UNIVERSITY OF CALIFORNIA, RIVERSIDE

NATIONAL ELEVATION – REGIONAL IMPACT

2022-2023 Office of Technology Partnerships Annual Report

UC RIVERSIDE
Technology Partnerships

Current UCR avocado scion breeding team, Mary Lu Arpaia and Eric Focht - UCR/Stan Lim

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Did you Know?

The Luna UCR™ avocado was selected as one of TIME's 'Best Inventions of 2023'.

This recognition comes just months after UCR released the variety to growers in California, and soon to be worldwide, through an international leader in the commercialization of agriculture innovations.

The variety is the result of a University of California avocado tree breeding program that started at UCLA just over 80 years ago, was transferred to UCR in the 1950s, and continues today.

The Luna UCR™ offers consumers a nutty flavor and a smooth texture that's ideal for guacamole. It also has a rind that turns a tell-tale black when ripe and is bred to maintain its quality well after it is harvested.

MESSAGE FROM VICE CHANCELLOR RESEARCH & ECONOMIC DEVELOPMENT

Greetings colleagues, friends, and partners,

Throughout this year, UCR takes pride in solidifying its position as a leader in shaping the future of higher education through collaborative efforts that resonate on local, national, and global scales. Our university has a strong commitment to research excellence, access, and student success.

In June, UCR was invited to join the prestigious Association of American Universities (AAU). This tremendous accomplishment is one of the best external accolades a university can receive to recognize its excellence in research and education. Among the 71 distinguished members representing top research universities in North America, UCR holds a unique position as the only university in the U.S. that is part of the AAU, designated as both a Hispanic Serving Institution (HSI) and an Asian American and Native American Pacific Islander-Serving Institution (AANAPISI), a recipient of the Seal of Excelencia and Fulbright HSI leader, and count two Nobel Laureates among our faculty.

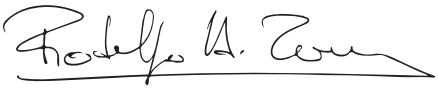
As Vice Chancellor for Research and Economic Development, I take pride in our efforts to expand UCR's visibility and influence in areas of clean technologies, sustainable agriculture, community health, and broader economic development initiatives. Our Office of Technology Partnerships (OTP) plays a pivotal role in cultivating an ecosystem that fosters the development, attraction, and commercialization of innovation. This is achieved through the forging of essential partnerships with regional economic development organizations, industry leaders, venture capital, and our local community.

Recently, the Luna UCR™ was recognized as one of TIME's 200 top inventions for 2023 — an immense achievement for the university. It represents not only a remarkable innovation but also a glimpse into the future of agriculture and its immense potential. In addition to the years invested by the breeders, I'd also like to acknowledge the efforts of the Office of Technology Partnerships (OTP) for their support of Luna UCR™ and all of our technologies and inventions. Special thanks to our partner, Eurosemillas S.A., for sponsoring UCR's avocado breeding programs, supporting the delivery of advanced avocado scions and rootstocks to the market.

In November, our campus had the privilege of hosting the Department of Energy. The event attracted over 500 attendees, including a significant number of students that gained exposure to potential career paths and funding prospects. Overall, it served as a dynamic platform for collaboration, knowledge sharing, and exploration of opportunities within the Department of Energy.

As we reflect on the past year's achievements and look toward the future, I am confident that the collective efforts of our university community, coupled with the support of our invaluable partners, will propel UC Riverside to new heights in research, innovation, and economic development. I invite you to read this report to learn more about the regional impact and national elevation of our Office of Technology Partnerships.

Cheers!



MESSAGE FROM ASSOCIATE VICE CHANCELLOR TECHNOLOGY PARTNERSHIPS

Dear partners,

OTP continues to strengthen the portfolio of activities that help us fulfill our mission of advancing the translation of innovation to the private sector for the benefit of society. This year we are excited to have recruited a great pool of entrepreneurs in residence to offer specialized mentoring services to academic and community innovators and entrepreneurs. The efforts of the team were particularly focused on continuing to support faculty, students, and community entrepreneurs in developing and building companies in the region and on the deployment of programs that supported the SoCal OASIS™ initiative.

We are pleased to observe that the teams we began supporting a few years ago are now yielding positive results. Helicoid Industries, which licensed technology from former faculty David Kisailus, launched their first project in hockey sticks. Edge Sound Research, launched by UCR students, Ethan Castro and Valtteri Salomaki, continues gaining traction with their product Resonx and is now in one of the NBA accelerators.

A major accomplishment is the successful release of the Luna UCR™ avocado variety by our tech commercialization and industry contracts team. This innovation has been recognized as one of TIME's top 200 inventions for 2023.

Raising early-stage capital continues to be a challenge for our region, and we continue to explore opportunities, networks, and programs that will provide venues for securing pre-seed and seed capital for our startups. This year, we will focus on reducing the time that it takes to secure first financing by launching the Scale Accelerator, where we are trying to engage early-stage investors in the selection and mentoring of our portfolio companies.

With respect to SoCal OASIS™, we focused our efforts on advancing the construction of the innovation park and implementing programs in climate technology and sustainability entrepreneurship. Earlier in the year, we joined the working group coordinating the design of the SoCal OASIS™ park, set to be completed in 2026. Additionally, we focused on activities supported by the EDA Build-2-Scale program, connecting companies to test beds and technical resources for real product evaluations. A search in Southern California revealed over 200 facilities, laboratories, experts, and potential funding sources. A team of EPIC SBDC mentors and regional advocates will assist entrepreneurs in accessing these resources.

We are also pleased with the completion of the first phase of the Zero-to-Entrepreneur program in modern agriculture and sustainable transportation, sponsored by the Irvine Foundation. We had over 70 community members registered for the online sessions of the program. Ten teams developed projects, and two of them received funding to support further development.

Our first showcase of climate and sustainability companies participating in the SoCal OASIS™ portfolio was a great success. Over 30 applications from the region were received, and close to 200 people attended the event to support six promising startups competing for $100,000 in grants for product and market development.

Four faculty and one postdoctoral researcher were appointed OASIS Faculty Entrepreneurial Fellows, receiving a combined total of $600,000 to conduct research in areas that address some of the critical needs of the region to enhance our climate resilience and adaptation. The first year of climate resilience activities will culminate with the Climate Conference in January 2024, where we will showcase these projects.

Thanks to the support from the UCOP Climate resilience grants, we launched the Climate Innovar program, adapting the customer discovery workshop to the specific requirements it takes to commercialize climate-related discoveries. We recruited new class speakers, including Dan Szabriezach, CEO of Ohmio.

We look forward to 2024, where we hope to break ground for the Northside Agricture Innovation Center and start construction of the SoCal OASIS™ park.

WORKING WITH THE OFFICE OF TECHNOLOGY PARTNERSHIPS

Reporting to the Vice Chancellor for Research and Economic Development, the Office of Technology Partnerships encompasses Technology Commercialization, Corporate & Strategic Partnerships, Innovation & Entrepreneurship, and Economic Development.

Our integrated approach helps us provide fast, transparent, efficient, and individualized support for the development, validation, and incubation of ideas for the benefit of society.

