

Offices of the President and Secretary to the Regents

TO MEMBERS OF THE SPECIAL COMMITTEE ON INNOVATION TRANSFER AND ENTREPRENEURSHIP:

ACTION ITEM

For the meeting of August 28, 2023

A CONCEPTUAL FRAMEWORK FOR DEFINING AND MEASURING THE VALUE OF UC'S INNOVATION AND ENTREPRENEURSHIP ENTERPRISE

EXECUTIVE SUMMARY

This item proposes a conceptual framework to effectuate Recommendation 13 of the May 2021 report of the Regents Working Group on Innovation Transfer and Entrepreneurship, which urges the University to expand how it defines, values, and measures success by going beyond counting transactional activities to also assessing the following:

ECONOMIC IMPACT – Are UC's licensed intellectual property, corporate-sponsored research, and startup companies leading to state and regional economic growth and development, including job creation, increased tax revenues, and new industry formation?

PUBLIC IMPACT – Is UC successfully translating laboratory-based research into the solutions the public seeks? From curing or preventing disease to growing food in more efficient ways to reversing human-caused climate change, UC must continue to strive to be a powerful engine for innovation, change, and societal good.

DIVERSITY, EQUITY, AND INCLUSION OUTCOMES – Is UC assessing the extent to which women, people of color, and other groups which have been historically marginalized in use-based researchⁱ, startup company formation, and other commercialization activities are included in UC's innovation ecosystem, reflecting the diversity of the University community and the people it serves?

This framework aspires to convey the value, breadth, and muscularity of UC innovation and entrepreneurship (I&E) by presenting a richer, more variegated, and multi-dimensional picture of the enterprise. The proposal aims to achieve the following:

- Inspire the UC community of students, faculty, and researchers to solve the world's most pressing challenges through use-inspired research, civically responsible entrepreneurship, and the translation of academic-based research into real-world solutions having societal benefit;

- Win broader support from outside sources of funding – ranging from federal and State legislatures to private industry and philanthropic entities – to invest in UC innovation transfer by presenting a compelling value proposition; and
- Promote a culture of innovation and growth that stokes the desire not just to improve the efficacy of UC’s business practices, but to promote responsible risk-taking and healthy competition, both internally and with other benchmark universities.

RECOMMENDATION

The Chair of the Special Committee on Innovation Transfer and Entrepreneurship recommends that the Special Committee endorse the new framework and recommend its approval by the Regents.

- A. There will be an annual performance and impact review focused on the following four elements: measures of key transactional activities; storytelling; innovation spotlight; and diversity, equity, and inclusion demographic data and outcomes.
- B. Every five years, the University will commission an economic analysis measuring some or all of the following types of economic impacts resulting from UC innovation transfer and entrepreneurship: job creation; tax revenues; regional economic development in the communities surrounding each UC campus; philanthropic giving to UC spurred by innovation and entrepreneurship activity; and faculty, postdoctoral fellow, and student recruitment and retention.

BACKGROUND

How Performance Is Currently Measured by the UC Office of the President

UC Technology Commercialization Report

The UC Office of the President (UCOP) publishes an annual report summarizing its commercialization activity. The report is exclusively comprised of measurements of transactional activity, including the following:

- invention disclosures
- U.S. patent applications filed
- patents issued
- licenses issued
- total active inventions
- total active patents
- total active licenses
- startup companies formed
- royalty, fees, and other income generated
- top earning inventions systemwide

The most recent report, covering 2020 activity, can be found [here](#).

UCOP currently collects 58 data points measuring innovation transfer and entrepreneurship activity from its campuses and laboratories. They are overwhelming, comprised of measurements of transactional activity and are used for internal management purposes, as well as to meet reporting requirements to external clients and oversight agencies. The 58 data points are:

Inventions Disclosures	Licenses with Large companies	Other Royalty & Fee Income
US Patent Applications	Licenses/options receiving income	Payments to Joint Holders
US Patents Issued	Licenses/options receiving running/earned royalties	Legal and Other Direct Expenses
Total Active US Patents	Licenses/options receiving >\$1M	Legal Expense Reimbursements
First Foreign Patent Applications	Agreements Executed Including Equity	Top-Earning Inventions
Foreign Patents Issued	Disclosures citing Federal Grants	Total Research Expenditures
Total Active Foreign Patents	Disclosures Returned to Inventors	Federal Research Expenditures
Options Issued	SBIR/STTR Companies Formed	Industrial Research Expenditures
Exclusive Utility Licenses Issued	Licensed Technologies Available	Clinical Trial Expenditures
Utility Licenses Issued	U.S. Plant Certificates Filed	External Legal Fees Patents & Copyrights
Plant Licenses Issued	Plant Patents/Certificates Issued	External Legal Fees Patents & Copyrights for Startup
Non-Exclusive Utility Licenses Issued	Tech Transfer Licensing FTEs	Legal Expenses Patent Prosecution Total
Tech Transfer Startups Formed	Tech Transfer Other FTEs	Legal Expenses Litigation
Tech Transfer startups in home state	Total Inventions Obligated under Issued Licenses/Options	Legal Expenses Defense
Non-operational Tech Transfer startups	Disclosures with woman inventor	Legal Settlements
Operational Tech Transfer startups	Applications with woman inventor	PCT application filings
Tech Transfer Startups with Equity	Royalty & Fee Income	EPO application filings
Licenses with Tech Transfer startups	Extraordinary Income	EPO application National Phase
First Available Products (PTS First Sales)	Running/Earned Royalties	
Licenses with Small Businesses	Equity Income	

