University of Nevada, Reno

Nevada Center for Applied Research (NCAR)

A best-in-class, stand-alone, fully functional, applied research and development technology center that serves to enhance the global competitiveness of Nevada industry, by leveraging the physical and intellectual assets of the University of Nevada, Reno (UNR).

"Matching Industry Needs with Academic Goals…"

Semi-Annual Progress Report

Reporting Period: February 1st to July 31st, 2024

September 2024

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Section I: Project Purpose

VISION

The Nevada Center for Applied Research (NCAR) is a best-in-class, stand-alone, fully functional, applied research and development technology center that serves to enhance the global competitiveness of Nevada industry, by leveraging the physical and intellectual assets of the University of Nevada, Reno (UNR).

OVERARCHING MISSION

Expand and improve the already established, professional, flexible, sustainable, market-responsive, technology innovation center that serves to stimulate regional innovation-based economic development, by aligning the needs of industry, startup companies, researchers, and entrepreneurs with resources at University of Nevada, Reno.

NCAR will continue to be a central and public access point to utilize the broad range of technical services, intellectual capital, testing and research capabilities, advanced tools, and methodologies available at NCAR's Shared Research Facilities. As a one-stop shop for applied research, NCAR's mission is to help industries:

- Establish collaborative relationships between industry and academia that promote open innovation research programs and scientific studies to address real-world problems.
- Facilitate industry access to cutting-edge, shared research laboratories and sophisticated instrumentation and equipment.
- Build an interdisciplinary team of faculty, scientists, postdoctoral students, and graduate students to work on ongoing or one-off projects, or new-complex developments.
- Provide access to an entrepreneurs' support network that includes incubation and business mentoring from experienced entrepreneurs and executives.
- Provide reduced-cost co-working space available to the University community and local startups.

Along with the already existing UNR infrastructure (Shared Research Facilities and Core Labs), NCAR has leveraged new initiatives and associated infrastructure created between 2016-2023 that were designed to provide value to industry and to be closely aligned with strategic university programs.

GOALS

To enhance the development of programs that provide industry with a broad range of technical services, intellectual capital, testing and research capabilities, advanced tools and methodologies in Science and Engineering; helping to nurture the economic development of the State of Nevada.

Main foci are i) Robotics, ii) Life Sciences, and iii) Advanced Manufacturing, including the breadth of relevant fields and the convergence with other disciplines. NCAR offers fast and effective access to more than 40 Shared Research Facilities and Core Labs, including the High-Performance Computing Facility, to support existing and new programs.

Section II: Proposal Progress

During this reporting period, the Nevada Center for Applied Research (NCAR) has made progress toward meeting the proposed metrics. Major accomplishments for the current reporting period include:

Section II. A) NCAR MANAGEMENT: Create a Stand-Alone, Research and Development Technology Center to Enhance the Global Competitiveness of Nevada Industry.

Accomplishments

After NCAR took over the FAA-Designated Nevada UAS Test Site, under the Nevada Autonomous (NA) name, it continues to be fully operational and with an exceptional relationship with Federal Aviation Administration (FAA) and the other 6 Test Sites. NCAR/NA has developed a complete operational strategy to support companies and/or agencies that want to operate UASs in Nevada. The team plans to continue efforts towards UAS-based activities and during this reporting period has engaged more than 50 UAS and OEM companies looking to do business in Nevada. UAS-based-operations is a fast-growing field and proven in other states to be very promising driver of regional economic growth.

For this reporting period, NCAR has onboarded 4 new companies that are incubating on campus. These new companies, along with some of the existing companies, have created 34 new jobs. Also, for this reporting period, NCAR-affiliated companies have collectively received $3.5M in Venture Capital and other investments.

The Applied Research Facility (ARF) building continues to be renovated to keep up with the demands from high-tech startups and established technology companies that need these facilities. Wet Labs, Dry Labs and Office Spaces are completely occupied with affiliated companies developing cutting-edge technologies. For this reporting period, NCAR has executed 17 projects and re-invested $95,292 in ARF. As of today, close to $895,000 from our return-on-investment funds were used for these improvements and remodeling, making ARF infrastructure appealing to startups and established technology companies that want to move to or start operations in Northern Nevada.

The Intelligent Mobility (IM) initiative has many ongoing components, which include the Living Labs communication of large amounts of data from several intersections on Virginia Street, the Digital Twins system for bust stop maintenance, and Nevada Autonomous. Now, we are including a custom desktop high-performance computer system to process different Generative AI algorithms for Intelligent Transportation. Intelligent Mobility continues to be an attractive initiative for some companies, agencies, and entrepreneurs that want to do transit and/or mobility testing in our regional ecosystem.

NCAR continues with the development and submission of grant proposals in partnership with UNR faculty and/or affiliated companies. Grant applications continue to be an integral part of NCAR operations. To that end, NCAR is a stakeholder and active participant in the National Science Foundation Engines Development Award for advancing the circular economy for lithium batteries in Nevada, in addition to active NSF and FTA grants.

The iLab Operations Management system continues to grow with 9 cores and 1 mega-core consisting of 5 cores currently implemented. For FY25, we are planning to complete a new core (Clean Room from

Engineering). This institutional software reduces the administrative burden of participating service Cores, allowing more time to support researchers while providing access to state-of-the-art facilities for researchers, companies, and entrepreneurs at the same time.

International collaborations continue to be part of NCAR activities with several discussions with international companies and agencies. We successfully completed ArchitectECA2024, a project with 7 European Union countries. We are now part of Cynergy4MIE, a new European Union consortium of more than 14 companies, agencies, and academic institutions in 7 different countries.

Table 1. Key Performance Indicator Summary for the reporting Period

Highlights of NCAR Accomplishments
During this Reporting Period

Number of Companies Receiving Services	28
Number of Companies Using Facilities/Equipment	39
Number of New Affiliated Companies Onboarded	4
Number of New Jobs Created by Affiliated Companies	34
Patents Filed/Received by Affiliated Companies	4
Reinvested in the Applied Research Facility Building	$95,292
Invoice for Service and Facility Use Agreements	$499,107
Grants Awarded	$450,000
VC/Investments Received by Affiliated Companies	$3,500,000

Summary of the Knowledge Fund investment and Key Performance Indicators can be found on Page 25, Section V: Knowledge Fund Investment - Summary

Commercialization and Partnering Activities

NCAR currently has 33 affiliated companies working on campus, and during this reporting period, there were 67 companies and entities that have performed one or more types of fee-for-service or facility use agreements with UNR labs, faculty members and students.