Entrepreneurship Support - Entrepreneurial Proof of Concept and Innovation Center (EPIC)

The UCR EPIC programs provide faculty, staff, students, and local innovators with valuable resources and tools to support their entrepreneurial journey. EPIC is a complete path-to-market platform for innovators to validate ideas, build teams, and launch companies.

EPIC Small Business Development Center (SBDC) and SBIR/STTR Resource Center - EPIC SBDC provides early stage tech entrepreneurs and companies with support to grow their business at no cost. Services include specialized tech commercialization consulting, training, and access to capital.

The SBIR/STTR Resource Center helps faculty develop and submit winning grant proposals, provides one-to-one mentorship, and offers a robust training program.

ExCITE and UCR EPIC Life Sciences Incubators - The ExCITE Startup Incubator is a partnership between UCR, Riverside County, and the City of Riverside providing startup residents with facilities, workshops, and community support to accelerate their company's success.

UCR's Life Science Incubator, located in the Multidisciplinary Research Building, is specifically outfitted to house young companies in agtech, biomedical technologies, bioengineering, and medical chemistry.

Student Entrepreneurship - Student entrepreneurship is promoted through various programs including the "Blackstone Launchpad" funded by the Blackstone Foundation to help students explore entrepreneurship by complementing existing entrepreneurial on-campus resources, coordinating off campus opportunities for students to expand their reach, and convening students and staff at world class events.

International Partnerships - OTP facilitates technology transfer and entrepreneurship capacity building for organizations and entities across the globe seeking to access the US market.

Economic Development - Activities focus on providing resources and support to enable innovative companies and small businesses to scale in the Inland Southern California, particularly in areas related to technology insertion, company attraction and relocation, and access to capital. This includes programs affiliated with the SoCal OASIS™ initiative.

Technology Commercialization

The Technology Commercialization team protects and helps commercialize cutting-edge research developed at UCR. From developing an intellectual property strategy, filing patent applications, to licensing technologies; the team provides faculty, students, and staff with full-service support.

Corporate & Strategic Partnerships

Corporate Research Contracts - The Corporate Research Contracts team helps faculty members advance their research by negotiating industry agreements and providing grant proposal support.

Corporate & Strategic Partnerships - The Corporate & Strategic Partnerships team facilitates collaborations between faculty and industry. The team provides specialized access to industry to the pioneering research, faculty, students, and infrastructure at UCR.

INTELLECTUAL PROPERTY MANAGEMENT

REALIZING OUR PROMINENCE IN INLAND SOUTHERN CALIFORNIA

This year, the Technology Commercialization team focused on establishing our prominence in translating UCR research from the lab to the market. Key achievements include the commercial release of the Luna UCR™ avocado cultivar in California, the execution of 9 license agreements and 1 option agreement (4 of which involve startups), and active participation in campus visits from The Regents Special Committee on Innovation Transfer & Entrepreneurship, as well as UC President Michael Drake. This year, three UCR faculty members were inducted into the National Academy of Inventors (NAI) — two as Fellows and one as a Senior Member. Notably, we also successfully launched the regional chapter of the NAI.

Featured Licences Executed

ACTIVE membranes

David Jassby, Former Associate Professor of Chemical & Environmental Engineering

Electrically conductive reverse osmosis membranes for desalination filters. Clean-up of membranes that are fouled is both a costly process and not environmentally friendly.

Licensed technology mitigates the problem of membrane fouling.

Match Sample Corporation

Will Grover, Associate Professor of Bioengineering

Characterizes and identifies substances for determining the authenticity and chemical composition of liquid samples. Licensed technology will allow for handheld and on-demand characterizations of different liquids and substances to help with quality control of olive oil, wine, and spirits.

Nu Leaf I.P. Pty Ltd.

Mikeal Roose, Professor Emeritus of Botany & Plant Sciences

Commercialization of 'KinnowLS' a late season citrus mandarin cultivar in Australia and New Zealand.

unium bioscience ltd

Paul Larsen, Professor of Biochemistry and Biochemist

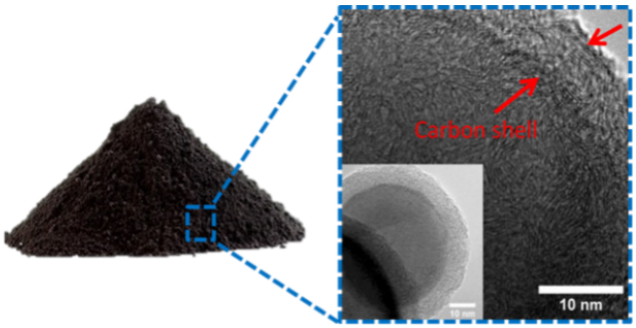
Pamoic acid to block ethylene signaling to preserve cut flowers and tolmetin to block ethylene signaling in crops to extend cut flowers and produce shelf life.

Fiscal Year 2023 Metrics

133	61	10	16.34%	10
UCR Inventors Served	Invention Disclosures Received	Patents Issued	UCR Portfolio Licensed	Agreements Executed

UCR-Licensed Startup Spotlight: SiLi-ion

UCR executed an exclusive license agreement with SiLi-ion (pronounced “sea-lion”), a UCR spin-out company. SiLi-ion, co-founded by UCR professor Lorenzo Mangolini, along with Mark Hatch, CEO and former CEO-in-Residence with UCR EPIC SBDC, is focused on developing a silicon-carbon nanoparticle with four times the energy density of graphite for next-generation lithium-ion batteries.



Nanocomposite drop-in additive - SiLi-ion

The licensed UCR technology provides an accessible and scalable method to coat silicon nanoparticles, serving as a drop-in additive in existing lithium-ion battery chemistries, effectively extending the range of electric vehicles. SiLi-ion has secured two grants from the California Energy Commission and a Small Business Innovation Research (SBIR) Phase 1 award from the United States Department of Energy. Professor Mangolini received $60K in two internal UCR Proof-of-Concept funds to advance the translation of UCR technologies and participated in the UCR INNOVAR National Science Foundation Innovation Corps (NSF I-Corps) program. Si-Li-Ion, currently a tenant of the UCR-managed Life Sciences Incubator, has been mentored by UCR EPIC Small Business Development Center (SBDC).

Harvesting Success: Nurturing Fruitful Partnerships

A new avocado variety, Luna UCR™ (‘BL516’), has been released to California growers this year, with plans for international availability in the coming years. This variety, developed by UCR agricultural scientists and protected under a pending patent, boasts excellent flavor, a distinctive black ripening rind, and high postharvest quality for consumers. Growers stand to benefit from its smaller tree size, enabling denser plantings for more efficient and safer harvesting, along with minimal pruning requirements. Luna UCR™ features a flower type that makes it an effective pollinizer for various avocado varieties, including the popular Hass.