Framework for a New Approach to Measuring the Value of UC Innovation and Entrepreneurship

The University of California is a research powerhouse and one of the world's most prolific cradles of ingenuity. It controls over 11,000 active patents globally and on average, creates five new inventions per day. In 2020, despite pandemic-caused shutdowns and operational disruptions, UC researchers produced 1,706 new inventions and filed 2,026 U.S. patent applications.

For more than a decade, UC annually has ranked as the number one university worldwide in the number of U.S. utility patents earned, far outpacing its peer institutions. In 2021, UC received 589 patents, exceeding that of the #2 and #3 universities, combined. The Massachusetts Institute of Technology ranked second, with 335 patents, and the University of Texas system ranked third with 203 patents.

While these accomplishments would be cause for celebration at most other institutions, UC seeks to be not only the best public research university, but also the nation's top public impact

university. From curing chronic disease to alleviating hunger to reversing human-caused climate change, its innovation and entrepreneurship enterprise is primed to become a more powerful change agent for societal good.

If organizations should measure what they value, then UC must capture and report on a more expansive, multi-dimensional set of measurements, benefits, and outcomes than the number of invention disclosures, patents, and startups. While transactional activity metrics are important indicators of productivity, their effectiveness in conveying the true value and impact of UC’s innovation transfer & entrepreneurship enterprise can be amplified by contextualizing them through the lenses of (a) how they uplift the human condition, (a) how they stimulate economic growth, and (c) how they democratize participation.

After nearly eight months of focus groups, surveys, and extensive fact finding with all ten campuses and three National Laboratories, as well as with more than a dozen of the nation’s leading technology transfer universities¹ a proposed new framework for measuring I&E impact has emerged.

The following chart provides a high-level outline of that framework. It is split into elements to be conducted annually and those to be completed every five years.

ANNUAL	PERIODIC
<p>This set of performance metrics will occur annually and be comprised of the following four elements:</p> <ol style="list-style-type: none"> 1. measures of key transactional activities 2. storytelling 3. innovation spotlight 4. diversity, equity, and inclusion demographic data and outcomes² 	<p>Every five years, the University will commission an economic analysis measuring some or all of the following types of economic impacts resulting from UC innovation transfer and entrepreneurship:</p> <ul style="list-style-type: none"> • job creation • tax revenues • regional economic development in the communities surrounding each UC campus • philanthropic giving to UC spurred by I&E activity • faculty, post-doctoral fellow, and student recruitment and retention

¹ These leading innovation transfer universities were used for benchmarking purposes: Columbia University, Georgia Institute of Technology, University of Illinois at Urbana-Champaign, Massachusetts Institute of Technology, University of Maryland system, University of Michigan, University of North Carolina system, University of North Carolina at Chapel Hill, University of Ohio at Columbus, Stanford University, University of Texas system, Utah System of Higher Education, University of Wisconsin at Madison, and Yale University.

² The frequency in which this data is collected, analyzed, and reported is subject to change and will be informed by the findings and recommendations resulting from the Inclusive Innovation Equitable Entrepreneurship Project (I2E2) project.

A discussion of each element follows in greater detail below.

Annual Metrics

Transactional Metrics

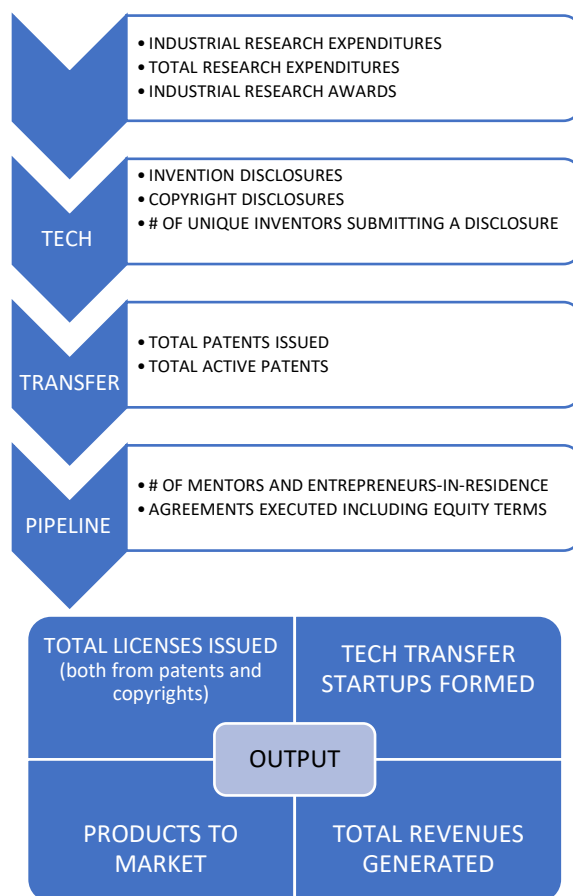
Over the past three months, focus groups and one-on-one interviews were conducted with senior technology transfer leaders at each of UC's ten campuses. According to nearly all participants, 15 transactional activities take place during the disclosure-to-commercialization lifecycle that are considered to be barometers of vitality and future success. Chief among them are total licenses issued (from both patents and copyrights³), number of products brought to market, number of startups formed, and total revenues generated. Because the end-game of technology transfer is to make products and services for the benefit of the public, these constitute four of the most tangible outputs of a successful effort to transfer University intellectual property (IP) to private industry for product development and ultimately market placement for the public interest.