Programmatic and Project Changes

N/A

Looking Forward

The successful trend for NCAR performance indicators along with the significant increase in the numbers of companies inquiring about potential UAS operations has increased the administrative burden; hence, new strategies are being developed to keep up with the increase in activities. As we coordinate and implement these strategies, NCAR will expand activities university-wide, adding a new focus, which is targeting larger companies with longer-term corporate-sponsored research activities, but maintaining and increasing current programs and initiatives that brings intellectual and economic growth to the state of Nevada. The growth in activities and affiliated companies has not only strained resources, but the Applied Research Facility, is at capacity, limiting additional growth, and denying startups and other innovative established companies access to these resources, and hence, inhibiting their potential to thrive in Nevada.

Section II. B) ROBOTICS: Create a state-wide "Institute of Service Science and Engineering"

Accomplishments

NCAR has assigned spaces in ARF for the research and development of robotics related activities, which include ground and areal robots for different applications. NCAR continues reaching out to all UNR faculty working on robotic developments to make sure that we can connect their research, development, and applications with our industry partners.

Mass Transit Autonomous System Data

Previously, the Intelligent Mobility team had worked with RTC on the "digital twin" project to explore the use of Lidar and cameras to automate infrastructure inspection. After exhaustively exploring the best ways to retrofit public transit vehicles with advanced sensors, the team concluded that Lidar is not ideal for this setting due to cost and risk of damage. At the conclusion of the project, the team also started to explore the use of Generative AI technologies such as large language models and vision-language models to assist with infrastructure inspection. Initial estimates were that Generative AI technology has the potential to reduce the cost of deploying AI in public transit by multiple orders of magnitude (from $50,000-$100,000 per vehicle with Lidar to less than $500 with GenAI). The team has continued to pursue this line of research and has found that indeed a $500 Generative AI system can outperform the previous $100,000 system. We have built a small, handheld system that attaches magnetically to a vehicle and uses a camera and AI to perform inspection from any vehicle (see image below). We continue to explore how to expand the deployment of these inspection units at a larger scale in Northern Nevada. This work has led to the open-source release of software for building AI systems.

Figure 1. Magnetic hand-held system for intelligent transportation

Autonomous Vehicle Program

The autonomous car continues to be used to support research in transit automation (see image above, of inspection unit attached to autonomous car). We continue to experiment with vision-language AI models that can run onboard the car without an internet connection. The team has also redesigned the car's rooftop sensor package to enable the construction of RGB color maps of the Reno area and is currently in the process of calibrating that sensor system.

Also, in support of the autonomous vehicle program, the team has designed, built, and is running a custom desktop computer with the ability to train and evaluate custom language models (see image below). This machine enables the team to work with large language models for a fraction of the cost of a cloud-based approach. This has led to another open-source release of software for running large language models on a local multi-GPU machine.

Figure 2. Custom desktop high -performance computer

Living Lab

Researchers continue to explore the best way to communicate large amounts of data from the intersections on Virginia Street to end users in public transit. The team continues exploring ways to "close the loop" from sensing to transit planning and traffic control, using adaptive algorithms and artificial intelligence. The team is looking at ways to improve traffic light timing in scenarios involving large flows of pedestrians, such as UNR football games. We also are discovering ways to improve disruptions to network connectivity because of construction projects, such as the construction of the new business building on the south end of the UNR campus.

Socioeconomic Impact

No new developments in this area. However, a proposal was submitted to the National Science Foundation (NSF) by some of the Intelligent Mobility team members. This grant was awarded by the NSF and the team will work now on a multidisciplinary approach to assessing city-wide near misses between vehicles and road users in Reno-Sparks, NV.

Legal and Regulatory Implications

No new developments in this area.

Digital Twins for Transit Infrastructure Maintenance

RTC has requested that UNR explore the possibility of adapting this technology to automatically detect tents at bus stops and stations, which is a growing issue in the Reno area. After a successful initial deployment, UNR and RTC are discussing how to extend the Digital Twin system and are exploring ways to find additional funding for further development since the project ended in October 2023.

Nevada Advanced Autonomous Systems Innovation Center (NAASIC)

The principles and goals of this program will remain the same. However, the NAASIC concept was integrated under the newly created Nevada Autonomous program presented below.

Nevada Autonomous

UNR Nevada Autonomous (UNR/NA) has taken a deliberate and effective approach to restarting the Nevada Unmanned Aircraft Systems (UAS) Test Site after assuming this role in 2022. Since GOED transferred the Test Site operation to NA from the previous operator, the Nevada Institute for Autonomous Systems (NIAS), UNR/NA has been diligently working with the Federal Aviation Administration (FAA), all other US Test Sites, the Reno/Tahoe Airport Authority, the Nevada National Security Site (NNSS) and several industry partners, to create a new identity for the Nevada UAS Test Site, nurturing government-industry and academic collaboration by creating projects, partnerships and workforce development programs that will open doors for UAS testing and for companies to look at the state of Nevada as the go to place for UAS activities.

The State of Nevada UAS / AAM Test Site is Operated by Nevada Autonomous, under NCAR at UNR. As of the end of this reporting period, the following has been achieved:

Capabilities and Assets

- Resources of University of Nevada, Reno (UNR)
- 1200 Square Mile OPAREA
- High Field Elevation Operations 4-6k ft
- Flight Altitudes up to 18k ft MSL
- Austere High Desert Environment
- Entire State of Nevada Available
- 300 Days of Sunshine per Year
- Primarily Class G Airspace
- Low Population Density
- Best Site for High Consequence Operations
- Four hours from Silicon Valley
- Focus on Low Technology Readiness Level (TRL) UAS and AAM Testing

Key Partnerships

- Nevada Governor's Office of Economic Development (GOED)
- Reno Tahoe Airport Authority (RTAA)
- City of Reno Beyond Program
- Reno Stead Airport (KRTS)
- Silver Springs Airport (KSPZ)
- Nevada National Security Site (NNSS)
- UNR Indigenous Relationships
- UNR Engineering, Aerospace Programs
- Nevada Aerospace and Defense Academy
- AUVSI Nevada Chapter Leadership

NV UASTS OPAREAs

- *Four OPAREAs with separate altitude limits*
- *Altitudes up to but not including 18K MSL*
- *Enables complex operations at Reno-Stead and Silver Springs Airports*
- *Operate UAS up to 300 lbm take-off weight*
- *Can operate BVLOS of remote pilot with mitigations*
- *>1000 square miles*

