense	OmniOx	TruVideo
CNNSuperChip	Iris Micromedical	Oncobionic	Tularik
Cognitive Wearable Technologies	Isatis	ON Diagnostics	Two Blades (Foundation)
Cooler	Joule Biotechnologies	Onix Microsystems	Urban Scan
CommandCAD	Juvenon	OnWafer Technologies	Ventria Biosciences
Colusa Software	Kaiwood Technologies	Oswald Green	Videnda
Cyberpac	Kalinex	Photoswitch Biosciences	Vitapath Genetics
Davis Allergy Research	KineMed	Preference Metrics	Wireless Industrial Tech
Digital Mosaic Systems	Leucadia Technologies	Protiveris	Xenometrix
Discera	Libraria	Q-Chem	
DNA Sciences	Light Stage	Quadrant Imaging	

Top Revenue-Generating IP: *Note Variety of Tech*

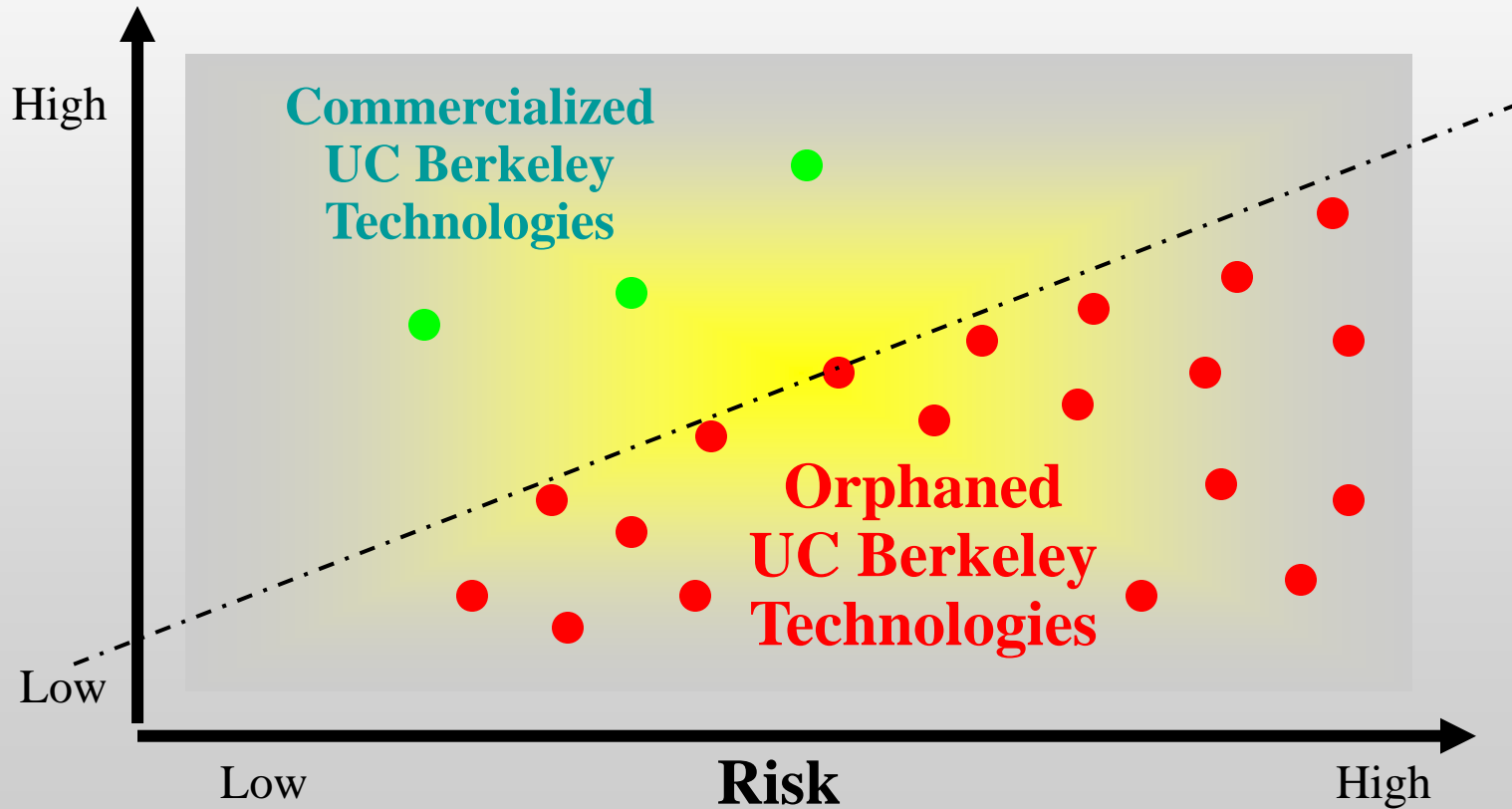
This is a list of 47 UC Berkeley patented inventions and copyrighted software that have generated the most IP licensing revenue for UC Berkeley.

This list doesn't include patentable inventions and copyrightable software developed at UC Berkeley that did not result in substantial licensing revenue but did create industries, market segments, and large companies – such as UNIX (scientific computing), SPICE (electronic design automation), and RAID (redundant disk storage).