Without a healthy technology transfer pipeline these desired outputs can be elusive. A healthy pipeline is successful at outreach to UC inventors; assessing incoming IP for its credibility, uniqueness, and potential for successful development; the translation of that IP; and finding licensing opportunities. A key question is how to measure the health of a pipeline that begins with invention disclosure and culminates in the four outputs noted above. Focus group participants agreed that the following ten key milestones in the pipeline should be measured: industrial research expenditures, total research expenditures, industrial research awards, invention disclosures, copyright disclosures, number of unique inventors submitting a disclosure, total patents issued, total active patents, number of mentors / entrepreneurs-in-residence, and agreements executed including equity.

For instance, there is often a correlation between the amount of research expenditures made by a campus and the number of patents and start-ups generated. Likewise, the absence of patenting activity can often be traced to the lack of disclosures.

Importantly, campus technology transfer leaders believe that these data points can appeal to external parties from whom the University seeks support. That is, these metrics are needed to demonstrate and validate the efficacy of UC's I&E ecosystem.

³ During focus groups and one-on-one discussions with UC's campus innovation transfer leaders, there was a strong push to include metrics capturing copyrighted intellectual property (IP). Under current UC practice, the annual commercialization report only covers patentable IP. It generally excludes copyrighted IP. As Carol Mimura (UC Berkeley's Assistant Vice Chancellor for Intellectual Property and Industry Research Alliances) opined, "UC's decision to *not* count copyright licenses sends the message that copyrighted IP is not valued. In California, ICT (information, communication, and technology) is enormous and is a major driver of the state's economy." Others agreed that excluding copyrighted IP marginalizes a large body of UC research output, in particular in the arts and humanities, as well as other non-STEM fields.



The table below explores these 15 transactional activity metrics in greater detail.

METRIC	DEFINITION	PRESENTLY COLLECTED BY UCOP? (Frequency)	SIGNIFICANCE TO THE SUCCESS OF UC INNOVATION TRANSFER AND ENTREPRENEURSHIP
Technology Transfer Startups Formed	<p>Startups are counted in the metrics for the annual report that meet this basic definition:</p> <ul style="list-style-type: none"> “A legally organized/incorporated company that acquired rights to a UC technology under a license, option, or letter of intent during FY of report, and that this agreement was essential to the startup’s formation. The startup was founded to develop products and services based on UC technology. The startup must operate independently of any pre-existing company when it is 	Yes (annual)	<p>UC’s technology transfer offices (TTOs) license IP rights to companies of all sizes, from publicly traded multinational corporations to one-person startup companies. Many startups are founded by UC’s own faculty, postdoctoral fellows, and student inventors who wish to develop their IP into commercial applications.</p> <p>Startup counts are one of the most tangible manifestations of successful technology translation. It means that a company has been created to license IP rights and to pursue their commercialization.</p>

	<p>formed. A subsidiary or spinoff does not count as a startup if its operations are integrated into the operations of a pre-existing company.</p> <ul style="list-style-type: none"> • A startup company is not counted for the reported fiscal year if it acquired rights to a UC technology in a prior fiscal year.” <p>Source: Research & Innovation (R&I), UCOP</p>		<p>Startup numbers also reflect the level of support provided by UC to entrepreneurs and startup companies, including</p> <ul style="list-style-type: none"> - curricula (academic programs) - new product research and development (R&D) support - legal, funding, and back-office assistance - office space and research facilities (e.g., wet labs) - product/market fit programs (including customer discovery) - help with recruitment of mentors, CEOs, and other critical staff. <p>In other words, startup numbers reflect the strength of a campus’s innovation ecosystem.</p> <p>They can also contribute directly to the local economy through the creation of high-paying jobs, increasing the tax base, and attracting investment capital to the region.</p>
First Available Product	<p>A licensee reports a first commercial sale tied to UC-licensed IP.</p> <p>Source: R&I, UCOP</p>	Yes (ad hoc)	Indicates the successful commercialization of a product or service based on UC IP rights.
Total Revenues Generated	<p>Income earned from fees, annual minimums, running (earned) royalties (above minimum), milestone payments, and equity cash-outs.</p> <p>Source: R&I, UCOP</p>	Yes (annual)	This is one of the most tangible manifestations of a successful translation. It means UC IP has successfully been translated into a commercial application that is generating sales revenues and therefore, royalty income for UC. It can also mean the company which has successfully commercialized UC IP has reached a level of success (e.g., initial public offering, merger and acquisition) that UC has an opportunity to cash out some or all of its equity holdings.
Total Licenses Issued	<p>“A license agreement formalizes the transfer of technology between two parties, where the owner of the technology (licensor) permits the other party (licensee) to share the rights to use the technology.”</p> <p>Source: Association of University Technology Managers (AUTM)</p> <p>+</p> <p>“The number of utility and plant licenses (including bailment licenses and hybrid utility/copyright licenses) executed during the fiscal year involving</p>	Yes (annual)	This is the one of the most tangible outputs of the technology transfer process. It reflects the successful transfer of technology to a company which will invest in its commercialization.

