



Anchoring a Commercialization Ecosystem for Environmental Technologies and Know-How

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Executive Summary

The Desert Research Institute (DRI) has initiated a two-year program to stimulate the transition of ideas from our research labs to the marketplace. Our strategy includes targeted support for faculty to explore the commercial potential of their research output, as well as strategic partnerships and a new Entrepreneur in Residence program to engage experts from the entrepreneurial community in Nevada to help bridge the knowledge gap between research expertise and commercialization skills, and ultimately take research products to market.

A new Commercialization Fellowship Program at DRI has engaged ten DRI faculty who have both research products and an interest in exploring the commercial potential of those research products. This is the first cohort of participants in this program. One faculty member is being supported to further commercial product development with an existing startup company spun out from DRI. Two more faculty members are in the process of raising funds for a new startup company based on two new patents awarded to DRI. Two faculty members are engaged in negotiations with existing businesses to commercialize intellectual property developed at DRI. Three more faculty members at DRI are participating in the UNLV Incubator program to explore the commercialization process most appropriate to their research products. At least two faculty are actively planning for new SBIR/STTR grant submissions, which if successful will receive matching funds through our Knowledge Fund program.

We have partnered with the UNLV Technology Transfer Office to continue supporting DRI with licensing of intellectual property and commercialization services. We are now expanding this partnership through an Entrepreneur in Residence program jointly funded by Knowledge Fund resources at the two institutions.

Though DRI remains behind on our projected spending from our Knowledge Fund project, we have accelerating expenditures over the current reporting period to support faculty in later stages of the commercializing fellowship and we are expanding access to expertise through our strategic partnerships to entrepreneurial and commercialization expertise that our faculty can use to grow commercialization activities.

Project Overview

Toward a goal of contributing to economic growth and vitality in Nevada, the Desert Research Institute has initiated a two-year program to stimulate the transition of ideas from our research labs to the marketplace. Our approach builds on our recent success in spinning out technology and engaging with corporate partners. We also acknowledge that there remains trepidation among some faculty when it comes to translating their innovation into commercial products or services. Thus, the project aims to achieve three objectives over the two-year project period:

- Increase the level of sophistication, knowledge, and interest in commercializing research products (primarily from DRI faculty)
- Identify, support, and evolve several promising ideas that are already in the DRI research portfolio
- Emplace a structure that can support a commercialization ecosystem beyond the project period

Our strategy includes targeted support for interested faculty to explore the commercial potential of their research output, as well as strategic partnerships with experts from the entrepreneurial community in Nevada to help bridge the knowledge gap between research expertise and commercialization skills. We have formalized this strategy into a new “Commercialization Fellowship Program” for faculty which aims to provide: limited support for active exploration of commercialization of an idea; training in some key aspects of practicing commercialization; and access to experts for consultation on their specific challenges to commercialization. We are also providing matching funds to SBIR/STTR grant funds coming to DRI as an incentive for faculty to collaborate in commercial research and development. Finally, we are actively building strategic partnerships with commercialization and entrepreneurial experts from within the state and beyond to help guide our overall approach to supporting technology transfer at DRI and to help individual faculty be successful in their efforts at commercializing their research. It is our intent to sustain these activities over the coming years as an ecosystem for commercialization that strengthens over time.

Commercialization Fellowship Program

DRI has embarked on a new program to foster faculty engagement in the commercialization of research products resulting from DRI’s labs and programs. The program is designed to achieve several specific goals, including: (1) engage faculty who either have an interest in commercializing their research products, or have a research output that they think might have commercial potential; (2) provide limited salary support to compensate faculty for the time they spend exploring the commercialization of their research; (3) provide education to our faculty and opportunities for them to receive direct consultation with experts within our network of strategic partners. The Program exists in three phases with both a progressive level of salary support available to the faculty member and an obligation by the faculty member to invest a progressive level of their own effort on direct commercialization of the idea resulting from their lab.

Phase 1 – Understanding commercialization

Nine members of the DRI faculty participated in the first phase of the commercialization fellowship. To participate, interested faculty were obligated to provide a brief description of the research product they think might have commercial potential and what information they think they need to advance their idea toward commercialization. Ideas that were submitted range from water quality monitoring and treatment technology to measurement technology for soils and air pollution to applications of environmental forecasting technology in occupational safety and renewable energy. A few participants have taken steps to protect the underlying intellectual property of their idea or have explored the potential market for their idea. Most participants have not taken any of these initial steps yet. The purpose of phase 1 is to help all participants understand some of the basic elements of commercializing an idea resulting from academic research and provide the information and some limited resources to begin thinking about these initial steps.

