



NEVADA SYSTEM OF HIGHER EDUCATION

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NEVADA SCIENCE AND TECHNOLOGY PLAN

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Nevada System of Higher Education

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INTRODUCTION

This Nevada Science and Technology Plan is presented by the Nevada System of Higher Education Board of Regents as a blueprint for the future. It is intended to provide sufficient details about the directions, capability, and vision of the educational, research, and economic development efforts of the Nevada System of Higher Education (NSHE) and its community partners to frame future decisions about directions for Nevada and for public higher education. Through the years, the State of Nevada has partnered with NSHE and has dedicated financial resources to support science and technology education and research programs.

This Plan provides the foundation for focusing research and education efforts statewide to benefit Nevada's citizenry, with consideration given to the research capacity and infrastructure already in place at NSHE institutions and potential opportunities for external funding. The Plan has been developed by the research officers of the three NSHE research institutions in concert with their research faculty and reviewed by the statewide EPSCoR (Experimental Program to Stimulate Competitive Research) Advisory Council and the NSHE Board of Regents.

The three research institutions of NSHE are the Desert Research Institute (DRI), the University of Nevada, Las Vegas (UNLV), and the University of Nevada, Reno (UNR). DRI operations are funded primarily through external research funding while the two universities receive more state general revenue funds for instruction and service activities. Total research funding for these three institutions for fiscal year 2008 was \$131 million with the majority coming from federal (62%) and federal pass-through (19%) sources. Research funding represented 65 percent of sponsored projects for NSHE.

Nevada is a member of the network of states participating in the federally-supported research-stimulation programs called the Experimental Program to Stimulate Competitive Research (EPSCoR) and Institutional Development Award (IDeA). EPSCoR began in 1979 at the National Science Foundation when five states received planning grants to develop strategies to build their research infrastructure. Nevada joined EPSCoR in 1985 with the awarding of its first planning grant and received its first infrastructure award in 1986. Since that time, Nevada has been awarded more than \$51 million in infrastructure grants through the United States Department of Agriculture (USDA), National Science Foundation (NSF), Department of Defense (DOD), Department of Energy (DOE), Environmental Protection Agency (EPA), National Aeronautics and Space Administration (NASA), and the National Institutes of Health (NIH). As Nevada moves forward in assembling greater research capability, EPSCoR is an important building block to assist in targeting key areas identified in this plan. Generally, funds received through these programs also require State General Fund matching dollars.

Nevada faces very critical issues at this time related to research and development, as do the other western states. To address these issues, key focus areas are identified and developed within this plan. These are not in ranked order because each is critical to Nevada's economic and environmental future. Three overarching themes for these focus areas are Natural Resources, Human Health, and Infrastructure and Technology. Within each theme, the following areas will be addressed by this plan:

Natural Resources

Alternative and Renewable Energy
Climate Change
Water Resources

Human Health

Health Care Access & Research
Public Health
Aging Services

Infrastructure and Technology

Transportation
Materials Science
Biotechnology

Each of these research focus areas is examined in this document with careful consideration given to the specific challenges facing Nevada, the assets available to meet these challenges, goals for the State of Nevada in each focus area, and strategies for how the Nevada System of Higher Education can provide the faculty expertise, applied and basic research, technology transfer, and graduates to help the State meet these goals.

NATURAL RESOURCES

I. ALTERNATIVE AND RENEWABLE ENERGY

The following quote outlines the economic, societal, and environmental benefits of alternative and renewable energy for Nevada.

Rising energy prices have spurred renewed interest in renewable energy sources, such as wind, geothermal, biomass, and solar power for electricity production, home heating, and home cooling. Alternatives to nonrenewable energy sources such as coal and natural gas have many advantages in terms of reducing emissions that lead to global warming, air-quality improvements, and related environmental and health benefits. Until recently, the market price of nonrenewable energy was low enough that converting to renewable sources did not have clear economic advantages. However, falling costs of electricity generation from renewable sources and rising energy costs for conventional sources are setting the stage for developing some of our renewable resources.

If these resources were exploited, it is likely that Nevada could increase electricity generation and export capacity and reduce reliance on other states for its power needs. Further, exploiting these resources could create jobs within the state, often in rural areas that are currently experiencing job losses. Thus, developing our solar, wind, biomass, and geothermal resources may prove to be a powerful economic development tool.