	at least one disclosed technology. May be exclusive or non-exclusive.” Source: R&I, UCOP		
Copyright Licenses Issued	A license agreement formalizes the transfer of copyrighted materials between two parties, where the owner of the material permits the other party (licensee) to share the rights to use the copyrighted material.	No	See “total licenses issued.” This new metric covers licenses issued for the use of copyrighted materials (e.g., software). UC’s decision to <i>not</i> count copyright licenses sends the message that copyrighted IP (primarily software at UC) is not valued. In California, ICT (information, communication, and technology) is enormous and is a major driver of the state’s economy.
Invention Disclosures	The number of new disclosures received by a UC technology transfer office (excluding cases transferred from another UC technology transfer office) during the fiscal year, where the UC Patent Policy ⁴ governs the disclosed technology (including any technology that gives rise to a plant variety certificate or to a tangible research property and excluding copyright-only or trademark-only disclosures). Source: R&I, UCOP	Yes (annual)	This is the initial step in the innovation transfer process. The technology transfer office then culls through these to determine which ones may be licensable and to invest funds to file patent applications as appropriate. It also indicates participation rates of faculty, staff, post-doctoral fellows, and student inventors. This metric also indicates which departments and academic fields are active in campus technology transfer.
Copyright Disclosures	Copyrighted intellectual property – which falls outside of the UC Patent Policy – received by a UC technology transfer office. Source: R&I, UCOP	No – New Metric	While a patent protects “technical inventions, such as chemical compositions, like pharmaceutical drugs, mechanical processes like complex machinery, or machine designs that are new, unique, and usable in some type of industry,” a copyright protects “artistic, literary, or intellectually created works, such as novels, music, movies, software code, photographs, and paintings that are original and exist in a tangible medium, such as paper, canvas, film, or digital format.” ⁵ Under current UC practice, “invention disclosures” only cover IP that is potentially patentable. It excludes works – generally outside of the STEM disciplines – that receive federal protection from unauthorized copying or exploitation through registration with the U.S. Copyright Office at the Library of Congress.

⁴ Note that substantive amendments to UC’s patent policy have been introduced and are currently under systemwide review. These amendments include revisions to the categories of intellectual property that will be covered by the policy.

⁵ United States Patent and Trademark Office: www.uspto.gov/trademarks/basics/trademark-patent-copyright

<p>Number of unique inventors submitting a disclosure</p>	<p>From the total number of disclosures submitted, a count of unique names (i.e., inventors). Source: R&I, UCOP</p>	<p>No – New Metric</p>	<p>While “invention disclosures” and “copyright disclosures” measure the number of IP submissions made to a campus TTO to determine their commercial viability, this proposed new metric would count the number of unique individuals who submit those disclosures. A healthy innovation and entrepreneurship ecosystem would have participation from a broad and diverse swath of the university community, rather than from a small number of repeat inventors.</p>
<p>Total Patents Issued</p>	<p>The number of U.S. and foreign patents for disclosed technologies issued during the fiscal year. Source: R&I, UCOP</p>	<p>Yes (annual)</p>	<p>Whether a new discovery can receive a patent is an early indicator of its commercial viability. To be eligible for a patent, the invention must meet the following four criteria:</p> <ol style="list-style-type: none"> 1. Able to be used (the invention must work and cannot just be a theory); 2. A clear description of how to make and use the invention; 3. New or novel (something not done before); 4. “Not obvious,” as related to a change to something already invented.⁶ <p>This is a common measure of the latent potential underlying a campus’s innovation portfolio.</p>
<p>Total Active Patents</p>	<p>The number of issued U.S. and foreign patents for disclosed technologies where the patent is active (i.e., the patent has been granted, maintained, and its owner has exclusive rights to use and enforce it) at fiscal year-end. Source: R&I, UCOP</p>	<p>Yes (annual)</p>	<p>Indicates the robustness and size of UC’s patent portfolio. Often reflects licensee interest in UC’s intellectual property.</p>
<p>Industrial Research Expenditures</p>	<p>“Research expenditures [i.e., moneys spent] from industrial sources include expenditures made by the institution in support of its research activities that are funded by for-profit corporations, but not expenditures supported by other sources such as foundations and other nonprofit organizations.” [emphasis added] Source: AUTM</p>	<p>Yes (annual)</p>	<p>These two metrics reflect industry engagement with the University. They also demonstrate the applicability of research at UC to real-world problems. Companies sponsor research projects at UC when they identify discoveries that just need an additional influx of capital to advance them to the applied/translational research stage.</p>
<p>Industrial Research Awards</p>	<p>“Moneys received [i.e., moneys granted] from industrial sources include awards made by the institution in support of its research activities that are funded by for-profit corporations, but not</p>	<p>Yes (ad hoc)</p>	<p>Sponsored research can also support critical experiments that indicate which types of</p>