The Luna UCR™ avocado - UCR/Stan Lim

The development is credited to Mary Lu Arpaia, a UC Cooperative Extension horticulturist based at UCR, and her colleague Eric Focht, a UCR staff research associate. Other co-inventors include former UCR scientists Gray Martin, the late David Stottlemyer, and the late B.O. “Bob” Bergh. In 2020, UCR partnered with Eurosemillas, S.A. to sponsor avocado breeding programs, resulting in the release of Luna UCR™ as the first scion cultivar under this collaboration. OTP executed a worldwide license agreement for Luna UCR™ with Eurosemillas earlier this year, positioning them to lead the global commercialization of this promising cultivar through Green Motion, an international platform established to accelerate UCR’s most advanced avocado scions and rootstocks with partners in 15 countries.

Luna UCR

Eurosemillas

GREEN MOTION AVOCADOS

INTELLECTUAL PROPERTY MANAGEMENT

Proof of Concept Grant Awardees

Two calls soliciting proposals for Eurosemillas Technology Acceleration Program (ETAP)/Proof-of-Concept (POC) funding were made this year and five projects were awarded grants.

Since the program's inception in 2013, we've granted over $2.15 million to 61 POC projects. Among them, 17 projects sparked commercialization activity. Eleven of these ventures were startups that secured $6.35 million in investment funding and received an additional $2 million in SBIR/STTR funding. Additionally, 11 projects earned $6.3 million in follow-on grant and research funding.

Christopher Bardeen, Professor of Chemistry

$50,000 for Method and System for Pulsed Light Deadhesion for Metal-Transparent and Transparent-Transparent Substrates Attached with Adhesives

Developing a solution for the safe and clean disassembling of photovoltaic (PV) modules using light-based delamination to accelerate the recovery of precious metals that enables the recycling of solar panels and their components.

Haizhou Liu, Professor of Chemical & Environmental Engineering

$50,000 for Poly- and Per-fluoroalkyl Substances (PFAS) Destruction Technology to Ensure Safe Water Supplies

Water ionization system utilizing deep ultra-violet light that can destroy PFAS and organic, inorganic, and microbial contaminants in drinking water, wastewater, landfill leachate, and hazardous waste treatment.

Masaru Rao, Associate Professor of Mechanical Engineering

$50,000 for Translational Engineering of Next-generation Device Concept for Treating Stroke

New flow diverter design to improve flow specificity, secure placement and stability within vascular wall, and decrease bacterial growth. This concept provides an opportunity to go beyond the current limitations of flow diverter technologies in treating aneurysms and hemorrhagic stroke.

Linda Walling, Professor and Geneticist and Peter Atkinson, Interim Dean, College of Natural and Agricultural Sciences

$50,000 for Synthetic Biology Enabling Insect Pest Control

This technology solves the issue of rapidly finding genomic safe harbors in target organisms to insert beneficial genes using CRISPR-Cas9. The underlying technology has the potential to make a global impact on food security, health, and biotechnology.

Edward Zagha, Associate Professor of Psychology and Huinan Liu, Professor of Bioengineering and Materials Science & Engineering

$45,000 for Intra-vascular Drug Delivery Platform to Eliminate Off-target Side Effects

This intravascular platform technology aims to deliver drugs specifically to a target organ, significantly reducing off-target drug exposure and minimizing off-target toxicity.

2022 National Academy of Inventors Fellows

Sean Cutler, Distinguished Professor and Plant Cell Biologist

Charles Wyman, Professor Emeritus

2023 National Academy of Inventors Senior Member

Masaru Rao, Associate Professor of Mechanical Engineering

National Academy of Inventors

The National Academy of Inventors (NAI) is a member organization comprising U.S. and international universities; governmental agencies; and non-profit research institutes. Currently, there are over 4,600 individual members, including Fellows, Senior Members, and Chapter Members, affiliated with more than 300 institutions worldwide. The NAI was founded in 2010 to recognize and encourage inventors with U.S. patents, enhance the visibility of academic technology and innovation, encourage the disclosure of intellectual property, educate and mentor innovative students, and to create wider public understanding of how its members' inventions benefit society. UCR launched the regional chapter of NAI to bring together a community of inventors and recognize them for their achievements, allow networking with fellow inventors and innovators from the region, and enable our innovators to be a part of the innovation ecosystem in the region.

IE Chapter of NAI kick-off event in April 2023 with inaugural chapter members.

STRENGTHENING INDUSTRY COLLABORATIONS AND BUILDING BRIDGES FOR INNOVATION

In Fiscal Year 2023, Corporate & Strategic Partnerships (CSP) and Corporate Research Contracts (CRC) strengthened UCR's industry collaborations by focusing on bringing industry partners to campus and engaging with more faculty to bridge faculty-industry connections and open doors for students to build strong University-Industry relationships. This focus resulted in 34 visits from industry partners that reached over 250 participants. Looking ahead, OTP remains committed to supporting faculty-led initiatives with ongoing events and guidance, ensuring that UCR thrives in innovative research and entrepreneurial ventures with corporate partners.

Fiscal Year 2023 Highlights

1. **Hosted University Industry Engagement Series:** OTP hosted speakers from BASF, Bayer Crop Science, Pratt & Whitney, Boehringer Ingelheim, and FLEXcon as part of our University-Industry Research Engagement Speaker Series. This monthly initiative invites industry leaders to share their research interests and opportunities with UCR faculty and students.

2. **Held New Faculty Welcome Luncheon:** OTP welcomed UCR's newest faculty members, sharing the breadth of its programs and how they support faculty and students in various aspects of the innovation cycle, including opportunities for research translation, forging corporate partnerships, accessing internal funding sources, and startup formation.

3. **Convened an Industry Advisory Committee Representing Leaders from the Agriculture Industry:** This group offered guidance and support in the implementation of specialized entrepreneurial certificate educational programs. Feedback included integrating the curriculum with the private sector's needs and creating pathways for program graduates to enter the workforce. The Advisory Committee comprises representatives from Mars, Sun World, Microsoft Agriculture, and the Washington Tree Fruit Research Association.

4. **Supported UCR Precision Agriculture Day:** CSP assisted in the organization and securing key industry panelists, moderators, and speakers for this special event organized by UCR Associate Research Agronomist Elia Scudiero. Audience participants included UCR faculty and prominent regional industry leaders, with over 65 registered attendees. The industry panel consisted of representatives of major California agricultural companies, including Carl Casale, innovator and investor at Ospraie Ag Science; David Marguleas, Chief Executive Officer of Sun World International; Lisa Park, Vice President of Strategy Innovation at Sunkist; Briana Layfield, President of Ag-Bee; and Kathleen Glass, Vice President of Marketing at AquaSpay. The industry panel was moderated by Dennis Donohue, Director of Western Growers Association Center for Innovation & Technology.

Fiscal Year 2023 Metrics

$6M	275+	40	188	34
Corporate Funding	Agreements Executed	Research Sponsors	Speaker Series Attendees	Campus Visits from Industry Sponsors

Faculty Spotlight: Professors Linda Walling & Peter Atkinson

The transition from chemical-based pesticides to biological-based applications represents a rare alliance between the agricultural pesticide industry and environmentalists. The goal is to reduce the environmental impacts of pesticides while maintaining or improving efficacy, decreasing grower costs, and improving crop yields through biological-based solutions.

UCR faculty researchers Peter Atkinson, Professor of Genetics in the Department of Entomology, and Professor Linda Walling, Professor of Genetics in the Department of Botany & Plant Science, have been working to develop novel biological-based solutions for controlling sap-feeding insects. These insects cause global crop losses of over $1 billion per year, leading to food insecurity, particularly in developing countries.