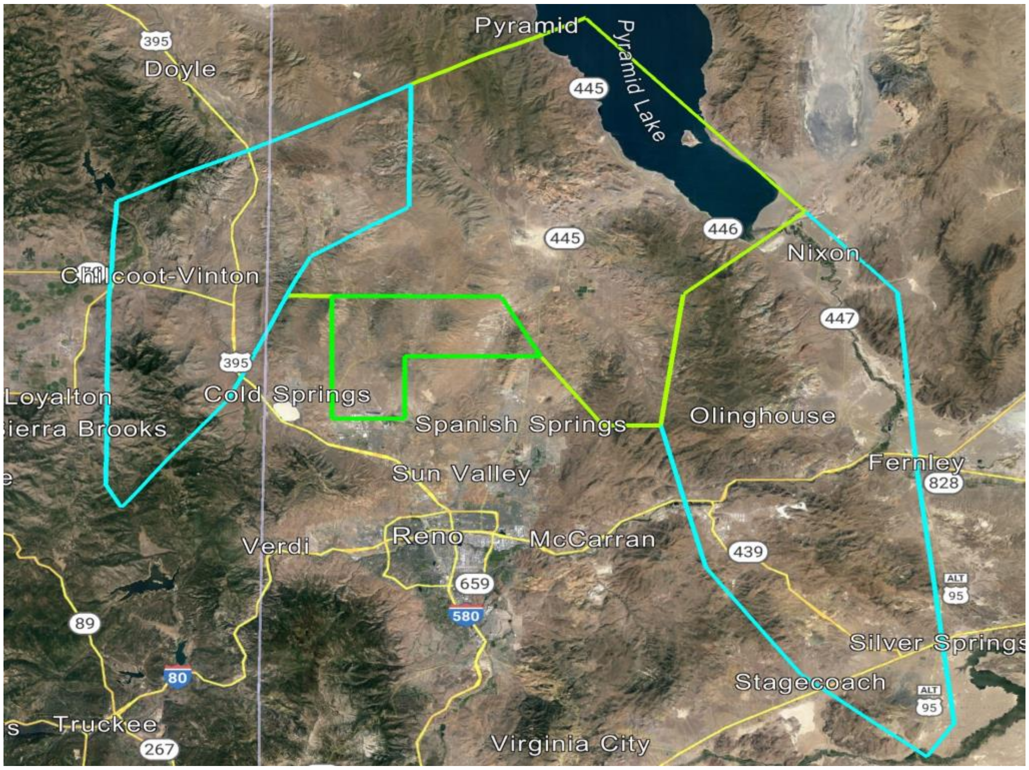

Figure 3. NV Test Site Operating Areas (OPAREAS)

Autonomous Robot Arena

NCAR will continue to support and improve the general capabilities of the Autonomous Robot Arena in ARF. The high-bay area at the ARF building was completely renovated and it is being modernized to make a more efficient area for robotic development and add new features and capabilities to the Robot Arena making it appealing for local and regional drone companies. The Robotic Arena is currently being used for a grant proposal and as a training ground for Nevada Autonomous.

Commercialization and Partnering Activities

N/A

Programmatic and Project Changes

We are in the process of integrating NAASIC into Nevada Autonomous.

Looking Forward

NCAR will continue the development and implementation of the IM Initiative, focusing on the full implementation and expansion of the Living Lab. NCAR is also developing a new strategic plan for corporate outreach to attract companies, agencies and talent to this program, the goal is to have this initiative fueled by industry-driven programs. After we receive the FAA's Civil waiver, Nevada

Autonomous operations shifted from small drones to larger aircraft capable of supporting Advance Air Mobility (AAM) and we expect to attract companies and agencies to the State of Nevada, creating a good opportunity for economic development.

Section II. C) LIFE SCIENCE: Create a self-supporting Biotech Hub in ARF

Accomplishments

As the central access point for highly innovative, fast-growing companies, the NCAR continues to provide access to UNR's cutting-edge capabilities, both physically and intellectually. Based on the number of biotechnology companies working with NCAR, we believe Northern Nevada could be an emerging biotech hub for the state, supported through the development of NCAR programs and initiatives.

In collaboration with the UNR Biotechnology Program, NCAR is resuming program development to design a pipeline between NCAR-affiliated startups and biotech students looking to acquire experience in R&D operations with potential for job placement upon degree completion. So far, respective websites have been deployed with literature designed to promote resources from both groups, including available infrastructure and resources from NCAR.

To complement the established Biotechnology Program pipeline, the NCAR has effectively launched the Wolf Pack STEM Internship Program in collaboration with the Nevada Career Studio to provide fully paid internships with local tech businesses, startup companies, as well as non-profit organizations. The program not only enhances workforce development efforts but supports the training and retention of STEM talent in the state of Nevada.

The Applied Research Facility (ARF) has emerged as a biotechnology cluster with significant growth in demand for wet laboratories. To satisfy this need, we launched a turnkey, fully furnished, shared biotech-focused innovation lab or the Biosciences Entrepreneurial Laboratory (BEL), by remodeling over 2,100 sq. ft. of wet laboratory space.

To complement the established BEL, we also completed a project to remediate previously unusable space in the ARF to create a central R&D support room. Aside from the procurement and installation of an industrial autoclave unit to support our biohazardous waste stream and sterilization needs, the space also provides necessary and centralized access to ultrapure water, flaked ice and a glassware washer.

Along with the BEL and the Autoclave and Research Resources lab, we completed the remodeling and purchasing of the necessary equipment for a Microbial Culture Room and a Cell Culture Room. These labs will be dedicated for culturing biosafety-level 2 (BSL-2) organisms and cell lines. While enhancing the safety of the BEL by segregating BSL-2 activities we will also be able to provide necessary quality assurance and control for affiliate R&D products.

The combination of the above-described infrastructure and access to sophisticated biotech equipment and intellectual capital on-campus are opening access to advance industry, innovation and scientific developments for the regional biotechnology industries, entrepreneurs and researchers.

BioBUBBLE Containment Environment

A large study sponsored by the NIH continues to be executed by the School of Public Health in this space supported by NCAR.

Genomics

The Nevada Genomics Center (NGC) was reallocated to ARF in a more dynamic space for the center, and it is fully operational. NGC is now closer, not only to NSHE users on campus, but also to all NCAR industry partners that may need to utilize its services.