An examination of the stock of renewable resources in Nevada proves that the state has the potential to be a leader in renewable electric generation. Solar resources for concentrating collectors range between 7,000 and 7,500 watt hours per square meter (whm^2), making southern Nevada one of the best sources for this type of generation in the world. Flat-plate collectors can provide a similar amount of generation power. Full utilization of Nevada's wind resources could generate 50,589 gigawatt hours (GWh) of electricity. The abundance of high-temperature sites in Nevada suggests geothermal could be a lucrative electrical generation resource for the state. A swath of geothermal sites covers portions of the western U.S. In Nevada, over 60 percent of the state has sites with high enough temperatures for electricity generation. The geography of the state does not lend itself as readily to conventional biomass production. The Department of Energy (DOE) rates the stock of conventional biomass resources in Nevada as "fair."

When 15 percent of electric needs come from renewable energy generated within the state, over 5,000 jobs can be attributed to the renewable energy industry with an average annual GSP effect of \$665 million through 2035. Even lower levels of use have significant impact. More than 2,500 jobs result when 7 percent of generation needs arise from renewable sources. GSP under the "low use" 7 percent generation scenario averages \$310 million annually through 2035.

The modeling results show clear economic benefits in terms of GSP and new employment in the state of Nevada. It is important to note that this economic development supports sustainable growth within the state. Renewable energy generation, on average, is

*associated with less environmental degradation than generation using nonrenewable energy sources. Air-quality impacts are scant or nonexistent. Thus, tallying the economic and environmental benefits of electric-energy generation, it is clear that it could be an important contributor to sustainable economic development.*¹

Nevada has an abundance of natural resources from solar, geothermal, and wind sources that provide the potential for the State to become energy independent and carbon neutral with the proper technical and financial resources in place. Few states have such a wide variety of assets. Development of these renewable energy resources, and the economic infrastructure to commercialize and bring them to market, will require partnerships between NSHE, industry, and government.

Nevada's assets for creation of alternative and renewable energy set the stage for its three research institutions to be involved in new discovery and technology transfer and its colleges to continue workforce training programs. The U.S. Department of Energy (DOE), through the Office of Energy Efficiency and Renewable Energy and the Office of Basic Energy Sciences, provides research funding and technical support for research in these areas. In 2007 Governor James Gibbons established the Nevada Renewable Energy Transmission Access Advisory Committee in order to identify needs and locations for new power transmission lines in the state of Nevada. Additionally, there are 1) the Nevada State Office of Energy, 2) the legislated Nevada energy portfolio standard (which requires renewable energy on the grid), 3) a highly supportive citizenry, and 4) a powerful congressional delegation and state legislature which support renewable energy development.

In spite of considerable assets for alternative energy production, Nevada faces challenges in the development and utilization of new methods of energy. These include a small amount of public and private investment in renewable energy development and a large number of small companies all trying to address renewable energy needs with little statewide coordination. At the same time, Nevada's rapidly increasing population and energy demands create pressure to hasten the development of these industries. Although Nevada has the potential to provide much of its energy in sustainable forms to citizens of the state and even to export energy to neighboring states, there is not a long and established history of infrastructure for research and education in renewable energy fields.

One particularly promising development, however, is the formation of The Nevada Renewable Energy Consortium among the three NSHE research institutions, along with participating community colleges. Active renewable energy research programs exist at each institution, with campuses historically highlighting different focal areas: solar energy and energy conservation (UNLV), geothermal energy (UNR), and wind energy, hydrogen systems, and biomass (DRI). Despite this variable emphasis, expertise in all key research areas exists at each institution. The consortium will provide a mechanism to integrate and leverage expertise across the institutions and will also provide a means to coordinate the activities of the renewable energy centers being developed at each member institution. In addition, the consortium will support the expansion of

¹ Riddel, M. & Schwer, R.K. (2003). *The Potential Economic Impact of Nevada's Renewable Energy Resources*. Nevada State Office of Energy.

workforce training programs in renewable energy technologies by building upon ongoing successful partnerships between union apprentice programs and Nevada community colleges. The ultimate purpose of the consortium is to help Nevada achieve its vision of being a national leader in renewable energy research, development, and workforce development.

Alternative and renewable energy development is and must remain a high priority for Nevada. It represents a critical link in the ability of the State to provide for its rapid population growth while maintaining the beauty of the State and the quality of life provided within.

Nevada Alternative and Renewable Energy Goals

Goal 1: Identify and foster the development of diverse renewable and alternative energy sources for Nevada to become energy independent and, eventually, an energy exporter.

Goal 2: Provide incentives for efficiency-related renovations and update and enforce building code standards for energy efficiency in new and retrofitted buildings.

Goal 3: Support the production of trained technicians and professional architects, engineers, scientists, and contractors to provide the workforce needed for a clean energy economy.

Goal 4: Educate Nevada citizens about the benefits of conservation and using alternative and renewable energy and provide programs to assist citizens in practicing energy efficiency on a local scale.