- Transfer primers for genetic analysis
- Spacers for primers in genetic analysis
- Laser confocal fluorescence microscanner
- Capillary confocal fluorescent microscanner
- Calcium primers for genetic analysis
- Search engine software
- Network router scheduling software algo
- Method of transforming barley genotypes
- Irreversible electroporation tissue ablation
- 3D modeling software
- Hydrodynamic transport for RFID mfg
- Gene reporter matrix for drug discovery
- Separation of thin film LEDs
- Monoclonal antibody mouse
- Microfabricated fluidic reactors
- Elimination of DNA artifacts
- Dehalogenation in toxic groundwater
- Improved fluorescence energy transfer
- E.coli detection in water DNA
- Recombination in eucaryotic cells
- Blockade of regulation from CTLA-4 signals
- resonant microstructure
- BMP antagonists / morphogenic proteins
- capillary array micro electronics
- Rotary confocal scanner
- Electrophoresis devices
- Mevalonate biochemical pathway
- Double-gate transistors
- Biosensor using filter & laser
- Tall microstructures
- Scanning micromirrors
- travel probe software algo
- Rejuvenating mitochondria
- Q-chem software
- hybridomas materials
- Identifying mutagenic changes
- Organocatalysis
- Heterologous proteins
- Pavement rehab analysis
- CA4PRS software
- Dectection in large doc sets software algo
- Methods for defining cell type
- Genetic markers breast/ovarian cancer
- TLA1 gene in algae for biofuels
- Intracellular delivery vehicles
- In-situ groundwater aquifer
- Treatment to reduce edema
- Capacitorless double-gate DRAM