Professors Atkinson and Walling have devised a new method of insect gene-editing for use in insect pest control. This involves the plant-based delivery of gene-editing machinery to the insect. This innovation, coupled with new and enhanced methods for rearing and screening gene-edited insects, provides a trans-kingdom approach to deliver macromolecules that control sap-feeding insects during embryonic development. Control at this early stage, prior to nymph emergence, prevents feeding damage to crops and blocks the expansion of insect populations.

With support from OTP, these faculty members were awarded $600,000 in funding from Bayer Research & Development to support their research in this area.

Misty Madero introduces faculty to the importance of working with industry partners. The faculty luncheons gave faculty the opportunity to have 1:1 time with OTP staff to ask questions about intellectual property, industry sponsored research, and opportunities to fund their research.

CAMPUS INNOVATORS CONTINUE TO THRIVE

OTP remains dedicated to fostering an entrepreneurial culture at UCR and in the region by actively continuing its impactful INNOVAR program. This signature initiative exposes participants to the intricacies of the entrepreneurial process, guiding them on how to effectively bring innovative ideas to the market and teaching them the techniques of customer discovery. This fiscal year, OTP successfully implemented a new hybrid format to deliver the INNOVAR program in order to adapt to the evolving needs of its diverse participants. OTP proudly maintains its role as an affiliate member of the NSF Hub West consortium, showcasing its commitment to collaborative efforts in advancing entrepreneurial education and initiatives. The journey of fostering innovation and entrepreneurship at UCR is ongoing, with OTP at the forefront of these endeavors.

Fiscal Year 2023 Highlights

1 **Fifteen teams** received certificates of completion from the INNOVAR program.

2 **Eight teams** participating in the I-Corps West Hub program received funding from OTP.

3 **Three faculty teams** were awarded $50,000 from the national NSF I-Corps program.

INNOVAR Spotlight: SuperSprouts Receives Travel Award

Innovar participants, Professor Thomas Eulgem, a plant cell biologist, and doctoral student Gloria Regalado maximized their $3,000 UCR/OTP award. Gloria immersed herself in the 2023 Cannabis Conference in Las Vegas, NV, while Thomas delved into the 4th Global Vertical Farming Show in Dubai, UAE. These events offered invaluable insights from vertical farmers and cannabis growers, aiding the team in customer discovery for their technology, SuperSprouts. SuperSprouts is known for enhancing crop performance, especially with cannabis and various standard indoor crops in vertical farming conditions.

Dubai, home to the world's largest vertical farm supplying leafy greens to Emirates Airlines and over 100 others, emerged as a hub for innovation. Thomas also explored potential collaboration with FarmlyPlace, a German company set on providing vertical farm equipment, supplies, and expertise in the Middle East. The UAE's dynamic vertical farming industry, boasting 80 established farms in Abu Dhabi, underscored the team's strategic exploration.

Fiscal Year 2017 - 2023 Metrics

520 Student Participants Engaged

89 Faculty Participants in INNOVAR

15 INNOVAR Workshops Delivered

181 Teams Trained through INNOVAR

10 Teams Selected to Participate in the National NSF Program

ENTREPRENEURSHIP OPPORTUNITIES FOR EVERYONE

This year, the Blackstone LaunchPad program organized workshops and activities with the aim to make entrepreneurship less mysterious and give students a hands-on experience to ignite their entrepreneurial interests. A total of 463 students in the Blackstone Launchpad workshops.

The workshops guided students through entrepreneurial concepts. Whether just starting or already working on innovative ideas, students gained valuable tools to strengthen their entrepreneurial journeys. Workshop topics included ideation, customer discovery, design, 3D printing, prototyping, financial literacy, and entrepreneurial pitching.

Thirteen transfer students from the Marlan and Rosemary Bourns College of Engineering took part in the "Entrepreneurship for Engineers" workshop.

To encourage broad campus participation, Blackstone LaunchPad partnered with various departments and organizations to engage students who might not naturally explore entrepreneurship. By organizing activities in different locations, the team reached a wide range of students, including graduates, undergraduates, transfer students, and veterans. Some of the events in which Blackstone launchpad participated include:

- **Participation in a a two-day workshop** for transfer students in collaboration with Dr. Leslie Abdul-Aziz and the Marlan and Rosemary Bourns College of Engineering.
- **Collaboration with BRIDGE (Blacks Rising in Domestic and Global Entrepreneurship)** focused on encouraging and nurturing entrepreneurial opportunities.
- **Partnered with the Veterans Resource Center** in helping UCR student veterans explore business creation opportunities.
- **Collaborated with the A. Gary Anderson Graduate School of Management (AGSM) Programming Club** in delivering mentoring workshops to help develop essential skills sought after by startups.

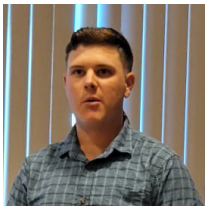
Thanks to these collaborations, several students from these groups have entered Blackstone LaunchPad competitions, attended West Hub NSF Zap and Boom programs, and are receiving mentorship to continue their entrepreneurial journey.

Fiscal Year 2023 Metrics

3,175	77	28	13
Students Engaged in Program	Mentoring Sessions Conducted	Events Hosted	Student-led Startups Supported

ENTREPRENEURIAL EDUCATION

OTP hosted the 2022 Ideas Pitch Competition. Ten student teams, representing four distinct categories, pitched their ideas for a chance to win $1,000. Our winning teams were BMBOO, Cortex, MeTime, and Omni.



Co-founders Jason Roberts ’23 and Seth Freeman, MFin ’22

BMBOO is an eco-friendly water bottle made from one of the fastest-growing plant species, bamboo.

Founder Erik Hakopian

Cortex is a biomedical device capable of suppressing body tremors for patients with Parkinson’s disease.

Co-founders Karanvir Chima and Siraaj Kudtarkar ’23

MeTime is an application that enables individuals to explore new interests, hobbies, or activities in their vicinity, fitting into their free time.

Founder Kelvin Wang

Omni is a wristband that empowers 3D designers with advanced control in the VR/AR space, with innovative hand-mapping technology.

Student Entrepreneur Spotlight: Yoseph Kim, founder of Dreamcoat

Yoseph Kim, an undergraduate student majoring in computer science and business applications, is the founder of Dreamcoat. This venture uses Computer Vision to analyze and modify videos post-production. Yoseph developed a machine learning CGI program over two years, seamlessly incorporating product placement into films for targeted advertising.

Yoseph envisions film companies boosting revenue with Dreamcoat, providing audiences with diverse and contemporary advertisements. The technology aims to democratize high-end advertising for small businesses, ensuring a significant return on investment.

Representing UCR at the Future Founders Summer Fellowship, an 8-week program in the Blackstone LaunchPad network, Yoseph expressed gratitude for the experience. Dreamcoat holds a Korean patent and is receiving assistance from Blackstone LaunchPad and EPIC SBDC to register his company in the U.S.