⁶ United States Patent and Trademark Office: www.uspto.gov/patents/basics/essentials#questions

	<p>awards supported by other sources such as foundations and other nonprofit organizations.” [emphasis added]</p> <p>Source: AUTM</p>		<p>products might arise from an invention or a prototype or shed light on a possible go-to-market strategy.</p> <p>These metrics also reflect the ability of UC to market its research capabilities to private sector companies to help them meet their corporate R&D needs.</p> <p>Importantly, corporate-sponsored research often leads to more patenting and licensing activity.</p>
<p>Agreements Executed Including Equity Terms</p>	<p>“The number of LICENSES that were executed in the year surveyed that included EQUITY, where EQUITY is defined as an institution acquiring an ownership interest in a company.”</p> <p>Source: AUTM</p>	<p>Yes (ad hoc)</p>	<p>This reflects growing interest among UC campuses – as well as leading innovation transfer universities around the country – to negotiate not just for fair market royalty terms in licensing agreements, but for equity shares and options.</p> <p>It also reflects the willingness of UC to share the risks and rewards associated with product development and commercialization. Should the startup company succeed, the possible upside potential of an equity cash-out could be significant.</p>
<p>Number of mentors and entrepreneurs-in-residence</p>	<p>“An entrepreneur-in-residence (EIR) is an experienced entrepreneur or business executive brought into a startup to provide strategic guidance and support in the development of a new product, service, or business model. . .”</p> <p>“An EIR’s specific responsibilities vary depending on the startup and its engagement goals. They may be involved in evaluating new business opportunities, conducting market research, assisting with fundraising efforts, advising on product development and marketing strategies, or even leading specific projects.”</p> <p>Like EIRs, mentors are also veteran entrepreneurs and business executives who can provide support, guidance, and even inspiration. They differ from EIRs in that (a) they can be paired with not only startups but also with inventors who wish to license their discoveries rather than pursue a spin-off company; and/or (b) the role can be less formal and is often unpaid.</p> <p>Source: LTSE Equity: equity.ltse.com/resources/what-is-an-entrepreneur-in-residence-eir</p>	<p>No – New Metric</p>	<p>This metric can be an indicator of community involvement in the entrepreneurial ecosystem. It can reflect:</p> <ul style="list-style-type: none"> • engagement by alumni, funders, and the business community; • visibility of campus I&E programs and the efficacy of the campus’s marketing communications; and • the value of campus brands and the brands of campus I&E programs, especially those of campus incubator and accelerator programs. <p>Source: Carol Mimura, Paul Roben, Josh Green, and Kathy Ku</p>
<p>Total Research Expenditures</p>	<p>“TOTAL RESEARCH EXPENDITURES include expenditures made by the institution in support of its research activities that are funded by all sources including the</p>	<p>Yes (annual)</p>	<p>A university (or campus’s) innovation and entrepreneurship enterprise is driven by and reflects its research portfolio. The more input (i.e., research spending), the stronger</p>

	<p>federal government, local government, industry, foundations, and other nonprofit organizations. Indirect costs should be included.”</p> <p>Source: AUTM</p>	<p>the likelihood there will be more output (e.g., patents, licenses, startups, and products to market).</p> <p>Because UC’s ten campuses are uneven in staffing, budgetary resources, and programmatic infrastructure and sophistication, this can be used as a potential “normalizer” to attempt to rebalance or level the playing field between different campuses in order to perform appropriate comparisons.</p> <p>As a normalizer, “research expenditures” can be applied to each of the prior 14 metrics to generate ratios (e.g., number of disclosures divided by the amount of research expenditures) that provide a more evaluative form of measurement than absolute counts can provide, alone. Provost Newman best articulates the value of this approach: “It’s this ratio that tell you whether the institution is truly making the most of its investments and whether it is genuinely improving over time in terms of productivity.”</p>
--	--	---

The Patent Tracking System (PTS) modernization project will focus on business process redesign and workflow reengineering in the coming weeks and months. Similarly, the Office of Research Policy Analysis and Coordination is leading a retooling of many of the core policies that govern UC’s I&E enterprise. Hitting the reset button in these two vital areas provides the University with the opportunity to revisit definitions and criteria that have long sparked division, as well as to improve and standardize data collection practices to ensure data integrity and compatibility.