Commercialization: *Challenges*

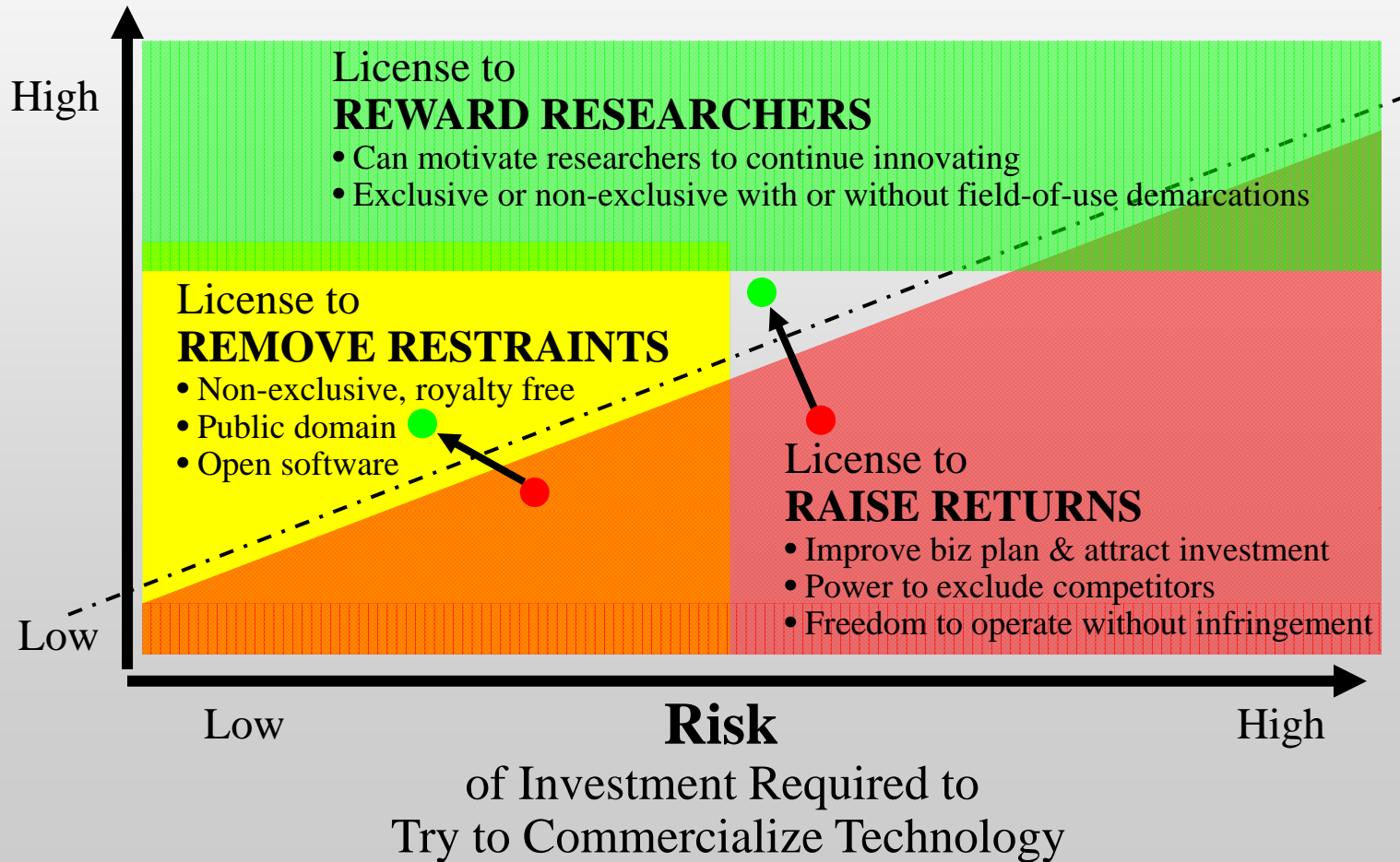
Potential **Return**
on Investment



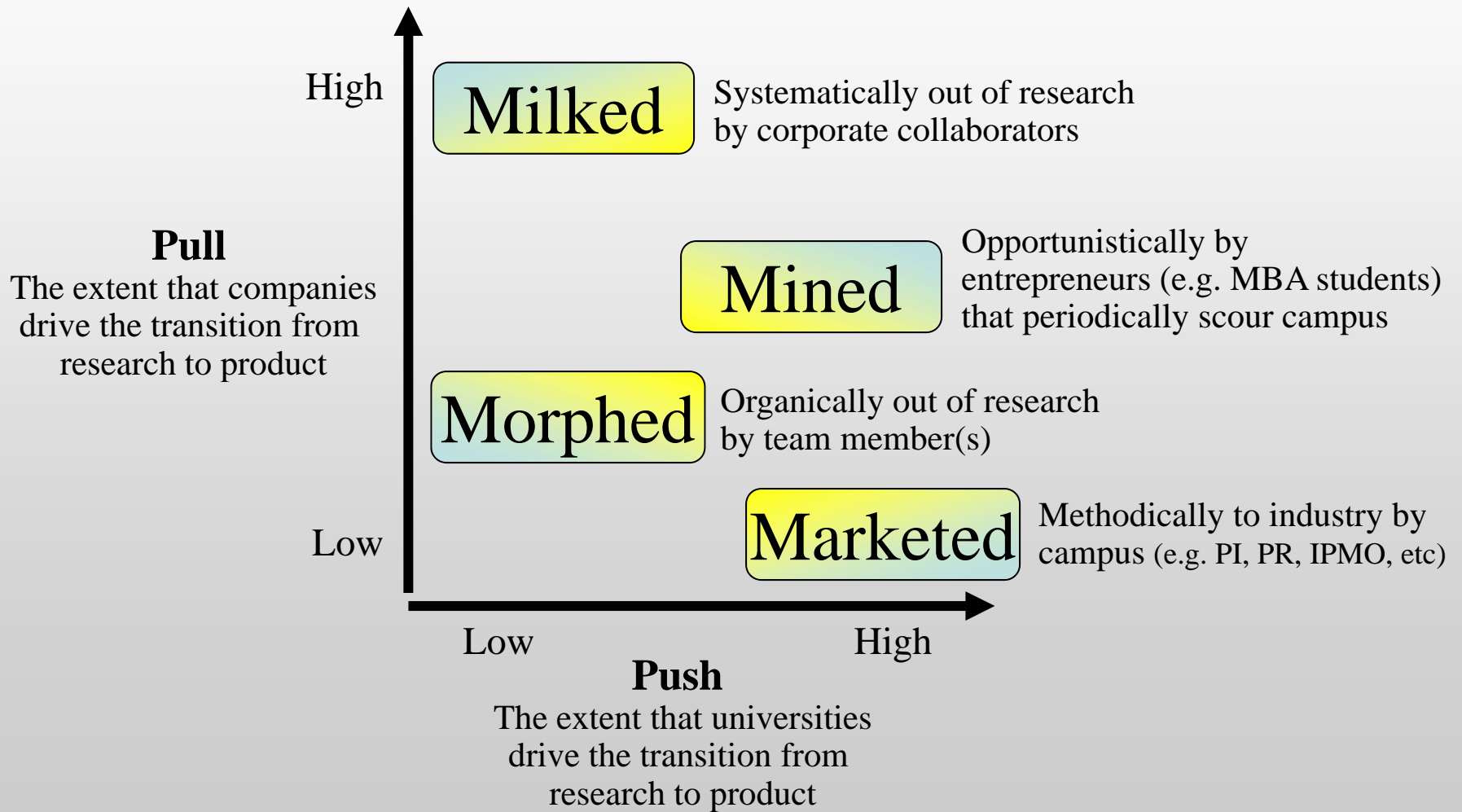
of Investment Required to
Try to Commercialize Technology