To provide instruction in this area we have partnered with StartupNV who provided a series of lecture and discussion sessions drawn from the curriculum for their incubator program

for startup founders. Sessions were held on the following topics: protecting intellectual property and licensing; researching markets; SBIR/STTR grants and non-dilutive investments; and the researcher’s role in commercialization. The size of the group encouraged informal discussion and group brainstorming. Discussions included contributions from StartupNV staff and guests from their network of mentors and experts. Participants were provided with salary coverage for the time to attend the events. Participants were also provided with another 8 hours of salary coverage to spend some time reflecting on their own commercialization project considering the content that StartupNV provided and prepare a short report on what kind of support they felt they needed next to advance their idea further.

Phase 2 – A Deeper Dive

Phase 2 is in progress for five members of the DRI faculty. Two are in active negotiations with industry partners over licensing of IP and further research and development agreements. We

DRI Technology and Faculty Leads engaged in the Commercialization Fellowship Program

Technology	DRI Faculty Lead	Commercialization Fellowship Phase (see description below)
Aerodynamic focusing lens for precision particle beams	Xiaoliang Wang	1
Components for quantitative monitoring of coal dust exposure	Xiaoliang Wang	2 – pursuing a partnership with a mining industry manufacturer and participating in UNLV Incubator program
Drinking water quality web application	Daniel Saftner	1
Activated biochar for water purification	Erick Bandala	2 – pursuing a partnership with an industry manufacturer and planning an SBIR submission.
Devices/software for electromagnetic soil property characterization	David Page	1
Science storybook series for STEAM education	Craig Rosen	1
Dynamic monitoring and control technology	Marco Giordano	2 – participating in UNLV Incubator program
Forecasting and display tools crane safety	Dave Decker	2 – engaged in customer discovery
Biopassivization of explosive ordinance	Dave Decker	2 – pursuing funding for a startup
Optimization of renewable energy systems coupled to battery storage	Eric Wilcox	2 – seeking SBIR funding
Devices/software for dust pollution measurements	George Nikolich	2 – participating in UNLV Incubator program
Water resource management tools based on satellite remote sensing	Justin Huntington	3 – partnering with an existing startup spun out from DRI.

have partnered with Steam LLC to provide individualized consulting to each of these faculty to assist in the successful commercialization of DRI IP. We have also partnered with the UNLV Incubator based at the Hughes Center to which has included three members of the DRI faculty in the 5-week intensive incubator program they provide in partnership with Aspire. Faculty participants will be provided with up to 200 hours of salary support for consultation with experts and incubator participation. Participants may also use this salary support for other initial steps appropriate to their idea, including preparing an IP disclosure or filing a provisional patent, market research and engagement, researching potential SBIR/STTR funding opportunities and finding potential proposal partners.

Phase 3 – Path to Startup

Phase 3 will offer a limited group of participants extended salary support for more intensive efforts at commercialization. With input from a panel of advisors the participants will be chosen based on the maturity of their idea and a compelling commitment from the faculty member for dedicated effort on a commercialization pathway. Partial salary coverage will be provided in 2- to 6-month increments with recurring assessment of the progress. This will include a recurring evaluation of whether further investment of faculty salary coverage and other support is warranted. Support for other costs of commercialization, such as patent filing, legal costs, marketing, or business development may also be provided on a case-by-case basis.

Current Status

Ten DRI faculty members have participated in the Commercialization Fellowship, including nine who participated in phase 1. Based on these reports, all participants have been offered an opportunity to advance to phase 2. Six participants are currently in phase 2, including 3 participating in the UNLV Incubator program, 2 in active negotiations with corporate partners, and at least two phase 2 participants are actively planning for new SBIR/STTR grant submissions. One faculty member is currently in phase 3 who is working with existing startup that was a spinout from DRI in 2014.