EPIC SBDC ACCELERATES GROWTH

In the past year, our EPIC Small Business Development Center (EPIC SBDC) has mentored 166 early-stage tech ventures and provided a notable 4,350 hours of counseling. The impact is evident as affiliated startups successfully secured $16 million in capital, generated $30 million in revenue, and created 402 jobs. To bolster its support network, the EPIC SBDC team actively engages with over 70 angel and venture capital investors, facilitating pre-seed and seed financing for its portfolio companies. Recognizing the need for continuous growth, the Entrepreneur-in-Residence team expanded to 15 mentors, each bringing expertise in diverse technology sectors.

Innovative initiatives like the Startup Advocate program and the Build 2 Scale Program reflect EPIC SBDC's commitment to leveraging regional incubators and specialized faculty, increasing awareness of resources for the region's entrepreneurs.

Looking ahead to 2024, EPIC SBDC is gearing up for the launch of the SCALE Accelerator. This four-month program is poised to accelerate founders' progress in gaining customer traction, raising capital, and achieving planned goals. Notably, SCALE aims to boost early-stage investor participation in the due diligence and mentoring process, ushering in a new era of entrepreneurial growth.

Startup Spotlights

Exigent AI founded by UCR Ph.D. graduates Paul and Samantha Corber Lou in 2022, aims to enhance quality and efficiency in the semiconductor industry through the optimization of the photomask production process using their proprietary AI-powered software.

Through UCR's INNOVAR and the NSF I-Corps programs, Paul and Samantha secured a pilot program with a major company in their industry segment. They anticipate this pilot will help them transition into recurring revenue before the end of 2023. Exigent AI is in the process of securing its first round of external investment with EPIC SBDC support, expected to close before 2024.

Water Illumination led by Professor Haizhou Liu in the Chemical and Environmental Engineering department, the team uses clean light energy to eliminate harmful PFAS compounds found in drinking water, landfills, and global water sources. Through participation in the NSF I-Corps program, the team completed 102 interviews focusing on municipal water processing facilities as their primary market. They are now partnering with water districts, using provided samples for ongoing testing and technology refinement. Additional funding for continued research and market development is anticipated through an NSF Phase I grant in early 2024.

Riverside Pitch Competition first place winner, StarNav LLC, proudly display their well-deserved victory check. As part of Riverside Innovation Month, four UCR EPIC SBDC teams – StarNav, Karamedica, e.e.r.s. and Chef'it participated in the event sponsored in part by the City of Riverside and ExCITE.

SEEKING ENTREPRENEURS – EXCITE AND UCR EPIC LIFE SCIENCES INCUBATOR

OTP-managed incubators, provide comprehensive support to startups. This includes access to cutting-edge facilities, mentorship from EPIC SBDC, and funding opportunities, all designed to accelerate startup growth in a collaborative space.

Riverside ExCITE

Located in downtown Riverside, ExCITE is a partnership that includes UCR, and the City and County of Riverside. ExCITE supports startups through their various growth phases offering eleven office spaces, two conference rooms, and a community partner room for workshops. There are also two open workspaces for community initiatives. Members gain access to workspace, equipment, business guidance, and a broad network.

This year, ExCITE hosted the EPIC/SBDC Fast Pitch Competition, where the top two winners became finalists at the Riverside County Innovation Month Fast Pitch Finale. This collaboration included the inaugural meeting of the Riverside chapter of the National Academy of Inventors (NAI).

Startup Spotlight

Tinker the Robot, founded in 2017 Kay Yang, aims to inspire the innovator in the next generation of builders, tinkerers, and problem-solvers. Kay's own engineering career, which includes four years at Mattel, was shaped by weekends spent doing projects with her dad during her youth. Tinker the Robot provides engaging, project-based learning kits and workshops to ignite "the inner engineer" in young students.

Kay began working with ExCITE in 2020, since then, Tinker has expanded its reach with workshops for LAUSD, public libraries, and the Disney Channel. Currently, Tinker is collaborating with PBS Riverside on animated edutainment content.

Fiscal Year 2023 Metrics

14	$1.5M	$2.5M	100	25
Active Companies	Investments Received	Grants Received	Jobs Supported	Positions to be Hired by Companies

Unique Incubator Serving UCR Faculty and Community Startups

The UCR EPIC Life Sciences Incubator, located at the heart of the UCR campus, is a valuable resource for entrepreneurs in Riverside and San Bernardino Counties. It has hosted 10 companies with a wide range of focuses, from cancer therapeutics to innovative pest repellency methods. Notable achievements include Armida Labs securing a Phase I SBIR grant, advancing Targefrin—a promising therapy for pancreatic cancer—towards an Investigational New Drug (IND) filing.

In addition to supporting tenants, the incubator has been instrumental in aiding over 18 faculty researchers. This support involves providing fee-for-service access to its $2 million high-tech equipment suite, facilitating various projects like purifying COVID-19 coat proteins, cultivating novel maize seedlings, and overseeing initiatives within its Microbiome Facility.

Recently, the incubator added its 13th and 14th tenants, UCR faculty spin-outs Remote Epigenetics and Sensorygen. With these additions, half of the companies in the Incubator are actively developing UCR intellectual property.

Startup Spolight

Remote Epigenetics, founded by Professor Anandasankar Ray and Paul Zorner, is dedicated to the discovery of naturally occurring, safe odorants that possess the unique ability to alter the properties of plant growth and resistance to environmental stress.

The technology includes a proprietary set of small molecules that are natural and affordable to reprogram chromatin structure in plants. Tiny amounts of these molecules can cause major shifts in gene expression leading to enhancement in plant development and response to abiotic stress.