Leveraging IP: Catalyzing Commercialization

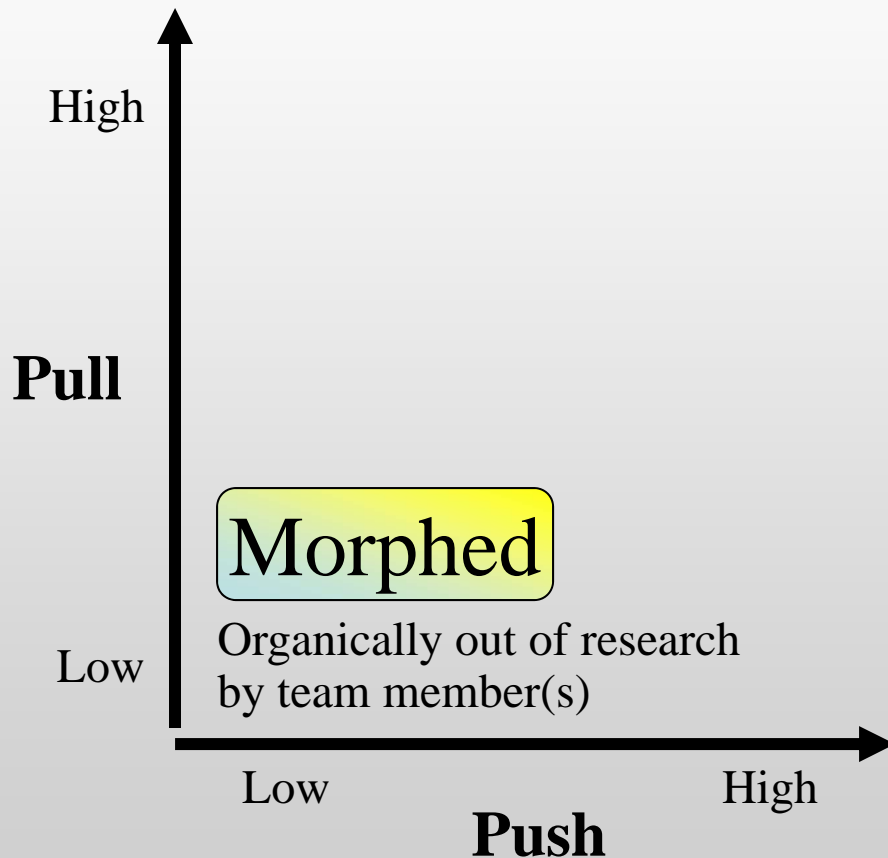
Potential **Return**
on Investment



Commercializing: 4 Pathways for Univ Tech

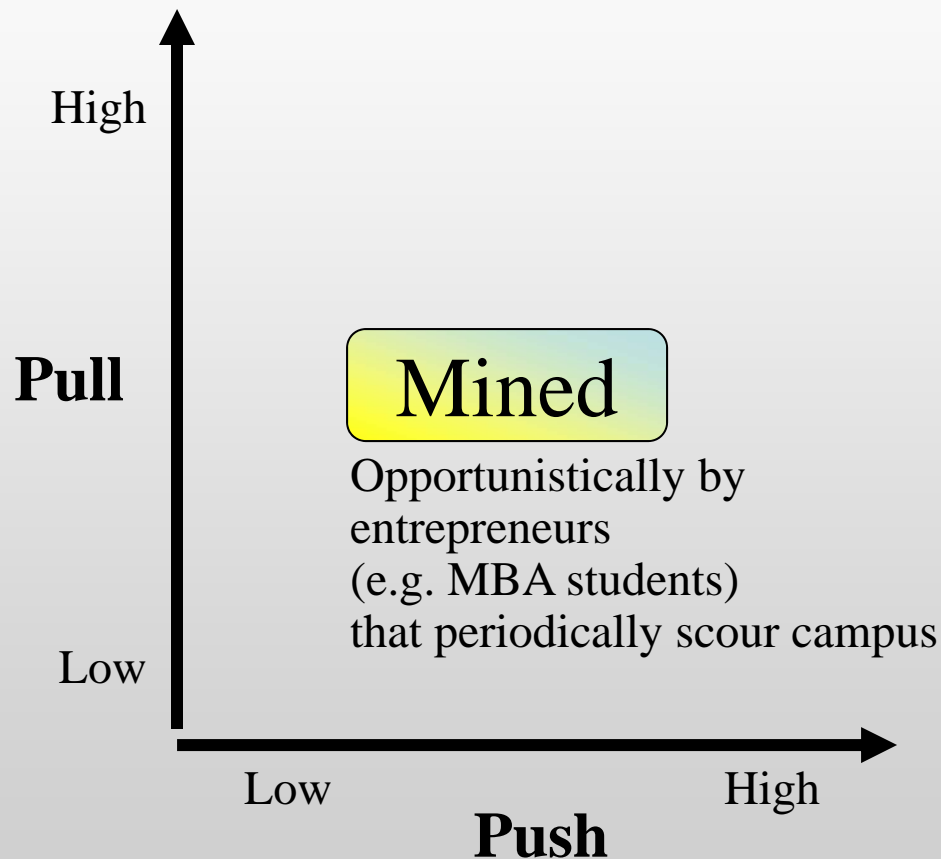


Commercialization: *Morphed*, *Mined*, *Milked*, *Marketed*



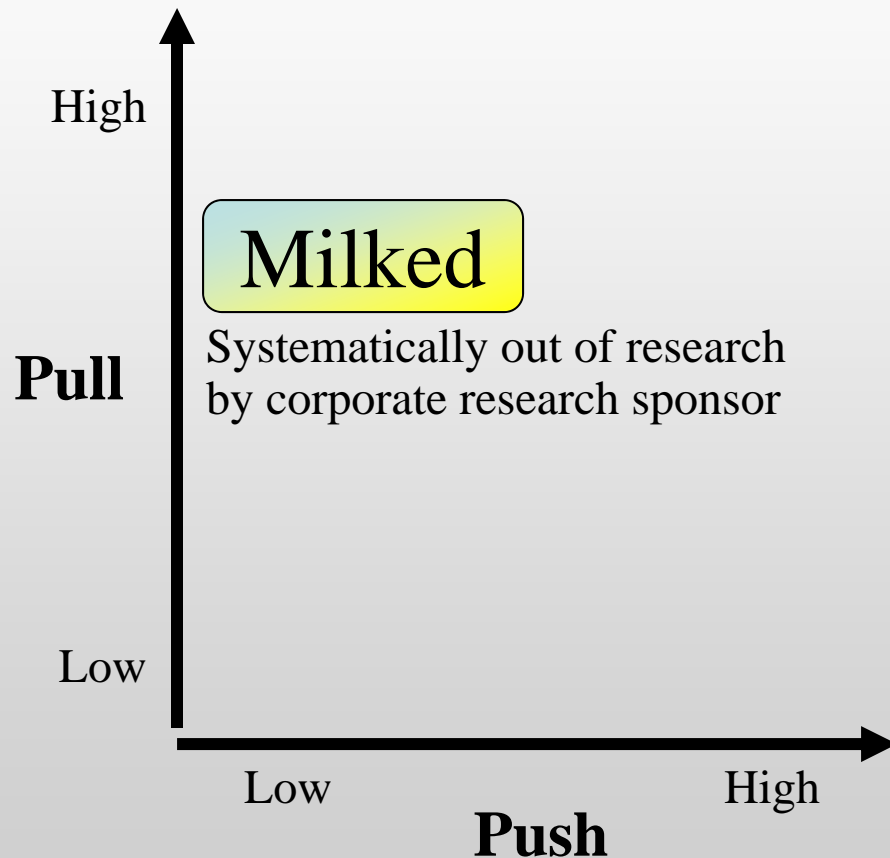
- Examples: Amyris, Calimetrics, CaliSolar, CellASIC, Chiron, Excellin, Fluxion Biosystems, GoodGuide (TaoIt), [Harmonic Devices](#), Inktomi, Integrated Diag, IntelliOne, Kalinex, Lumiphore, Mercator Med (EndoBionics), MicroClimates (Aptility), MicroFluiDX, OnWafer, ON Diagnostics, PhotoSwitch Bioscience, Redwood Bioscience, SiClocks, TheraFuse, Urban Scan, Verimetra Med, Wireless Industrial Tech, Dust Networks, Iris AO, SiTime, NanoGripTech*
- Drivers:
 - Great Research
 - Entrepreneurial culture & eco-system
- IP:
 - Some obtain exclusive license to improve biz plan & attract investors
 - Some ignore or abscond with IP