Case Studies of new commercialization efforts at DRI

Biopassivization – Two recent patents issued to DRI researchers describe how genetically engineered organisms can be integrated into a passivation reactor to render explosive ordinance less explosive and/or non-explosive. This technology is broadly applicable in the national defense sector for safe handling of ordinance. The two DRI inventors of this technology, one who is now partially supported by Knowledge Funds to work on commercializing this technology, are currently raising venture capital funding for a new startup company.

Monitoring of coal mine dust – A DRI team has developed new components for devices that monitor the exposure of mining personnel to total coal dust particulate mass and crystalline silica particulates, which are a serious health risk to miners and under regulatory control. A provisional patent is being submitted and the DRI faculty member leading this team is being supported by Knowledge Funds to seek a pathway to commercialize this technology in partnership with a leading manufacturer of personal dust monitoring equipment used in the mining industry.

Activated biochar for water purification – A DRI faculty member has developed a new activated biochar material suitable for removing contaminants from storm water runoff more efficiently than commonly available granulated materials. A provisional patent is being submitted and the DRI faculty inventor is being supported by Knowledge Funds to work on developing a partnership with an existing company to perform further research and development of a product based on this technology, potentially through SBIR/STTR funding.

Climate Engine – Climate Engine is a startup company founded by a DRI faculty member in 2014 with a grant from Google to leverage Google’s Earth Engine technology to deliver products based on processed Earth observing data from NASA and USGS satellites. This startup has an ongoing relationship with DRI for continuing research and development of commercially viable products for the agricultural and water resource management sectors. The DRI founder of Climate Engine is working with the Climate Engine leadership on further business development of this venture.

Incentives for SBIR/STTR Projects

The pursuit of SBIR/STTR funding fosters collaboration among DRI faculty and the private sector on research oriented toward commercialization. To incentivize such proposals, we are offering matching funds to faculty up to the amount of the federal SBIR/STTR grant awarded to DRI. Since the start of the project there have been two DRI faculty who have collaborated with industry partners on SBIR/STTR proposals, and as noted above, at least two Commercialization Fellowship participants are actively planning to seek SBIR/STTR funding to advance development of their ideas.

Entrepreneur-in-Residence Program and Strategic Partnerships

A key element of assisting DRI faculty in advancing their research toward commercialization is strategic partnerships. We have partnered closely with StartupNV, Steam LLC, the Sierra Accelerator for Growth and Entrepreneurship at UNR, The UNLV Technology Transfer Office, and the UNLV Incubator at the Hughes Center to provide direct support to DRI faculty on aspects of protecting intellectual property, commercialization planning, market research, and connecting DRI faculty with their broader network of entrepreneurial experts in the region. Knowledge Funds are supporting our partnership with the UNLV Technology Transfer office for them to support us with licensing agreements, patent applications and commercialization support. We are initiating a new Entrepreneur in Residence (EIR) program in partnership with the UNLV Technology Transfer Office to hire two EIRs who will identify commercializable technology at DRI and UNLV, form a startup company, and lead that startup company to a successful spin-out from the campus. A project manager based at UNLV will oversee the implementation of the EIR program with sufficient oversight from leadership at both campuses to ensure that the resources and time of the EIRs is shared equitably between the two campuses.

Knowledge Account Budget

DRI's grant for this project from the Nevada Knowledge Account totals \$1,496,096 for the period 10/1/2021 to 6/30/2023. Expenditures during the reporting period (3/2022 – 8/2022) were \$66,630.53. Total expenditures since the start of the project are \$92,802.59. Much of the project's early efforts were spent building the infrastructure of the commercialization fellowship. This included setting up the structure of the fellowship, aligning partners, determining scope, identifying promising technologies, competing the opportunity for the first cohort, and setting up the fellows. These efforts were hampered somewhat by the enduring pandemic, but mostly just required significant upfront planning and thought. The first fellowship is now underway with several of the faculty in the program having recently transitioned into the most intensive phase (3) where significant support is provided for commercialization activities. Additionally, formalized partnerships with Steam LLC and the UNLV Technology Transfer Office have been added to the partnership established earlier on with StartupNV. One supplemental program with the UNLV Technology Transfer Office includes addition of EIRs in the program (starting November, 2022) that can begin to impact fellowship-spawned startups/spinouts. All of these factors will contribute to higher funding utilization rates in the coming quarters. Otherwise, the project is proceeding within budget.