NSHE Strategies to Support State Goals

- Increase faculty research and development (R&D) in alternative and renewable energy by identifying and applying for funding sources in all related areas.
- Target additional research support and faculty hires in the most promising renewable energy areas for Nevada.
- Engage and advise researchers, experienced entrepreneurs, business executives, and venture capital to identify, commercialize, and fund promising technologies resulting from faculty R&D.
- Address the economic aspects of the clean energy marketplace by providing research and expertise on cost-benefit analyses, market barriers, economic impact studies, negative-cost options, and the efficacy of economic incentives.
- Lend expertise to the policy-making and practical aspects of alternative and renewable energy by providing research on land use, regulatory barriers, portfolio standards, retrofitting, construction management practices, and the coordination of federal, state, and local regulations.
- Expand certificate programs, minors, majors, and graduate degrees to respond to market demands for professional workers in alternative and renewable energy development.
- Provide fast-track training programs to produce technicians and support personnel for jobs in the renewable energy industry.
- Partner with energy companies, government entities, and public schools to develop public education campaigns about conservation and renewable energy.

II. CLIMATE CHANGE

Climate change and variability are ongoing natural processes that have occurred on various timescales throughout earth's history, driven mainly by variations in the earth's orbit and changes in atmospheric composition. In recent years, an increasing body of evidence has shown that anthropogenic effects, manifested primarily by increased CO₂ content of the atmosphere from burning of fossil fuels, have a profound influence on climate and have resulted in unprecedented and rapid climate change (e.g., global temperature increases). These effects are predicted to continue into the future and may become increasingly severe. Changes in climate occurring in the intermountain West (including Nevada) now are manifested by increases in seasonal, nocturnal, and annual temperature and changes in the amount and type of precipitation.

Nevada has several attributes that impact the response of human and natural systems to climate change – past, present, and future. These include, but are not limited to: (1) great contrasts in climate and ecosystems over short distances created by the Basin and Range topography of the most mountainous state in the lower 48 states of the U.S.; (2) a high degree of aridity throughout Nevada, which is the most arid state in the U.S.; (3) a highly urbanized and rapidly growing population (90.36% of which lives in urban areas, making Nevada the most urban state in the nation), (4) extensive areas of largely undeveloped, publically owned lands (86% of Nevada is federally owned, the highest percentage in the nation). The combination of rapidly growing urban centers in an arid, scarcely populated region is characteristic of Nevada but also occurs in many other parts of the world.

Climate, especially temperature and precipitation, has a major influence on the structure and function of ecosystems and the services (e.g., nutrient cycling, water supply) that ecosystems provide to humans. In the face of rapid and unprecedented climate change, such services may no longer be sustainable in their present quantity and quality. Understanding the nature of this uncertainty lies at the heart of the proposed goals.

Responding to human perceptions and responses to climate change is another important component to progress in this area. Climate change now and in the future will have significant effects on public policy. There will be a need to engage stakeholders in identifying their needs and to develop a two-way exchange of information between stakeholders and the science community.

Many of the State's goals in the area of climate change are embedded in the new five year, \$21 million NSHE National Science Foundation EPSCoR grant.

Nevada Climate Change Goals

Goal 1: Improve climate modeling capabilities and evaluate the impact of climatic change (past, present, and future) on the State's natural resources to answer questions of resilience, resistance, and thresholds.

Goal 2: Engage citizens, industry, government, and the science community to collaborate on changes to public policy, land management, and water management in response to climate change research and developments, including regional approaches.

Goal 3: Improve the statewide computing infrastructure and compilation of integrated data sets to facilitate shared research from multiple sources as well as to support integrated policy-making.

Goal 4: Support the production of more scientists and engineers in order to provide teachers in science, technology, engineering, and mathematics (STEM) fields.

NSHE Strategies to Support State Goals

- Increase faculty research on climate change and its impacts by identifying and applying for funding sources in all related areas.
- Develop improved capabilities to downscale global projects to a regional scale that is relevant for decision making.
- Have NSHE institutions serve as repositories of integrated statewide and regional data.
- Use climate-change models to help predict Nevada's future water availability and use.
- Engage and advise individuals, businesses, and state, local, and federal agencies to develop balanced, effective, innovative, and politically acceptable strategies for mitigating and adapting to climate change in the State and region.
- Develop an integrated program in which science, technology, engineering, and mathematics (STEM) teaching in P-16 will be fostered through use of climate change as an example of fundamental physical and geographical concepts in an earth systems framework.