Commercialization: *Morphed, **Mined**, Milked, Marketed*



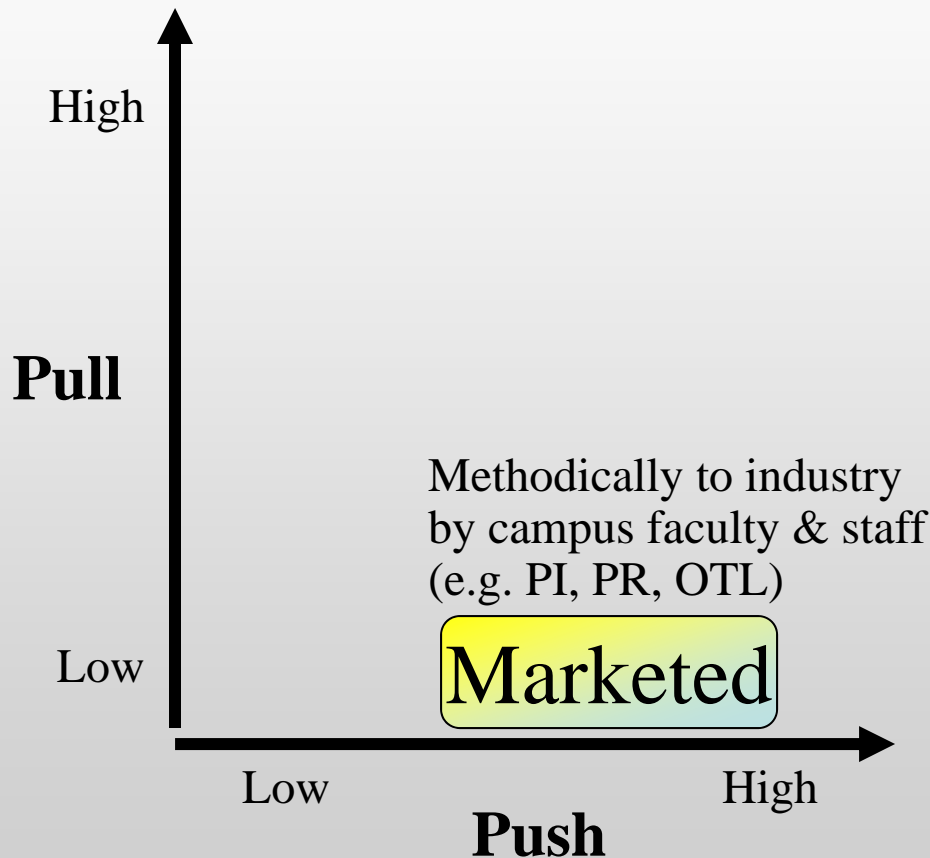
- ❑ Examples: **Acura Tech, Aurora Biofuels**, CommandCAD, Euclid Media, **MediFuel**, NanoRay, nanoPrint
- ❑ Drivers:
 - Great Research
 - MBAs, Biz plan comp, OTL mrktg
- ❑ IP:
 - Many obtain exclusive license to improve biz plan & attract investors
 - Some ignore or abscond with IP
- ❑ Comments:
 - Pathway with highest growth rate
 - MBAs are the campus's EIRs

Commercialization: *Morphed, Mined, **Milked**, Marketed*



- ❑ Examples (*that licensed IP*):
Analog Devices, **Ecoprene** (XL Tech), **Google**, Honeywell, Intel, Berkeley Bionics (first morphed then milked)
- ❑ Drivers:
 - Great sponsored research with optimized terms (i.e. 1st access, NERF, open source, etc)
 - Off-campus corporate labs (i.e. BWRC, Intel, Cadence, Yahoo, Starkey, etc)
- ❑ IP:
 - Some jointly own IP
 - Some obtain a license to legally use IP or thwart competitors
 - Some ignore or abscond with IP