Storytelling

While transactional activity data is necessary to track progress (or regression), monitor trends, and validate the efficacy of an approach, it – alone – rarely inspires the public and other stakeholders to invest their time, money, or support. Empirical data must be paired with messaging that demonstrates human impact. Innovation leaders agree that nothing resonates as powerfully as presenting the human-interest angle of a new UC innovation. From treating cancer to developing ecologically friendly new energy sources to addressing food insecurity with new agricultural advances, the audiences the University seeks to engage want to know how further investment will make a direct difference to their lives and those of their communities and constituencies.

The following examples demonstrate the powerful impact of human-interest focused storytelling:

- The U.S. Department of Energy showcased CalWave, a UC Berkeley spin-off company that has commercialized a new green technology that unlocks the power of ocean waves to produce clean, sustainable electricity that has the potential of meeting up to 34 percent of the nation’s electricity needs. See [here](#). Also note the attached video as an example of how UC could use multi-media tools and social media platforms to tell the story of UC’s I&E impact.
- UCLA’s most recent edition of its “Innovation Magazine” tells the story of how UCLA chemist Heather Maynard invented a polymer with the potential to extend the shelf life of medications so that they remain potent longer and are less vulnerable to heat, cold, and pressure, ultimately broadening access and benefitting human health. See pages 12 and 13 [here](#).
- The University of North Carolina at Chapel Hill devoted one-third of its most recent annual commercialization report to showcasing six examples of how its faculty and students brought new technologies to market and how they contribute to the societal and economic good of North Carolinians. See pages 23 – 32 [here](#).
- The University of Michigan’s 2022 annual commercialization report tells the story of one of its spin-off companies, NewHaptics, which developed a novel technology enabling the creation of portable, tactile “screens” that can raise or lower Braille lines and tactile graphics so the blind can unlock the power of the internet. See pages 12 and 13 [here](#).

This proposal not only recommends that UC add compelling human-interest context to its empirical data through storytelling, but also recommends two approaches for selecting the stories. They include:

(1) Special Committee Chair Park has proposed the establishment of a UC Regents Innovation Award program to recognize exceptionalism in UC innovation and entrepreneurship, as discussed at the June 2023 meeting of the Special Committee. At this time, the proposal would include multiple awards in the following five categories:

- *Regents Gamechanger Award* – awarded to that year’s most impactful product to market. The invention must have been translated into a new or improved technology, product or service which has been put into widespread use and has (a) improved societal well-being, (b) provided economic benefit to the region or state, and (c) advanced scientific understanding in their field.
- *Regents Disruptive Research Award* – awarded to use-inspired research that has not yet been translated into real world applications but has demonstrated exceptional novelty and discovery with strong potential to be developed into new or improved technologies, products, and/or services that will address societal needs and improve lives.
- *Regent Best Startup Award* – awarded to a new company utilizing UC research to develop new technologies, products, and/or services that improve the lives of others and addresses societal needs.

- *Regents Community Changemaker Award*: Recognizes a private sector leader or organization that has contributed significantly to improving social and economic prosperity by supporting UC's innovation enterprise.
- *Regents Distinguished Lifetime Achievement Award* – awarded to a serial inventor or entrepreneur whose career accomplishments include innovations that have led to long-term positive impacts on the lives of others and is an inspiring influence for aspiring UC innovators.

The winners of the Regents innovation awards could be showcased in the annual UC technology commercialization report, as well as through other platforms (e.g., social media, press releases, marketing materials, etc.).

Should this proposed awards program be approved, it can serve as a source for the stories that can effectively showcase the robust nature of UC I&E. Rather than crafting a new selection process that creates additional workload for both campuses and UCOP, this approach leverages a process designed to identify innovations, inventors, and new startup companies worthy of public attention.

(2) Provost Newman has proposed the establishment of a President's Entrepreneurship Network Council, which will have three broad objectives:

- Creating and sustaining an innovation ecosystem at every campus and, where appropriate, between them;
- Supporting faculty and other researchers in their entrepreneurial initiatives; and
- Advocating for resources to support innovation and entrepreneurship.

Because the work of this council will be (1) rooted in campus priorities and needs, (2) chaired by a campus innovation leader, and (3) comprised of nine members, four of whom will be campus innovation leaders, this body will have both well-informed and unique insights into which of UC's thousands of innovations can best illustrate the breadth and impact of UC's I&E enterprise. This proposal recommends that the President's Entrepreneurship Network Council play a leading role in choosing which innovations to highlight, in concert with the President's Office of External Relations and Communications.

Innovation Spotlight

While storytelling highlights individual achievement to illustrate the societal impact of the University's innovation transfer enterprise, it is also proposed that the University annually choose a theme or topic that has captured the public's attention and is trending with the mainstream media. By doing so, UC can highlight its relevance and its leadership role in creating, refining, or advancing solutions to problems that the public cares about. Topics could include:

- **New technological advances** which are fast becoming a regular part of daily life, shaping the manner in which Americans work and play, such as artificial intelligence or financial technology that allows Americans to move money with the ease and

convenience of a mouse click. It would be timely for UC to highlight its global leadership role in the development of these budding technologies and how its cutting-edge research shapes these rapidly growing fields.