Magnetic Resonance Imaging

Use of the functional Magnetic Resonance Imaging (fMRI) scanner at Renown Health continues to operate as a Core Lab, and it was successfully incorporated as part of a larger imaging core using the iLab System.

Proteomics Center

The Mick Hitchcock, Ph.D. Nevada Proteomic Center will continue to provide cutting-edge, mass spectral approaches for proteomic researchers within NSHE. NCAR will continue a campaign to provide these services to industry working with the Proteomics Center team to improve industry access to the services.

Bioinformatics

The Nevada Center for Bioinformatics was successfully moved to ARF and is fully operational. We are working now on enhancing this core facility and the bioinformatics research resources, services, and training in support of existing research programs, development of new programs and develop a more comprehensive portfolio of services for industry clients.

Commercialization and Partnering Activities

N/A

Programmatic and Project Changes

N/A

Looking Forward

One of the main challenges now is the need for new wet lab spaces. The Applied Research facility is at capacity and at this point, we are turning down requests from companies and entrepreneurs in need of wet labs. Looking forward to identifying spaces on- or off-campus where we can continue offering resource and services to new enterprises.

Section II. D) ADVANCED MANUFACTURING: Establish industry-funded "Industry University Cooperative Research Center".

Accomplishments

Proposal development support from GOED helped the University receive a Type-1 NSF Engines Development Award of $1M. The University is now working diligently to be competitive for a full implementation grant of up to $160M over a 10-year period. The University has formed working groups that are made up of stakeholders with relevant expertise to work together over a 24-month project period to flesh out strengths and **opportunities in economic development, use-inspired research, culture of innovation and workforce development.** The momentum of the Type-1 achievement helped lead the University to be named an EDA Tech Hub. The State Legislature's Interim Finance Committee recently approved a provisional $7.5 million match for a $75 million appropriation from the EDA to fund the Tech Hub. In partnership with the Economic Development Authority of Western Nevada (EDAWN), the state government is contributing to **national security and creating the businesses and new jobs** that will power broader national and statewide economic development.

NCAR is an active participant of this ype-1 NSF Engines Development, that envisions a region in which workforce and economic development practices, private-sector innovation, and use-inspired research are coordinated and aligned to support the circular lithium economy. We will make every effort to have the NCAR model implemented in this engine and create an advance manufacturing ecosystem to advance the circular economy for lithium batteries in Nevada.

Commercialization and Partnering Activities

N/A

Programmatic and Project Changes

N/A

Looking Forward

Once an internal framework for advanced manufacturing is defined, we will attempt to find a group of initial industry partners that can pilot this effort.

Section II. E) HIGH PERFORMANCE COMPUTING (HPC) FACILITY

Accomplishments

The primary use of the HPC has shifted from Intelligent Mobility to more general applications. The HPS has limited capacity for current applications and may need to be updated. There are no specific plans for NCAR to work on any updates.

Commercialization and Partnering Activities

N/A

Programmatic and Project Changes

N/A

Looking Forward

NCAR Associations are being promoted and access to the HPC resource is available for industry partners and initiatives.

Section II. F) OTHER PROPOSALS DEVELOPMENT

To increase multi-disciplinary activities with faculty members and industry partners, NCAR has been supporting/developing different grant applications. See Table 1 in the Performance Section.

Table 2. Awarded Grant – Supported by NCAR's Incubating Companies and/or Developed by NCAR			
Category	**Recipient**	**Awarding Entity**	**Amount**
**Health Science	UNR/NCAR	Strategic Progress, LLC	$50,000
**Cybersecurity	UNR/NCAR Innovative Res Analysis	Office of Homeland Security	$100,000
**Biosciences Administration	IDeA Network of Biomedical Research (INBRE)/NCAR	National Institute of General Medical Sciences	$300,000
**Bioscience	UNR-DxDiscovery	National Institute of Health	600,000
**Bioscience	UNR-DxDiscovery	National Institute of Health	589,866
**Bioscience	UNR-DxDiscovery	National Institute of Health	1,453,291
**Bioscience	UNR-DxDiscovery	US Department of Defense	200,000
**Bioscience	UNR-DxDiscovery	National Institute of Health	600,000
**Bioscience	UNR-DxDiscovery	US Department of Defense	999,899
**Bioscience	UNR-DxDiscovery	US Department of Defense	150,000
**Bioscience	UNR-DxDiscovery	National Institute of Health	420,640
**Bioscience	UNR-DxDiscovery	US Department of Defense	999,395
**Bioscience	UNR-DxDiscovery	National Institute of Health	25,000
**Battery Development	NexTech Batteries	Department of Defense	$250,000
**Bioscience	UNR-EscaZyme	National Institute of Health	$124,000
**Bioscience	UNR-EscaZyme	STTR	$225,000
**Bioscience	UNR-EscaZyme	STTR	$225,000
**Bioscience	UNR-EscaZyme	Private Partner	$530,000
**Bioscience	UNR-EscaZyme	STTR	$225,000
Traffic Management	UNR-Intelligent Mobility	Regional Transportation Commission (Washoe County)	$250,000
**Traffic Management	UNR-Intelligent Mobility	Nevada Department of Transportation	$313,397
**Traffic Management	UNR-Intelligent Mobility	Regional Transportation Commission (Southern Nevada)	$86,000
**Bioscience	UNR-DxDiscovery	National Institute of Health/ National Institute of Allergy and Infectious Diseases	$595,000
**Bioscience	UNR-DxDiscovery	National Institute of Health/National Institute of Biomedical Imaging and Bioengineering	1,490,000
**Robotics	Autonomous Robots Lab	Defense Advanced Research Projects Agency	$4,489,329
**Bioscience	UNR-Dx Discovery	Department of Defense	$398,927
**Bio-Bubble/Community Health	UNR-Sc. Of Community Health	National Institute of Health NIDA/FDA Center for Tobacco Product	$20,000
**Traffic Management	UNR-Intelligent Mobility	Regional Transportation Commission (Washoe County)	$450,000
**Road Feature Extraction	UNR-Intelligent Mobility	Department of Transportation	$328,819
**Autonomous Vehicles	UNR-Intelligent Mobility	Ozmen Center for Entrepreneurship	$2,690
**Mining - Autonomous	UNR	Nevada Gold Mine	$65,282
**Mining - Autonomous	UNR	Nevada Gold Mine	$46,615
** Mining - Autonomous	UNR	Nevada Gold Mine	$80,179
** Advanced Mobility	UNR-RTC	USDOT – Federal Transit Administration	$195,392
** Critical Material	American Battery Metal Corp.	USDOE Advanced Manufacturing Office	$4,500,000
** Batteries	American Battery Metal Corp.	US Advanced battery Consortium	$2,000,000
**Diagnostic	UNR-DxDiscovery	NIBIB SBIR Phase II	$433,825