Commercialization: *Morphed, Mined, Milked, Marketed*

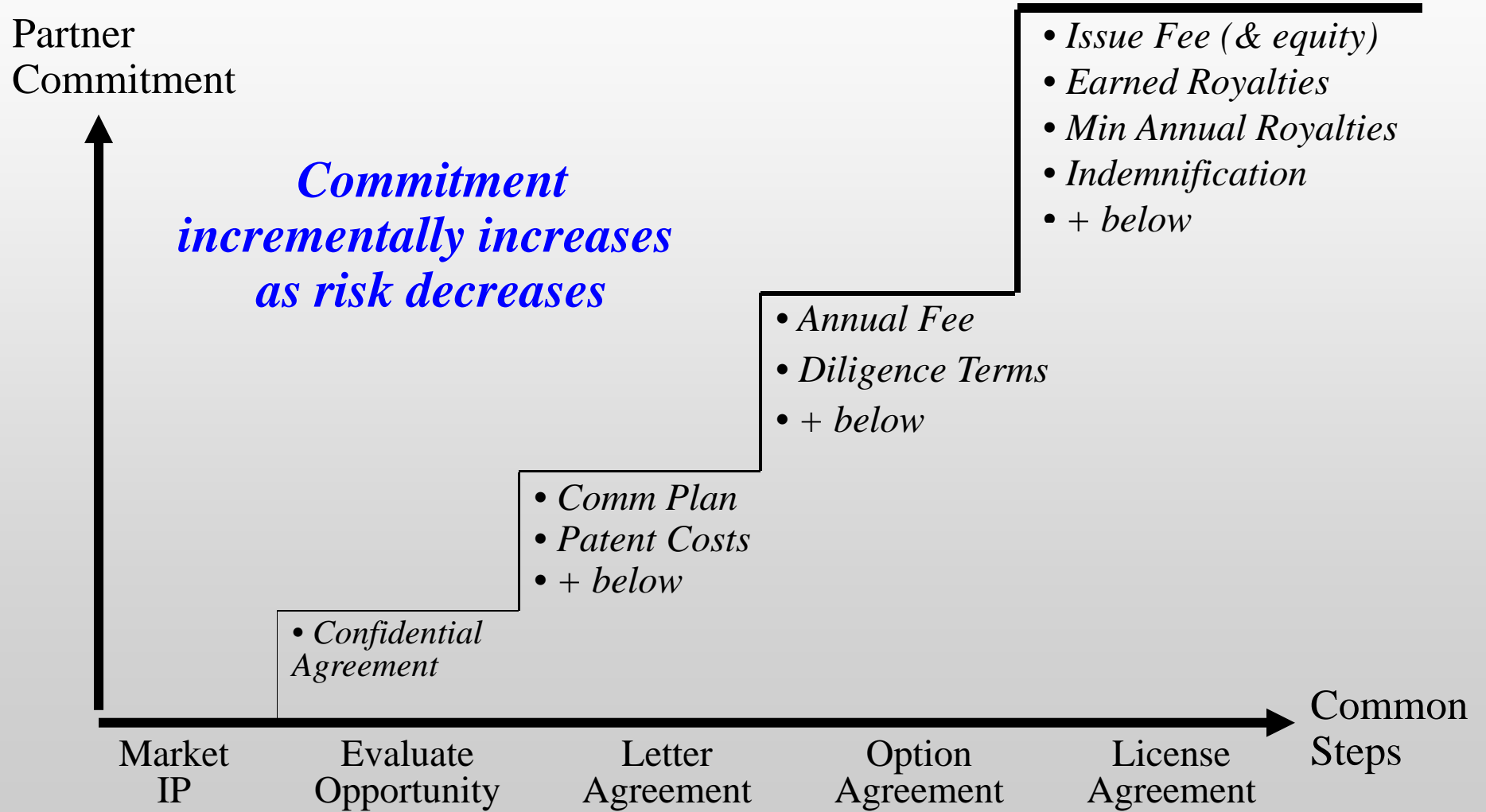


- ❑ Examples: [Arkal Medical](#), Cisco, [ClimateCooler](#), [FuelFX](#), [Luminus Devices](#), Honeywell, Microchip Biotech, Renovis, [Sand9](#), Silicon Basis, [Solexel](#), Vitesse, 3M
- ❑ Drivers:
 - Great Research
 - Marketing (i.e. IP Licensing offices, University PR programs, Faculty pubs & ppts, Patent pubs, etc)
- ❑ IP:
 - Most obtain exclusive license to stay legal, improve BP, attract investment, or thwart competitors
 - Some ignore IP or abscond with IP
- ❑ Comments: Didn't get *morphed, milked* or *mined* because tech or market too nascent when invented

License: *Overview of IP Rights Agreements*

- ❑ Purpose: Legal agreement in which licensor gives licensee the right to use the licensor's patented technology or copyrightable software (note that IP is not sold)
- ❑ Types
 - License agreement (decades) vs option agreement (years) vs letter agreement (months)
 - Patent rights vs copyrights vs data rights licenses
 - Exclusive vs Non-exclusive
 - Field-of-use demarcation, sublicensing, etc
- ❑ Terms
 - Financial: royalties, license fees, patent costs, etc
 - Legal: Warranties, indemnification, confidentiality
 - Operational: Performance milestones (require progress or the license can be terminated)
- ❑ Price (royalty rate, fees, etc)
 - Nature of IP: revolutionary vs incremental / method vs device
 - Risks to commercialize IP: time, capital, regulatory, etc
 - Economics of IP's market: pharmaceuticals, biotech, semiconductors, software, energy

Licensing: $Commitment = f(Risk)$



Patents: *Overview of IP*

- ❑ Intellectual Property (IP): Includes patents, copyrights, trademarks, trade secrets
 - Patentable invention is a new & useful process, machine, article of manufacture, or composition of matter
 - Copyrightable work protects the expression of an original work of authorship (i.e. software)
 - UC Berkeley doesn't keep trade secrets
 - Researchers own their know-how
- ❑ Purpose: A patent is a legal monopoly that gives the patent owner the right to exclude others from making, using, or selling an invention for a limited time (20y)
- ❑ Creation: Patents & copyrights granted & enforced by governmental authorities in each country (in return for full disclosure of inventions to enrich public knowledge)
- ❑ Timing: A US patent must be filed within a year after the invention has been publicly disclosed; & most international patents must be filed before the invention is publicly disclosed; a patent *filing* is not a patent; it can take 1-3+ years for a patent to *issue*; once issued the patent term is 20 years from the *filing* date
- ❑ Costs: **Utility** US filing-only can cost > \$15K, & international patent filings are even more expensive (translation charges, etc); **Provisional** US filing can cost ~\$1K
- ❑ Value: It's not difficult to get a patent, but it's challenging to get a useful patent

Patents: *Value to Companies*

Exclusive License



1. Used as **competitive barrier** & thereby **improves return on (risky) investment**
 - New feature, point-product, product-line, or multi-segment product family
 - Conducive to startup, midsize or large company
2. Used to **impress investors** & thereby **improve funding, acquisitions, valuation**
 - IP on which start-up is founded
 - IP that strengthens portfolio of emerging growth company or established company
3. Used (with know-how, etc) to implement sublicense **solution** (fab-less IC corp)
4. Used (with other IP) to **cross-license** with competitors & gain freedom-to-operate
5. Used to **discourage infringement claims** & thereby decrease company's legal costs
6. Used (with other IP) to **promote industry standard**
7. Used to prevent companies from **nefariously controlling technology's market**