- **Seemingly intractable problems** that threaten economic vitality and human welfare. For example, according to research published on June 12, 2023 in the Proceedings of the National Academy of Sciences, there has been a fivefold increase in wildfire damage in forests in northern and central California during 1996 to 2021 relative to 1971 to 1995. The research finds that nearly all of the observed increase is due to human-caused climate change.

It would be timely to highlight how UC has not only become one of the world's cradles of transformative climate technologies but will award \$100 million in climate action grants in the coming year to help communities across the state meet the challenges of climate change.

- **The mission-driven values which undergird UC.** For example, original research conducted by UC Berkeley analyzed 14,400 venture-backed start-ups headquartered in the United States that exited since 2000. The study discovered that while females founded 17 percent of all start-ups, they only received three percent of all venture capital funding. The study also found that the presence of at least one female founder materially shortened the time to startup exit, thereby refuting the common trope that male entrepreneurs outperform their female counterparts.

According to UC Davis Professor Damon Tull, of the \$330 million in U.S. venture capital invested in 2021, only 1.1 percent went to black founders. His research also shows that the cost of “racial bias in the access to entrepreneurial capital is staggering and unsustainable . . . leading to \$16 trillion dollars in lost GDP in the U.S., alone.”

UC has long been a change agent promoting the democratization of not just higher education access, but also innovation and entrepreneurship. From the UCOP-sponsored “Inclusive Innovation and Equitable Entrepreneurship” Initiative which aims to develop new strategies for gathering demographic data of innovation ecosystems in academic settings to campus-led efforts to promote greater diversity and inclusion in who participates in the founding of companies and the commercialization of big ideas, UC is in a unique position to influence the nationwide conversation underway about equity and opportunity.

From highlighting the University's role in developing new therapeutics and diagnostics during the COVID-19 pandemic to showcasing UC women-led startups, UC should create opportunities to illustrate its relevance to what matters most to the public it serves and the constituencies it relies upon for support and sustained growth.

Diversity, Equity, and Inclusion Demographic Data and Outcomes

After multiple planning sprints dating back to August 2020, the University of California Inclusive Innovation Equitable Entrepreneurship (I2E2) Initiative was launched in October 2021 to understand patterns of participation in UC's I&E ecosystem and to develop data-driven strategies to engage a broader community of innovators and entrepreneurs across UC.

The Initiative's work aims to: 1) provide baseline demographics of UC-wide I&E in formal and informal settings, and 2) uncover challenges that may hinder and opportunities that can broaden the participation of people from historically underrepresented minority groups in I&E. Though the I2E2 initiative is separate from the Regents Special Committee on Innovation Transfer and Entrepreneurship, the group's work aligns with the recommendations of the Regents Working Group report, including Recommendation 13, which states, "In addition to considering a more expansive set of impact measures...the University can assess the extent to which women, people with disabilities and other groups that have been historically marginalized in translational research, innovation, and entrepreneurship are included in UC's innovation ecosystem, reflecting the diversity of the University community."

Since its formation, the group has engaged in an unprecedented effort to securely collect and analyze data from fragmented and siloed databases within UCOP and across the University system, with an emphasis on data related to education and training, infrastructure, data, and funding across UC's I&E ecosystem. In partnership with UCOP and campus partners, the Initiative obtained key datasets from each campus and began a comprehensive analysis of millions of data points. Subcommittee members met at UCOP on July 14, 2023, to discuss preliminary findings. The meeting resulted in additional feedback that will be incorporated and combined with the first round of reviews from an anonymous external review panel. At this time, the Initiative is preparing a revision for a second round of external review and validation by the external panel and the I2E2 team. The Initiative hopes to be in a position to share its findings by fall 2023 or spring 2024.

Periodic Metrics

At the April and June 2023 meetings of the Special Committee, internal and external subject matter experts provided input on the following:

- a) Whether it is feasible to measure the economic and public impact of University-based innovation transfer and entrepreneurship.
- b) If so, what methodological approaches are available and should be considered?
- c) What data and other inputs would be required to perform the desired economic and public impact analyses?
- d) What are the costs to gain an empirical, data-driven understanding of how UC's I&E enterprise impacts local, state, and national economic growth and meets societal needs?
- e) How frequently should this economic and public impact analysis occur?

The table below provides a distillation of the testimony provided in response to these questions.

The cost projections offered by the subject matter experts are speculative and aim to provide the Committee with an estimate of the necessary level of investment. The ultimate cost will rely on the scope of work, desired deliverables, the extent to which necessary data is readily available or must be procured, and other factors.