**Diagnostic	UNR-DxDiscovery	NIAID SBIR Phase I	$150,779
**Diagnostic	UNR-DxDiscovery	Department of Defense	$39,906
**Defense	Goodman Technologies	NASA: Johnson Space Center	$749,996
**Defense	Goodman Technologies	US Navy - Office of Naval Research	$999,986
** UAS / Remote ID	NCAR-Nevada Autonomous	Federal Aviation Administration	$109,901
**Battery Recycling	American Battery Technology Company	US Department of Energy	$57,000,000
**Battery Recycling	American Battery Technology Company	Company's Cost Share	$57,000,000
**Battery Recycling	American Battery Technology Company	US Department of Energy	$10,000,000
**Dermatophyte diagnostic	UNR-Dx Discovery	NIBIB SBIR	$1,482,335
**Coccidioidomycosis diag.	UNR-Dx Discovery	SBIR Phase II	$1,469,691
**SYMBA Project	UNR-Dx Discovery	Department of Defense	$546,786
**Orbital Reef Challenge	Ecoatoms	Blue Origin	$50,000
**Military development	Goodman Technologies		$224,980
**Intelligent Mobility/Pedestrian Safety	UNR/NCAR	National Science Foundation	$147,035
** Aerospace	US Space Workforce	Goodman Technologies	$1,249,978
** Pertussis Diagnosis	DxDiscovery	National Institute of Allergies and Infectious Diseases	$1,009,408
** Prosthetics/Robotics	Adaract	National Institute for Disabilities, Independent Living and Rehabilitation	$100,000
**Robotics	Adaract	US Air Force	$110,000
**Battery/Recycling Technology	American Battery Technology Company	US DOE	$57,000,000
**Battery/Recycling Technology	American Battery Technology Company	US DOE	$10,000,000
*Aerospace Tech	Ecoatoms	NASA TechLeap Prize	$200,000
*Clean Energy	Gennext Materials & Technologies, LLC	Department of Energy	$250,000
		TOTAL THIS REPORTING PERIOD	$450,000
		TOTAL SINCE INCEPTION	$223,703,327

** Reporting period*
*** Previous periods*

Section II. G) STARTUP AND TECHNOLOGY INDUSTRY TALENT RETENTION (VIA INTERNSHIP) PROGRAM

The Start-up and Technology Industry Talent Retention (via Internships) Program at the University of Nevada, Reno is managed by the Nevada Career Studio (NCS) and is named the Wolf Pack STEM Internship Program (Pack STEM). In April 2023, an Internship Coordinator was hired to manage the program.

The Coordinator and NCS Director worked closely with the Nevada Center for Applied Research (NCAR) and the Economic Development Authority of Western Nevada (EDAWN) to finalize the program structure. As a result, a Wolf Pack STEM Internship program process was created, two pilot programs were completed, and two UNR women STEM students partook in the program. The two start-up companies that participated in the program were Iris Automation and Adaract, both NCAR affiliated companies.

Section II. H) EXPANSION OF THE SBIR/STTI MENTORING PROGRAM

The Sierra Accelerator for Growth and Entrepreneurship (SAGE) program supports community and economic development by providing SBIR/STTR grant support services to Nevada businesses, innovators, and entrepreneurs.

Program participation

During the reporting period 2/1/24-7/31/24, SAGE received 15 new applications from small businesses, 9 of which were from Northern Nevada, 5 from Southern Nevada, and one from North Carolina, which was deemed not suitable for the program. The list of new program participants during this reporting period is shown in Table 1.

Application Process

In this reporting period, a total of 10 new SBIR/STTR proposal preparations were initiated. The grant opportunities are with the National Science Foundation (NSF), the Air Force SBIR Program, and the Department of Transportation SBIR Program. Of these 10 proposal preparations, 5 were started by new SAGE applicants for this reporting period.

Furthermore, a total of 9 SBIR/STTR proposals were submitted to the federal agencies by previous/current SAGE applicants. Of all participants in the program, 3 proposals to the NSF were accepted to apply to their Phase 1 SBIR program, one Phase 1 proposal was submitted to the Air Force SBIR Program, and one Phase 1 proposal was submitted to the Department of Transportation SBIR Program. Both are awaiting feedback on whether the proposals will be funded. Lastly, four proposals were rejected by the NSF and will be re-applying during the next funding cycle, which begins on Sept. 19, 2024. The companies that are not actively developing proposals are currently seeking other funding opportunities with the federal agencies or were not eligible for the SBIR program.

Development of WolfCorps

WolfCorps is designed to help move research beyond the university laboratory and guide the process of transferring research innovations into products and processes that benefit society. Based on the Lean Launchpad methodology developed by Steve Blank, WolfCorps offers researchers an immersive training experience where participants engage with industry leaders to identify challenges and develop targeted solutions.

Program Participation

The WolfCorps program has been on hold since the departure of the program manager and lack of funding. However, we have recommended several faculty, student, and non-university affiliated entrepreneurs to a similar program at the University of Nevada, Las Vegas.

In compliance with requirements for the Nevada Knowledge Fund grant, the following semi-annual updates relate to annual goals.

a. *A statement of the benefit to the public from the distribution of the Knowledge Account Grant funds, including documentation that supports the benefit;*

Nevada's strategic investment through the Knowledge Fund leverages the research, innovation, and entrepreneurial initiatives at the University of Nevada, Reno (UNR) to support economic development in the state. One national indicator of economic growth is the number of Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grants awarded for each state. These grants are a key tool to help accelerate innovations at our universities and bring technologies *from lab to market*.

The Sierra Accelerator for Growth and Entrepreneurship (SAGE) program provides tailored support to innovators and entrepreneurs to improve their chances of receiving these grants. As a result of an entrepreneur securing a SBIR/STTR grant, the community may experience increased opportunities for employment, heightened business activity, and subsequent economic growth.