Non-Exclusive License

Invention & SW Disclosures: *Responsibilities*

❑ Disclosures Required By

- Many funding agreements -- especially US Government funding
- UC Employment agreement (Patent Policy and associated Patent Acknowledgement)
- Note that UC employees own their own “know-how”

❑ Disclosure Forms Purpose (not a useless bureaucratic exercise)

- Describe specific invention to clarify novelty & value (i.e. patentability)
- List funding source(s) to check for encumbrances & obligations related to patent rights
- List public enabling disclosure(s) to determine patent deadlines (bar dates)
- List inventorship to determine ownership, distribution of proceeds, patenting help, etc

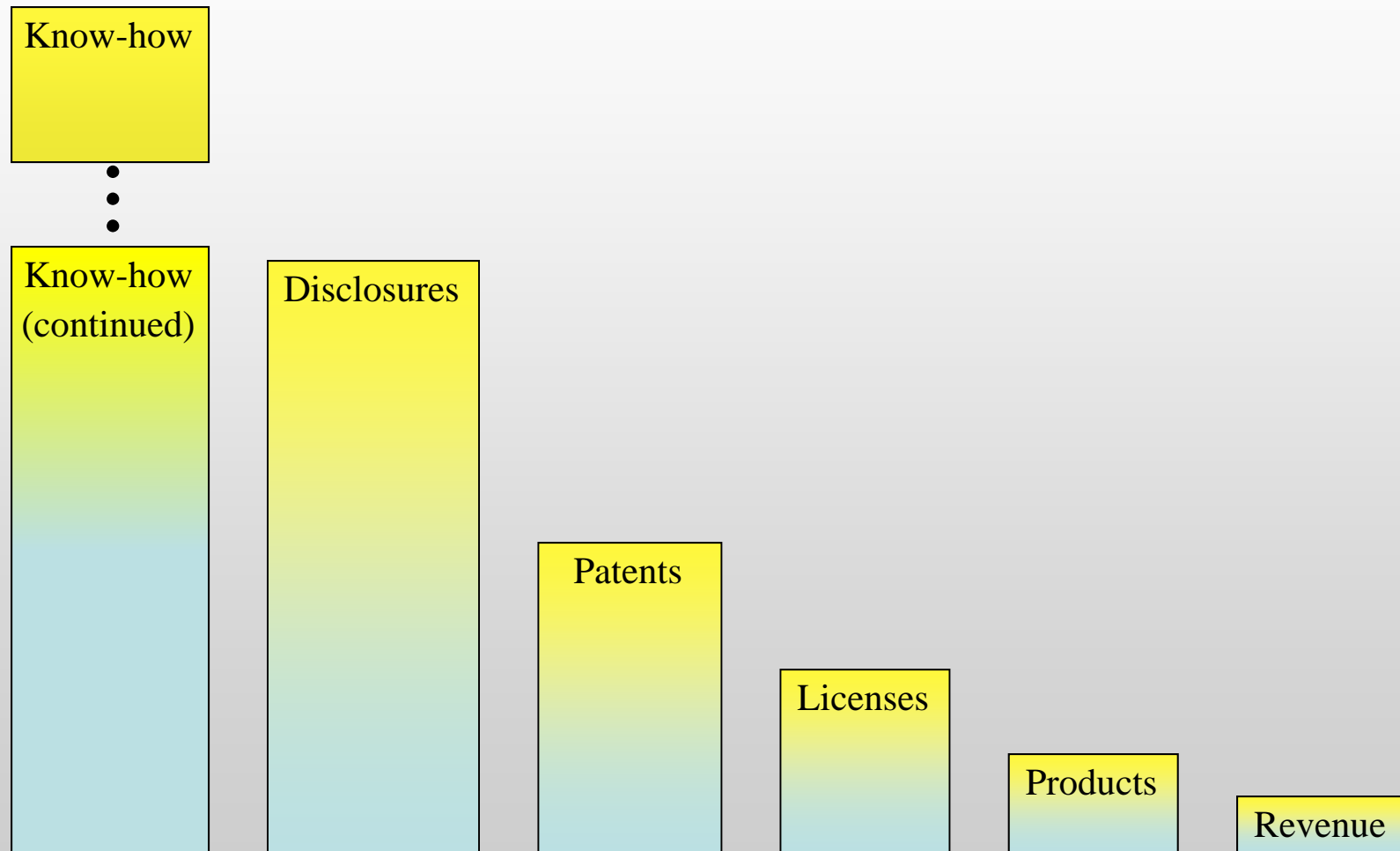
❑ Inventorship on Disclosure Form

- If contributed to 1 claim, then co-inventor on patent (this is law not UC policy)
- Can change from disclosure to patent depending in claims in actual patent issued
- If co-inventor from another university or company, then IP jointly owned
 - Each owner has rights to the entire patent rights
 - Often joint owners establish an agreement on how to collaboratively manage IP

Invention & SW Disclosures: *Opportunities*

- ❑ UCB inventors (hired after 1997)
 - Get 35% of licensing proceeds (after costs)
 - Proceeds split evenly among co-inventors unless another split is agreed to in writing
- ❑ UCB researchers that spin-out companies can license patent rights
 - Inventors have the most know-how to commercialize inventions
 - Therefore inventor start-ups are best candidates to meet objectives of exclusive license
- ❑ Ownership of IP
 - Invention disclosure doesn't automatically give title to UC
 - UC owns if (a) use UC resources, (b) fund via UC, or (c) scope of employment with UC
 - Inventors can request UC DISCLAIM or WAIVE ownership of invention
 - If in doubt about ownership, then it's better to disclose invention to UCB OTL
- ❑ If UCB doesn't want to pursue patent for an invention, then
 - Funding agency can pursue the patent
 - If funding agency doesn't want to pursue patent, then inventors can pursue patent