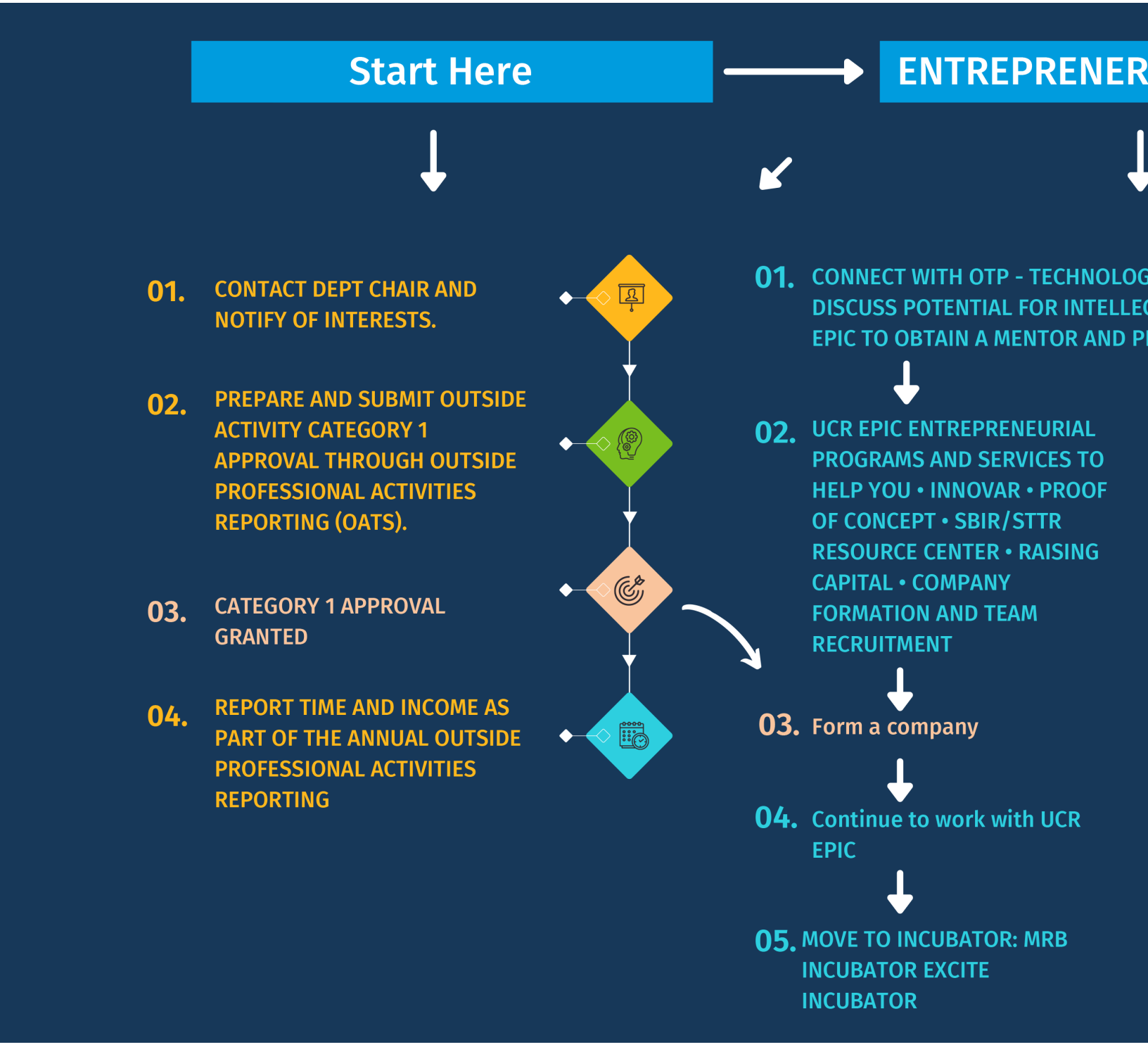
The incubator remains dynamic, evolving to meet the needs of our incubator companies and the UCR community. In partnership with Dr. Quinn McFrederick, director of UCR's Microbiome Initiative, a new microbiome facility has been launched within the incubator.

New microbiome resources available to expand research include a COY anaerobic chamber, Isolation Bio Prospector (able to isolate pure colonies from thousands of microbes at a time), Leica Cryostat, and NanoCellect WOLF Cell Sorter.

"Through access to the incubator's prospector, we've expanded our citrus culture collection by more than 10%. This growth includes new, rare genera identified as keystone species for the citrus microbiome. The high-throughput capabilities of the prospector have also enabled us to quickly screen hundreds of bacterial isolates for their potential to produce novel antibiotic compounds, which could be valuable in combatting severe agricultural diseases." - Christopher Drozd, Ph.D. candidate (Microbiology and Plant Pathology)

UCR'S NEW STARTUP PROCESS

This figure is a guide to assist faculty entrepreneurs in navigating the startup creation and approval process, outlining the steps involved and their interrelation with the Academic Personnel Office (APO), Office of Technology Partnerships (OTP), and Office of Research Integrity (ORI).



Academic Personnel Office (APO)

Office of Technology Partnerships (OTP)

Office of Research Integrity (ORI)

IAL SUPPORT → CONTRACT SUPPORT

GY COMMERCIALIZATION (OTC) TO
CTUAL PROPERTY AND WORK WITH UCR
ROGRAM RESOURCES TO HELP YOU.

Is there IP?

02. COMPLETE AND SUBMIT RECORD OF INVENTION (ROI) DISCLOSURE FORM AND OTC WILL REFER YOU TO UCR EPIC

03. CREATE COMMERCIALIZATION PLAN

04. COMPANY CEO OR REPRESENTATIVE NEGOTIATES IP RIGHTS FROM THE UNIVERSITY

01. CONNECT WITH OTP -- INDUSTRY (CORPORATE) RESEARCH CONTRACTS, IF COMPANY WANTS TO SPONSOR RESEARCH, TRANSFERS MATERIALS OR DATA

02. COMPLETE RESEARCH COMPLIANCE REPORTING FOR OFFICE OF RESEARCH INTEGRITY (ORI) - PRO COMMITTEE REVIEW, AS REQUIRED

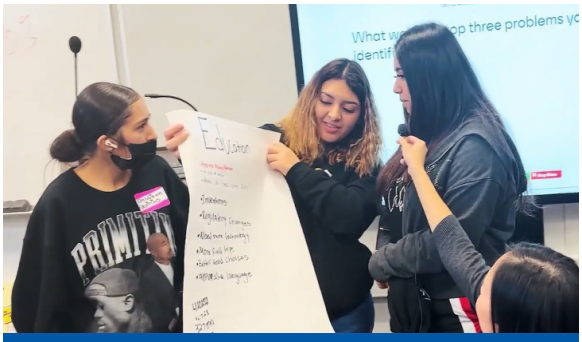
SOCAL OASIS™: DRIVING INCLUSIVE INNOVATION IN INLAND SOUTHERN CALIFORNIA

The goal of SoCal OASIS™ is to transform Inland Southern California into a thriving hub for sustainable, fast growing industries, providing quality jobs and boosting economic prosperity. In the past year, the OTP team actively implemented various physical and programmatic initiatives under the OASIS Umbrella. This included securing funds for the Northside Agriculture Innovation Center (NAIC) in partnership with the City of Riverside and LampLighter Energy, completing the Basis of Design for the OASIS Park, and assisting in obtaining funds for the critical minerals and certification lab at UCR's Palm Desert campus. On the programmatic side, the team successfully launched specialized certificates in entrepreneurial modern agriculture and sustainable transportation in partnership with UCR Extension, secured $2 million from the Department of Commerce to launch the Build 2 Scale program, and participated in SelectUSA, a Foreign Direct Investment Conference to support the attraction of sustainability-focused companies to the region.

Fiscal Year 2023 Highlights

1 **Completion of the Basis of Design** for Phase 1 of the SoCal OASIS™ Park. The park will be located near the California Air Resources Board. Anticipated for completion in 2026, the technology park will feature cutting-edge laboratories for mobility and climate science, a startup incubator, leasable office spaces, a state-of-the-art makerspace, and advanced training facilities..

2 **Secured $1 million** in Community Project Funding to support the construction of an advanced ag tech incubator and training facilities at the NAIC, thanks to the support of Congressman Mark Takano.



High school students presenting their ideas at a workshop on agriculture technology.

3 **Received a $2 million grant** through the Economic Development Administration's Build-2-Scale program to support the growth and attraction of technology startups with a focus on sustainability to Inland Southern California.

4 **Launched two specialized certificates** in entrepreneurial modern agriculture and sustainable transportation attracting over 80 participating and resulting in ten entrepreneurial projects, with funding from the James Irvine Foundation.