IMPACT METRIC	FEASIBILITY, METHODOLOGY, DATA REQUIREMENTS	PROJECTED COST	FREQUENCY
Job Creation	<p>“The economic impact of UC’s research efforts can be estimated by using an input-output model, such as IMPLAN. The IMPLAN model uses inputs, such as sales and investments by licensees and start-ups, to estimate the downstream “multiplier” effects of those inputs on economic output and employment. From these results, it is possible to estimate State and local tax revenue generated from this economic activity. Licensee sales and investments based on royalty and other income from licensees can be used to derive the inputs for this modeling effort. Additional information on licensees and start-ups can be derived from publicly available data, as well as case studies and surveys.</p> <p>Develop case studies of high-impact innovations. We will perform detailed case studies of a selection of the companies that have developed products and services from high return inventions. Out of 12,766 active UC inventions, the top five account for 39 percent of total innovation-related income, while the top 25 account for 65 percent (UC Technology Commercialization Report, 2020). Thus, these inventions likely account for a large share of UC’s innovation impact. Careful examination and quantification of these high-impact innovations will allow us to craft a more complete and accurate picture of the economic impacts of UC inventions.” – <i>Tim Gage (Principal, Blue Sky Consulting / Former Director, CA Department of Finance)</i></p>	<p>\$103,240 - Tim Gage</p> <p>\$228,000 – Elizabeth Lyons</p> <p>Between \$200,000 and \$280,000, with a likely mid-range cost of approximately \$240,000 – Sean Randolph</p>	<p>Every 5 years – Sean Randolph</p> <p>Every 3 to 5 years – Elizabeth Lyons</p>
Tax Revenues	<p>Careful examination and quantification of these high-impact innovations will allow us to craft a more complete and accurate picture of the economic impacts of UC inventions.” – <i>Tim Gage (Principal, Blue Sky Consulting / Former Director, CA Department of Finance)</i></p>	<p>– Sean Randolph</p>	
Regional economic development	<p>Models can be developed to measure the number of employees at licensee firms who were hired as a direct result of the UC licensed technology. This can be done using</p>		

<p>in the communities surrounding each of UC's campuses</p>	<p>founder/employer surveys and/or data available from commercial databases such as Crunchbase, LinkedIn, and Glassdoor. – <i>Elizabeth Lyons (Associate Professor of Management at UCSD's School of Global Policy and Strategy and Founder of the Policy and Strategy Entrepreneurship Lab)</i></p> <p>“Company information generated through one or more of these methods [i.e., linking UC licensing data with the in-depth information about companies through Dunn & Bradstreet; using proprietary start-up databases, such as Pitchbook and McKinsey, to link companies to UC campuses; and working with campus VCRs and alumni offices to identify startups originating from their campuses) can be run through the IMPLAN economic model to generate impact numbers (direct, indirect, and induced) for business revenues, employment, and taxes generated. Hard numbers can be supplemented by interviews with UC ecosystem leaders on each campus and with selected company founders to develop illustrative case studies and a deeper narrative.” – <i>Sean Randolph (Senior Director, Bay Area Council Economic Institute)</i></p>		
<p>Philanthropic Giving to UC</p>	<p>Will measure donations of time and money to UC as a direct result of UC I&E activities. This will include “the number and value of financial and in-kind donations from UC founders, inventors, and licensees using administrative data from UC advancement and foundation offices linked to data from technology transfer offices, supplemented with donor surveys.</p>	<p>\$60,000 first time; \$40,000 each time thereafter – Elizabeth Lyons</p>	<p>Every 3 years – Elizabeth Lyons</p>
<p>Faculty, post-doctoral fellow, and student recruitment and retention</p>	<p>Will measure “the number of faculty, post-doc, and students whose recruitment and/or retention was influenced by UC I&E activities, and administrative savings from retentions.”</p> <p>This can be accomplished utilizing, “[a] multiple event studies to capture improvements in faculty/post-doc/student recruitment and retention due to specific UC I&E activities using UC administrative data, [b] faculty and student surveys, [c] number of students/post-docs/faculty working on UC I&E activities using UC administrative data.”</p>	<p>\$45,000 first time; \$40,000 each time thereafter – Elizabeth Lyons</p>	<p>Every 5 years – Elizabeth Lyons</p>

A FEW FINAL NOTES ON THE COST AND FREQUENCY OF PRODUCTION

- Because the length of time between invention disclosure and its development into a new product or service is generally measured in years rather than months, this proposal recommends that an economic analysis be conducted every five years. Not only would

this interval better track with the general flow of getting a new discovery from the laboratory to the marketplace, but it would allow the University to spread the costs over a five-year period.

- The quality and availability of data inputs will be a determining factor in not only the credibility of the results, but in the cost of producing this periodic economic analysis. It would be grossly inefficient for a researcher to have to recreate processes for and begin collecting inputs anew, every five years. Significant gains in cost efficiency and data quality would come from identifying the specific data inputs required by the economic analysis model and systematizing their collection, preferably in an automated fashion. Note that the Patent Tracking System (PTS) modernization project will be focusing on business process redesign and workflow reengineering in the coming weeks and months. This would be an opportune time for the PTS project to factor in the data collection needs undergirding the periodic analysis of the economic impact of UC innovation transfer and entrepreneurship.

ⁱ “Use-inspired research” is research designed to be put into action in the real world.