WolfCorps is designed to move research beyond the university laboratory and guide the process of transferring innovations to the marketplace that benefit society. WolfCorps is the springboard to the NSF I-Corps program, an immersive entrepreneurial training program that focuses on customer discovery. Successful completion of the I-Corps program strengthens a company's chance of successfully obtaining SBIR or STTR grants.

b. *Information regarding the recruitment, hiring, operation and retention of research teams and faculty to conduct research in science and technology which has the potential to contribute to economic development in this State*;

The objective of the program is to recruit faculty, students, small businesses, and community entrepreneurs to engage in technology-based innovation, both via the launch of new Nevada-based technology companies and to enhance technology innovation at the existing small-to-medium enterprises (SME) in Nevada. The SAGE and WolfCorps programs do not engage in personnel hiring and operations but instead support UNR faculty and members of the business community to obtain grants and develop their business plans.

c. Information regarding research laboratories and related equipment located or to be located in this State;

Not applicable to SAGE or WolfCorps.

d. Information regarding the construction of research clinics, institutes and facilities and related buildings located or to be located in this State;

Not applicable to SAGE or WolfCorps.

e. Information regarding the research being conducted by the research teams and faculty for which the Executive Director of GOED has provided funding pursuant to NRS 231.1597;

For this reporting period, SAGE companies that have applied or are applying for grants are working on research that falls under the following technology sectors or industries:

- Mining
- Renewable Energy
- Education
- Cybersecurity
- Infrastructure
- Bioinformatics
- Consumer goods
- Distributed Ledgers
- Consumer Products
- Aerospace
- Agriculture
- Environmental Technology
- Healthcare
- Biomedical

f. *Information regarding the number of invention disclosures, provisional patent applications, and utility patent applications which have been filed, and the number of patents which have been granted or issued, as a result of the programs established pursuant to NRS 231.1591 to 231.1597, inclusive;*

The applicants to the SAGE program during this reporting period are all businesses not associated with the University. The company inventions and patents, if any, are private and business confidential and are not tracked under the program.

g. *Information regarding the amount of research grants, gifts and donations awarded to the research teams and faculty recruited, hired, and retained pursuant to NRS 231.1597;*

SAGE assists companies with accessing two types of grants, Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grants. The number of new SBIR/STTR awarded as a result of this program will not be available until late 2024.

h. *Information regarding all grants, gifts, and donations to the Knowledge Account from public and private sources made through the Research Universities;*

Not Applicable.

i. *Information regarding matching funds for federal and private sector grants and contract opportunities that support economic development consistent with the State Plan for Economic Development developed by the Executive Director pursuant to subsection 2 of NRS 231.053;*

Matching funds are not a metric applied to SBIR/STTR or NSF I-Corps grant programs.

j. *Information regarding the number of businesses that have been created or expanded in this State, or relocated to this state, because of the programs established pursuant to NRS 231.1591 to NRS 231.1597, inclusive;*

For the SAGE program during this reporting period, we assisted two new companies to register as a business entity in Nevada.

k. *Information regarding the number of jobs which have been created or saved as a result of the activities undertaken pursuant to this Agreement;*

Information not collected.

l. *Information regarding activities related to workforce development and training such as certificate programs and degree programs;*

SAGE is not a certificate or degree program.

m. *For projects requiring a Financial Sustainability Plan, information regarding progress toward attainment of sustainability;*

The Knowledge Fund has supported UNR as it builds competency and capacity toward a longer-term SBIR/STTR program. UNR plans to continue SAGE and WolfCorps services to faculty, University spinouts, and community entrepreneurs beyond the initial funding period.

For the SAGE program, UNR has applied to be a component in Nevada's application for the Small Business Administration's (SBA) Federal and State Technology (FAST) Program. News on funding will arrive in late 2024.

For the WolfCorps program, UNR will continue sending entrepreneurial candidates to the University of Nevada, Las Vegas for a similar training program until a program manager is hired. UNR is currently working with the University of Nevada, Las Vegas to incorporate itself in the Desert and Pacific Region hub once that time comes.

n. *All Commercialization Revenue, as defined in Section IV, received and the allocation of such Revenue to the Inventor and the Research University as a result of the funded project.*

Entrepreneurs and startup companies applying for SBIR/STTR and WolfCorps are in their early stage. It's unlikely that there will be significant commercialization revenue by the end of the one-year program period as a result of an SBIR/STTR grant. Additionally, revenue generated from products and services sold by private companies is considered proprietary corporate financial information. We do not track this private information.

TABLE 3. New SAGE Program Applicants for the period 9/1/23-1/31/24.

Company Name	Industry or Technology Sector	General Location
Connected Future Labs	Biomedical	Northern Nevada
DRW Consulting	Utilities	Northern Nevada
RMDy AI	Telehealth	Northern Nevada
AmplifAI	Telehealth	Northern Nevada
OldEKG.com LLC	Healthcare	Northern Nevada
Trash2Treasures LLC	Waste Management	Northern Nevada
Deltium LLC	Environmental Technology	Northern Nevada
AOE Geens LLC	Agriculture	Northern Nevada
StemTech International	Professional and Business Services	Northern Nevada
Kiron.AI	Healthcare	Southern Nevada
Starz Electronics	Electrical Equipment Manufacturing	Southern Nevada
Sm24.AI	Biomedical	Southern Nevada
Ultion Technologies Inc	Electrical Equipment Manufacturing	Southern Nevada
One Well LLC	Textile Product Mills	Southern Nevada
SOAR	Telehealth	North Carolina

Commercialization and Partnering Activities

N/A

Programmatic and Project Changes

N/A

Looking Forward

To continue the program with the current successful outcomes.

Section III: Performance

TABLE 4: COMPANIES CURRENTLY AFFILIATED WITH NCAR: Start-ups/Spinouts

	Company Name	Core Specialty	Original Location	Type	Jobs Created Total	Job Created This Period
1	AbVision, Inc.	Biopharmaceutical Company	Reno, NV	Start-up	4	
2	Adaract	Artificial Muscles	Reno, NV	Start-up	7	
3	Alternate Environmental Technology Holdings Company	Environmental Technology Company	Auburn, WA	Start-up	5	
4	American Battery Technology Company	Lithium Batteries	Cambridge, MA	Established, moved R&D operations to Reno	27	6
5	Atlas Magnetics	Spark Testing	Reno, NV	Start-up	7	
6	Bio-Med Scientific, LLC	Biomedical	Reno, NV	Start-up	4	
9	DxDiscovery, Inc.	Biomedical	Reno, NV	UNR Spin Out	12	4
10	Ecoatoms	Aerospace Biomanufacturing	Reno, NV	Start-up	15	12
12	(*)eNVy Formulations	BioSciences	Reno, NV	Start-up	1	1
13	Ethox Chemicals	Chemical Materials	South Carolina	Established	3	
14	Eye Sight Quest, LLC	Optometry	Reno, NV	Start-up	3	
15	(*)GenNEXT Materials & technologies, LLC	Advanced Manufacturing & Alternate Energy	Reno, NV	Start-up	2	2
16	Goodman Technologies, LLC	Technology		Start-up	3	
17	Hamilton Company	Liquid Handling and Measuring Devices Developer	Reno, NV	Established, expanding R&D to Reno, NV	12	
18	Innovomer, LLC	Innovative Polymer Materials Developer	Blairsden, CA	Start-up	2	