CREATING A PIPELINE OF TALENT AND INNOVATION

This year OTP launched the SoCal OASIS™ Accelerator program, supported by the James Irvine Foundation. The program is designed to:

- **Expand Opportunities,** in particular for minority and underserved community members, by creating high-growth, technology-based startups that generate high-quality jobs.
- **Enhance Capacity** by developing specialized training programs that expose community innovators and entrepreneurs to leading-edge tools and technologies developed at UC Riverside.
- **Build a Robust Pipeline** of sustainability-focused technology startups.
- **Drive Investment Capital** into regional startups, especially those with significant societal impact.

The Zero-to-Entrepreneur Certificate in Modern Agriculture, offered in partnership with University Extension, spans the disciplines of business, science, and engineering to prepare graduates to enter the workforce as entrepreneurs with broad knowledge of modern agricultural solutions. Designed to be completed in 20 weeks, the program was created for participants with high school degrees and some basic science training equivalent to the second year of undergraduate level. Students learn to grow plants from cells and tissues, focusing on large-scale cloning and genetic enhancement. They also participate in online entrepreneurship training and receive one-on-one mentoring from EPIC SBDC. Webinars with industry experts discuss trends, small business practices, and advanced networking. After the 10-week program, ten teams presented their startup ideas, including innovations in greenhouse design and improvements to native plants through tissue culture and biotechnology.

Students participating in the Modern Agriculture Certificate program.

Using a similar framework, the Zero-to-Entrepreneur Certificate in Sustainable Transportation completed its first year in September 2023. Students were introduced to the fundamentals of connected, automated, and electrified transportation, along with the industry's current challenges, including optimization modules for travel, battery performance in drivetrains, and the importance of equitable public policies. Students participated in simulations of electrified and automated vehicles, toured the City of Riverside's traffic management center, and visited the heavy-duty electric dynamometer truck facilities at the California Air Resources Board's Southern California headquarters.

Students participating in the Sustainable Transportation Certificate program.

An industry advisory board has been estabished and business advisory speakers have been invited to engage and provide guidance on curriculm, internships, and to provide connections on other opportunities.

Business Agriculture Advisory Speakers

April Agee Carroll, Ph.D.
Bayer & Bayer

Dan Ruzicka, Ph.D.
Bayer & Bayer

Jim Pantaleo
AI Institute Food Systems

Vonnie Estes
International Fresh Produce Association

ECONOMIC DEVELOPMENT

OTP's Opportunity Exposure workshops introduced over 60 high school students from disadvantaged areas to careers in modern agriculture and sustainable transportation. Students from North High School in Riverside and various San Bernardino schools learned about real-world challenges and opportunities. For more than 90% of these students, terms like "entrepreneur" and visiting a university were new experiences. After the workshops, over half expressed increased openness to pursuing high-tech careers and reported greater self-confidence about their future.

High school students, attending the Opportunity Exposure Workshop, tour a controlled environmental facility for growing leafy vegetables.

Northside Agriculture Innovation Center: Training the Next Generation of Climate Smart Talent

The Northside Agriculture Innovation Center is a community-driven project designed to enhance regional workforce skills and foster innovation and entrepreneurship in modern sustainable agriculture and food production. Situated on a 6.7-acre parcel, the project features several key environments to provide training and incubation facilities for farmers in the region. In January 2023, the project received approval for a feed-in tariff and power purchase agreement with Lamplighter for the solar greenhouses. In April 2023, the city council authorized negotiations for the land lease/leaseback agreement with Lamplighter. Construction is set to start in Spring 2024. With assistance from Congressman Mark Takano, the project received $1 million in Community Project funds to establish a teaching and incubation facility for ag tech startups. The Northside Ag Innovation Center comprises several key elements, including:

- **Urban Greening (Entire Site):** Approximately seven acres dedicated to planting over 450+ trees and shrubs, along with constructing about half a mile of trails encircling the site.
- **Community Learning Center:** A space for community events, a community garden, a shared learning center, and demonstration greenhouses featuring future agricultural practices.
- **Agrivoltaics, Soil-Based Training, and Community Garden:** Elevated solar panels for applied research and training in modern agrivoltaic practices. 1.5-acres allocated for hands-on training in beginner farming through a certified program by UCR University Extension.
- **Controlled Environment Agriculture:** 44,000 square feet of advanced solar greenhouses for training and launching startups in controlled environment high-tech agriculture methods.

INCREASING COMPETITIVENESS FOR SMALL BUSINESSES THROUGH TECHNOLOGY ADOPTION

In partnership with a dozen regional and city economic development organizations, small businesses in Inland Southern California can access specialized technical assistance consulting provided by OTP through the EDA-funded Technical Assistance for COVID-19-Impacted Inland Empire Small Businesses (TACIES) grant. More than 50 businesses registered for free consulting on topics such as Data Analytics, Cybersecurity, Robotics, and the Internet of Things. Additionally, 350 business owners participated in financial fitness training. Reports submitted by TACIES consultants, together with additional interviews, indicate that many of these small businesses are not ready to incorporate technology into their operations. They have more fundamental and immediate training needs in areas such as financial management, marketing, and operations. Fifteen-minute narrated videos on these timely topics are available on the OTP website at **ucrotp.ucr.edu**.

Fiscal Year 2023 Highlights

1 350 business owners participating in financial fitness training delivered by Cal State San Bernardino IE SBDC.

2 24 company referrals for technical consultation.

3 15 companies interviewed to further assess readiness for technology adoption business growth and competitiveness.

Rosibel Ochoa, UCR's Associate Vice Chancellor for technology partnerships was named Female Entrepreneurial Leader of the Year by the Accreditation Council for Entrepreneurial and Engaged Universities (ACEEU) at the TripleE Global Awards in Barcelona, Spain this year. Ochoa was recognized as a leader in higher education and for driving innovation, entrepreneurship, and societal improvements.

LEVERAGING ACADEMIC PARTNERSHIPS TO STRENGTHEN REGIONAL SUPPLY CHAINS

In addition to overseeing various OASIS programs, this year, RED and OTP led the submission of two applications for funding to support regional economic development initiatives. Supported by more than 20 local and regional partners, the Southern California Alliance for Economic Development in Sustainable Logistics (SCALE-SL), a collaborative effort involving academia, government, and the private sector, aims to accelerate the transition of the logistics industry in Southern California toward achieving net-zero carbon emissions. This collaborative initiative was established in response to the National Science Foundation Regional Innovations Engine Initiative.

The focus on the logistics industry stems from its critical role in the Southern California economy. This region serves as the nation's primary hub for goods movement, with the logistics sector responsible for handling roughly 40% of the nation's containerized cargo, thus supporting one in seven jobs. However, this industry is grappling with a multitude of challenges, including a vulnerable supply chain, job losses due to automation, concerns about the impact of congestion and emissions on vulnerable communities, and the increasing pressure on the industry to swiftly transition to a net-zero carbon operation in compliance with state and national regulations. These concerns have been identified and substantiated through feedback obtained from over 50 stakeholder interviews.