Invention Disclosures: *Statistics* (not to scale)



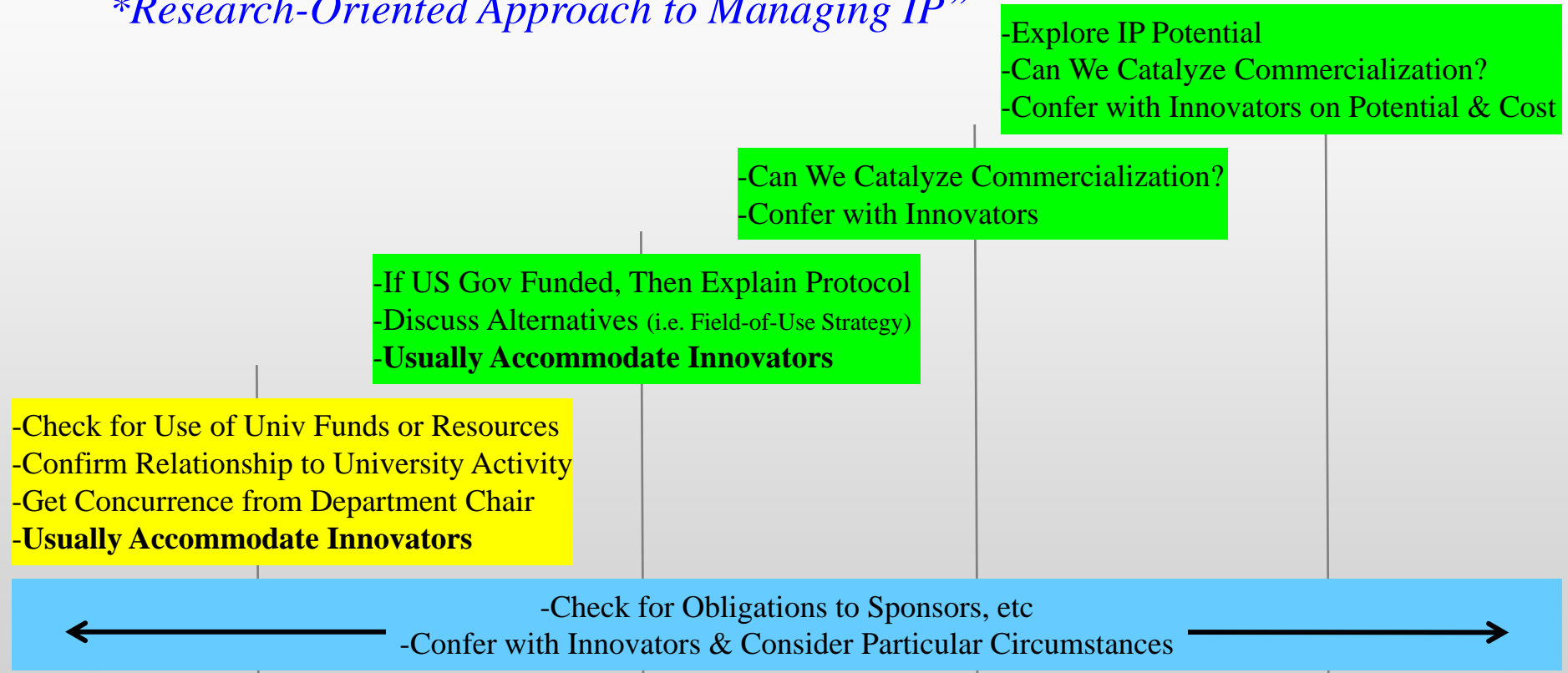
UC Berkeley IP Management: *Approach**

**Research-Oriented Approach to Managing IP*

IP Activity	Licensor-Oriented Mindset	Researcher-Oriented Mindset	Comments
<i>Establishing IP terms of sponsored research agreements</i>	Control IP terms especially with regard to maximizing potential licensing revenue	Partner with PI by prioritizing the goal of getting the research sponsored (not getting license revenue)	<ul style="list-style-type: none"> • If the PI rejects sponsor's IP proposal, then sponsor can't criticize IP office as unreasonable • Use informed consent agreements with research team regarding any IP limitations
<i>Disclosing innovations developed by researchers</i>	Police (and possibly audit) researchers to enforce their disclosure of innovations	Advise researchers about the IP terms of their university employment & research agreements	<ul style="list-style-type: none"> • Absconding with IP is very different from putting IP in the public domain • Manage inappropriate use of IP via research & faculty chain of management as well as conflict of interest committee
<i>Developing IP strategy for disclosed innovations</i>	Treat innovators as disinterested or conflicted & consequently exclude them from formulating IP strategy	Assume innovators have insights or preferences & therefore confer with them in formulating IP strategy	<ul style="list-style-type: none"> • When company knows that innovators want their IP licensed, then company can't criticize IP office for licensing • Including in formulation of IP strategy is very different from including in negotiation of terms

UC Berkeley IP Management: *Approach**

Research-Oriented Approach to Managing IP



Wants Univ to Waive or Disclaim Ownership of IP

Wants IP to be Open & Gratis, or in Public Domain

Indifferent or Uncertain About What to Do with IP

Wants Univ to Explore IP License Potential

Continuum of Inventor's / Author's Perspective on IP

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- ✓ The Berkeley Way: A Research-Oriented Approach to IP
- ✓ How University Innovations Commercialized (the 4M's)
- ✓ How UCB Leverages IP to Catalyze Commercialization
- ✓ Overview of Licenses, Patents, Disclosures
- 5. Q & A
 - IPIRA.berkeley.edu
 - BerkeleyStartupCluster.net