19	LF Research	Electromagnetic Tests	Poplar Grove, IL	Established, moved operations to Reno.	2	
20	LiDAR Matrix, Inc.	Lidar Sensors and Devices	Reno, NV	Start-up	3	
22	Macoma Environmental Technologies, LLC	Environmental Technology	Las Vegas, NV	Start-up	5	
23	NV LED Optics, Inc.	LED manufacturing	Reno, NV	Start-up	2	
24	(*)NVTX Energy, Inc.	Batteries	Carson City, NV	Start-up	4	4
25	Phigenics, LLC	Water Management	Warrenville, IL	Expanding R&D Operations	15	3
26	RosVivo Therapeutics	Biotechnology	Reno, NV	Start-up	4	
27	TLS Supply Chain Solutions, Inc.	Warehousing/ Land, Air, Sea Freight	Turkey	Start-up	14	
28	Truckee Applied Genomics, LLC	Biotechnology	Reno, NV	Start-up	5	
29	TuBiomics, Inc.	Biomedical	Reno, NV	Start-up	4	
30	UVC Science, Inc.	UV Lights Development	Reno, NV	Start-up	4	
31	(*)Your Main Lab, LLC	Healthcare	Reno, NV	Start-up	2	2
32	Zhittya Genesis Medicine, Inc.	Biomedical	Reno, NV	Start-up	2	
Total Jobs Created Current NCAR Affiliated Companies					173	34

(*) Onboarded during this reporting period

TABLE 5: NCAR GRADUATED (Alumni) COMPANIES

Company Name	Core Specialty	Original Location	Jobs Created Total
Alert Wildfire System	IOT	Reno, NV	1
Bioelectronica, Inc.	Biomedical	Palo Alto, CA	10
Lana Sheta DBA FloCheck	Biotech	Reno, Nevada	1
DRW Consulting, LLC	Consulting/R&D	Carson City, NV	1
Khepra, Inc.	Biotechnologies	San Diego, CA	4
Kremenak Nanotech	Biomedical	Columbia, MO	3
Prothelia, Inc.	Biotechnologies	Boston, MA	9
Disruptor Scientific	Nanomaterial	Reno, NV	2
EnCompass Technologies, Inc.	Biomedical	Carson City, NV	3
Eye Sight Quest, LLC	Optometry	Reno, NV	3
Osanni Bio, Inc.	Biotechnology	Delaware/Reno, NV	2
Renogenyx, Inc.	Biotechnology	Reno, NV	4
Avanus Corporation	Electronic Devices	Berkley, CA	1
Theralytix, LLC	Biomedical	Danville, CA	2
LabSync Consulting, Inc.	Biotech Consulting	Reno, NV	3
Carolina Cannabinoids	Hemp derived from Cannabinoids	Charlotte, NC	1
Adaract	Artificial Muscles	Reno, NV	7
Atlas Magnetics	Spark Testing	Reno, NV	7
TOTAL			64

	This Reporting Period	TOTAL
TOTAL CUMULATIVE JOBS CREATED BY AFFILIATED COMPANIES	34	237

Section IV: Metrics (Return on Investment)

Table 6. NCAR: KNOWLEDGE FUND SUMMARY ROLL-UP PROJECT: Income/Funds directly and indirectly related to NCAR activities		
	This Period Feb 1, 2024, to Jul 31, 2024	Since Inception Jan 1, 2016, to Jul 31, 2024
Fee for Service Agreements (D)	$136,504	$2,474,690
Facility Use Agreements (including BEL / EL System) (D)	$362,603	$2,324,272
Evolutionary Computing System Lab (*) (D)	$0	$140,510
Gifts / Donations (**) (D)	$0	$4,965,572
Other Contributions (***) (D)	$0	$1,200,000
Grants (****) (D) (I)	$450,000	$223,703,327
VC/Investments Received by Affiliated Companies (I)	$3,500,000	$323,466,000
Total ROI	**$4,449,107**	**$558,274,371**

(*) No longer a program under Knowledge Fund
(**) Mick Hitchcock (Proteomics): $1,200,000 / Mick Hitchcock (HPCF): $200,000 / Switch (in-kind) in technology infrastructure support (space, power & security for 5 years): $3,400,000 / Mick Hitchcock (Sterilization Room & Equipment in ARF): $165,572
(***) Nevada Terawatt Facilities/NSTec: $400,000 / UNR/VPRI (HPCF): $800,000
(****) See Table 1 above for details

Section V: Knowledge Fund Investment – Summary

University of Nevada, Reno

Knowledge Fund Investment

Funded by Nevada Governor's Office of ECONOMIC DEVELOPMENT

$8.7M Knowledge Fund investment over 11 years

$327M in venture capital raised by affiliated startups (cumulative)

143 companies, agencies, orgs engaged through memberships or agreements (during reporting period)

881 jobs created by affiliated companies (cumulative)

62 companies with University-based operations (during reporting period)

$235M+ in grants, contracts, gifts, agreements (cumulative)

Programs Supported: Serving Nevada's Economic Growth

Nevada Center for Applied Research
Providing industry, entrepreneurs and agencies access to the University's labs, equipment and expertise by:

- Offering **access to more than 60 leading-edge labs, support and affordable co-working and laboratory space on campus.**
- Facilitating **large-scale research initiatives** involving coalitions of public and private stakeholders.
- Supporting **incubation of early-stage science and technology businesses.**
- Supporting **workforce development** and experiential learning for students.
- Collaborating with Manufacture Nevada to support **customers seeking R&D, upskilling and moving from prototyping to production to manufacturing.**

Innevation Center
A hub of entrepreneurialism in downtown Reno, supported in part by the Knowledge Fund and open to the community through a membership model, the center is:

- Facilitating access to mentorship, investors, makerspace, interns and more.
- Partnering with local organizations to support the **startup ecosystem** and celebrate the **entrepreneurial spirit**; a primary venue for the Reno Startup Week.
- Managing the K-12 Robotics Center for **robotics-based education and competition that is strengthening paths to degrees and careers.**

Knowledge Fund-supported efforts – Further RESULTS since 2013

- **$235.8M** total in grants, contracts, agreements and donations received
- **18** spin-off companies
- **24** companies relocating to Nevada
- **12** faculty hired full-time by Knowledge Fund
- **11** faculty receiving some portion of support
- **117** student interns engaged with projects (hired by affiliated companies)
- **14** student employees (hired by University)
- Patents filed by University – none, work in progress
- **129** patents filed by companies incubated in NCAR
- **881** jobs created
- Commercialization revenue to University – none, work in progress
- **$327M** venture capital raised by affiliated companies

Nevada Autonomous
Developing robotics, artificial intelligence and autonomous systems, with current research that includes:

- **Drone and unmanned aerial operations, driverless cars, advanced manufacturing systems, underground and underwater robots**.
- Management of Nevada's official, **FAA-designated Unmanned Aircraft Systems (UAS) Test Site Service** – covering 1,000 square miles of FAA-approved airspace in Northern Nevada – conducting research and development in areas such as **infrastructure inspection, fire detection and mitigation, first responders, and medication and other critical deliveries**.
- **Leadership in Beyond-Visual-Line-Of-Sight (BVLOS) operations and partnerships with regional mine companies** testing underground robotics applications **for exploration and safety.**
- Establishment of **safety procedures that have been validated** through field trials since 2015.
- **International collaborations** with Silicon Misiones and Macoma Environmental Technologies, LLC in Argentina.

Startup and Tech Industry Talent Retention: The Wolf Pack STEM Internship Program
Managed by the Nevada Career Studio, this program supports the **training and retention of STEM talent, focusing on women and underrepresented minorities**. Students apply their education and **gain experience in the tech industry**. Since its launch in 2023, the program received over **1,100 applications for its first 82 positions**, and has already **placed hundreds of students in competitive-wage internships.** Four interns working at Dragonfly Energy have continued past original internships, and two **likely to be hired as full-time engineers after graduating.**

Intelligent Mobility
Developing solutions for safe, clean and efficient transportation. This statewide effort coordinated through NCAR involves:
- **Researchers with expertise** in synchronized transportation, advanced autonomous systems, computer sciences and robotics, geography, social psychology and judicial studies.
- **"Living Laboratory" real-world test sites in northern and southern Nevada**, with "LiDAR-enhanced" roads able to communicate data to connected vehicles.
- **International research collaborations** and active participation in the ArchitectECA2030 project with the European Union Consortium.

Sierra Accelerator for Growth and Entrepreneurship (SAGE)
SAGE is designed to put Nevada's qualified small, technology-based businesses on the path to earn federal grant funding through the competitive SBIR and STTR programs.

Making a Difference for Nevada

American Battery Technology Company (ABTC)
The University's co-location of ABTC (NASDAQ: ABAT) **brings new R&D venture to campus, opportunities to students and economic development to Nevada**. One of the 20 manufacturing and processing companies receiving grant awards as part of the Bipartisan Infrastructure Law, ABTC has pioneered first-of-kind technologies to unlock recycled battery metals critically needed to help meet the significant demand from the electric vehicle, stationary storage, and consumer electronics industries. The company was recently selected for another highly competitive Department of Energy grant for $150M to be applied toward the construction of their second U.S. lithium-ion battery recycling facility. *"We are very fortunate to be working with a premier university such as **UNR that embodies some of the top metallurgical and chemical engineering programs in the nation.** The partnership with NCAR enables a seamless relationship with the University and allows us to take full advantage of University resources including facilities, faculty and students." – Ryan Melsert, CEO, American Battery Technology Company*

Nevada Unmanned Aircraft Systems (UAS) Test Site
Nevada was designated by the Federal Aviation Administration (FAA) as one of 7 state to serve as a **center for the development and testing of unmanned autonomous systems (UAS) vehicles.** The University executed the first-ever Nevada Autonomous/Nevada Unmanned Aircraft Systems Test Site (NV UASTS) contract with FAA. This combined UAS and named aircraft – under the control of the UNR Nevada Autonomous Mission Commander – led to a test for Remote ID (RID) Technologies in support of first responders. Also, through NCAR support, **San Francisco-based company** Kraus Hamdani Aerospace recently **moved their testing manufacturing operations to the University.**

Ecoatoms
An affiliate of both the Innevation Center and NCAR, Ecoatoms, Inc. is using three specialized research labs in the University's Applied Research Facility, and is utilizing resources and expertise to design and build specialized space payloads called 'Ecos' (habitats). Ecoatoms stands at **the forefront of on-orbit materials science, developing compounds and medical devices** that leverage the unique conditions of space. Their recent payload onboard a NASA flight on Blue Origin included hundreds of sensors, such as medical device strips coated while under microgravity conditions. This technique results in more uniform coatings, enhancing the sensitivity and specificity of the sensors – an advancement that could lead to **improved disease detection capabilities**. *"The opportunity to use **NCAR's fee-for-service model for expensive equipment and the unique drone testing capabilities** in Nevada have been instrumental in our success." – Solange Massa, founder and CEO, Ecoatoms*

NSF Engines and EDA Tech Hub – Synergistic opportunities through federal, state and industry investments
The Knowledge Fund has been instrumental in securing the **NSF Engines Development Award** for the University, a crucial milestone in advancing the state's innovation ecosystem. Through proposal development support from GOED, the University received a $1 million Type-1 NSF Engines Development Award. This grant is enabling the University to build a strong foundation for future growth, as it now competes for a full NSF Engine implementation award worth up to $160 million over 10 years. The Knowledge Fund's backing has allowed the University to form working groups that bring together experts in economic development, research, innovation, and workforce training. This collaborative approach aligns with Nevada's broader goal of creating a robust lithium circular economy, an effort championed by the **Recharge Nevada** initiative. The success of the Type-1 award has also contributed to the University being named an **EDA Tech Hub**, positioning Nevada as a leader in clean energy and advanced technologies.

These efforts are funded by different federal agencies and have unique vantage points and deliverables but complement each other and **work towards common goals.**

For more information

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Section VI: Budget

Please see budget documents prepared by UNR Office of Sponsored Projects Administration.