Regional Challenges and Opportunities for Growth

1. Uncertainty regarding technology performance and its compliance with regulations.
2. Uneven generation and transmission infrastructure to facilitate electrification.
3. The necessity for real-time data to inform technology investment decisions.
4. Improved definition of workforce skills to facilitate technology implementation and operation.
5. Access to test beds and pilot programs for validating technology before deployment.
6. Availability of incentives and policies to support minority-owned businesses.

Although not selected for funding, RED and OTP are continuing to engage with partners to pursue the implementation of SCALE-SL. The successful achievement of its goals will support an equitable transition of the goods movement industry in Southern California.

Lithium Valley Clean Tech Hub

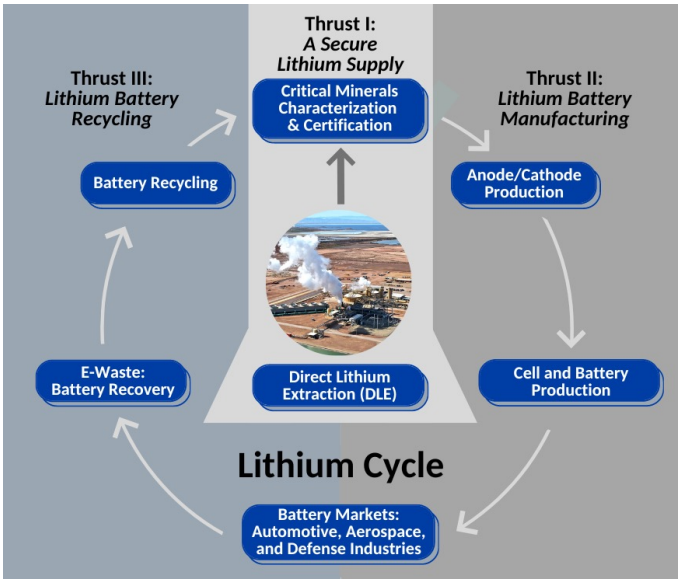
This past summer, OTP supported the submission of an application to the Economic Development Administration for the designation of Lithium Valley as a Technology Hub. This application was co-led with Imperial County.

Centered around the lithium brine deposits in Southern California's Imperial County, the Lithium Valley Clean Tech Hub is a consortium of nearly 40 members committed to:

- Securing the supply of lithium for the nation's energy markets.
- Creating a sustainable, inclusive, advanced-energy ecosystem in Southern California.

The proposed Lithium Valley Clean Tech Hub leverages significant investments already made by the hub's geothermal power industry partners in Direct Lithium Extraction, together with UCR's state-of-the-art infrastructure in critical minerals characterization and advanced battery testing. Other academic partners include San Diego State University, Cal State San Bernardino, and Imperial Valley College.

This Technology Hub is uniquely positioned to enhance economic opportunities in one of the nation's most economically underserved regions. Simultaneously, the energy technologies produced by the Hub will play a crucial role in both economic and national security.



In the fall of 2023, the consortium was awarded a $500,000 strategy development grant from the Economic Development Administration to create the roadmap for the development of the Lithium Valley supply chain.

Participating in the Technical Delegation to Enhance the Strength of the US Semiconductor Supply Chain

Rosibel Ochoa, Associate Vice Chancellor for Technology Partnerships and David Dayton, Director of Program Development for UCR University Extension, participated as members of a delegation of US semiconductor technical specialists led by the US State Department and the US Mexico Embassy. The group included representatives from the University of California, Los Angeles; the University of Texas, El Paso; the State of Arizona Office of the Governor; INTEL; and industry support groups from the State of Texas. In August 2023, the group visited three industrial regions in Mexico to explore potential partnerships and engagements between Mexico and the USA in support of the US semiconductor supply chain. By diversifying the supply chain regionally, economic vulnerabilities in the crucial semiconductor industry can be mitigated.

The delegation concluded that there are two potential areas of collaboration in the fields of conventional semiconductor packaging, printed circuit boards, testing, and workforce development.

STRENGTHENING PARTNERSHIPS TO SUPPORT CHILEAN COMPANIES' SOFT LANDING IN THE U.S.

Since 2019, OTP and its partner, Know Hub, have worked together to promote innovation, technology transfer, and economic development in Chile. Know Hub Ignition, one of the partnership's flagship programs, consists of a 10-week workshop focused on customer discovery and technology commercialization, following OTP's INNOVAR program.

This year's program focused on four categories: cybersecurity, climate change, circular economy, and health.

More than 80 teams applied to participate in the program, but only 10 teams were accepted. Each selected team was assigned an OTP and a Chilean mentor to provide them with guidance, support, and feedback every week.

At the conclusion of the program, the teams delivered their presentations to a group of judges that included representatives from OTP, EPIC SBDC, Know Hub, Lockheed Martin, and the National Association of Innovation and Development from Chile, among others.

Winning Teams

Beloop

Founders: Gabriel Sanllehi, Dorian Silva, and Felipe Pizzarro

Beloop uses an integrated software solution to help manage, report, and produce product packaging while increasing circularity, maximizing efficiency, and reducing waste.

BIOPROC

Founders: Vasco Leon, Daniela Sepulveda, Gabriela Villouta, and Carlos Carrasco

Bioproc is a gas purification Hardware-as-a-Service platform to reduce emissions and odors generated by pork processing companies.

Dropit

Founders: Nicolas Retamal, Marcelo Torres, and Fernando Avaria

Dropit makes concentrated cleaning tablets for B2B enterprises, optimizing space, saving on transportation, and reducing costs in line with sustainability goals.

Three teams were selected to participate in a weeklong immersion program in Riverside in November 2023, they met with potential partners and experts, and pitched their product or service in front of potential investors.

Javier Ramirez, Executive Director of Know Hub with the participants of the Know Hub Ignition 2023.

MARTIN KLECKNER, PH.D.

Recently appointed Director of the EPIC SBDC

Martin Kleckner has 28 years of experience in operations and business development in life sciences, healthcare, oil & gas, and cable television. He has advised over 115 emerging and Fortune 100 companies with corporate planning and strategy, commercialization, and public policy throughout Europe, Asia, and the Americas. He participated as a founder or early-stage employee in five venture start-ups with two successful exits.

MARICELA COVARRUBIAS ARGUETA

Recently appointed Interim Manager of ExCITE Incubator

Maricela Covarrubias Argueta, who has contributed to the growth of the UCR Life Science Incubator for the past 3 years, will now support the ExCITE management and growth of our incubator residents in both locations.

VENKAT KRISHNAMURTY, PH.D.

Promoted to Senior Licensing Officer

Venkat Krishnamurty focuses on research, assessment, marketing, business development, and commercialization of the engineering and physical sciences intellectual property portfolio. This includes negotiating technology transfer agreements, overseeing licensee commitments, and engaging with faculty and students to support on-campus entrepreneurial activities and the commercialization of their inventions.

SONALI BHAKTA ’23

Northwestern Graduate Student

Sonali Bhakta, a UCR graduate and former OTP student employee, earned her B.S. in biochemistry with a minor in law & society. Passionate about science and law, Sonali assisted the corporate research contracts team with processing agreements. In her graduate studies in the Masters of Science of Law Program, Sonali aspires to actively contribute to the sciences and be a catalyst for innovation.

UC RIVERSIDE

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