III. WATER RESOURCES

The Nevada Division of Water Resources states that water is Nevada's most precious renewable natural resource, and a key element in safeguarding this limited resource is responsible management gained through education. Future economic and geographic growth in the State of Nevada is completely dependent upon accurately quantifying and carefully managing water resources. Improving the understanding of available water resources (both quantity and quality) and the potential complex responses due to climate variability and change is accomplished through advanced education in science and/or engineering-based disciplines. Careful management of these resources involves the development and implementation of successful public policies by well trained professionals with academic backgrounds ranging from social science to engineering.

The Nevada System of Higher Education has a wealth of faculty expertise and infrastructure to support world class research and educational programs concerning water. To date, however, most of these resources have not been integrated either geographically or institutionally. A prior NSF EPSCoR grant for a system-wide Access Grid Node makes possible the offering of course work, seminars, and other meetings in a way that truly supports the emergence of technology to overcome the limitations of place. The recently completed environmental lysimeter facility in Boulder City (also funded by the most recent NSF EPSCoR statewide grant) to investigate Scaling Environmental Processes in Heterogeneous Arid Soils (SEPHAS) creates a focal point for future collaborative research among a growing community of NSHE faculty with interests in water resources.

Nevada Water Resources Goals

Goal 1: Accurately assess the total quantity and quality of available water resources in Nevada and collaborate with the intermountain states on a regional approach to expanding freshwater supplies and increasing efficiency of use.

Goal 2: Improve predictive water management tools and develop new visualization tools for both scientific exploration and public education.

Goal 3: Support increased production of trained technicians and professional scientists, engineers, and policy analysts in the field of water resources.

Goal 4: Facilitate the collection and integration of knowledge, data, and information on interactions between water resources, ecosystems, and large-scale climatic patterns in Nevada for the benefit of improved public policy decisions.

NSHE Strategies to Support State Goals

- Increase faculty research and development (R&D) in water resources by identifying and applying for funding sources in all related areas.
- Integrate water and water-related issues into the Nevada P-16 curriculum as part of an overall plan for educating the public, as well as current and future teachers, on the importance of water and water-policy related issues in the semi-arid southwest, including Nevada.
- Engage the Nevada Water Resources Research Institute (a statewide entity serving all of NSHE) to facilitate access to water resource information throughout the State.
- Expand certificate programs, minors, majors, and graduate degrees to respond to market demands for technicians and professional workers in water-related professions.
- Develop an integrated statewide water resources academic program that builds upon the existing, internationally recognized graduate program in hydrologic sciences while elevating a complementary water resources management program to national prominence.
- Engage researchers from across Nevada, the United States, and the globe to use NSHE's state-of-the-art SEPHAS facility to better understand water movement and water quality transformations in semi-arid settings.

- Make available as a shared community resource NSHE's emerging high-end visualization capabilities (e.g., DRI's 4-sided and 6-sided CAVES and UNLV's proposed Solution Room) as a means to integrate cutting-edge scientific visualization with public policy needs.

HUMAN HEALTH

IV. HEALTH CARE ACCESS AND RESEARCH

Nevada is both one of the most prosperous and fastest growing states in the nation. Nevertheless, its citizens are among the least healthy. While the population has quadrupled in the past three decades to 2.7 million, the state's all-cause mortality has reached a rank of 40th in the nation. Deaths from respiratory disease, cancer, and suicide rank well above the national mean.² Nevada ranks 47th in the number of doctors in the U.S. (172 per 100,000 people)³ and has the fewest nurses (514 per 100,000)⁴ of any state. Yet its public medical school is the smallest, it has the fewest medical residency training positions of any state with a medical school,⁵ and other health professions training programs (e.g. nursing, allied health, public health, nutrition, and others) are limited and do not meet the demands for health professionals in the State. Nevada also has some of the most restrictive licensing requirements for medical professions, a pattern of public policy that makes in-migration more difficult.

In Nevada, women too often struggle to access prenatal care, patients seeking to ameliorate chronic illness overcrowd emergency rooms, residents must leave the State to access sub-specialty care, health promotion and disease prevention get short shrift,⁶ research infrastructure and clinical research remain unfunded, and too many lack personal physicians.⁷ Nevada has the fifth highest hospital billed charges in the United States⁸ and nearly the highest percentage of children without health insurance.⁹ In 1999, Nevada ranked last in the nation on per capita state spending for health care programs at \$464.89 per person, well below the national average of \$872.62.¹⁰ Finally, not graduating from high school is associated with delayed employment opportunities, poverty, and poor health. In fact, dropping out of high school confers five years less life expectancy! Nevada's high school graduation rate is 49th in the nation at 64 percent.¹¹

Nevada has a health care crisis. This crisis will only worsen if the status quo is not challenged while the population doubles to 4.3 million by 2030. The predicted consequences are alarming. The best and brightest medical graduates seek sub-specialty training opportunities outside Nevada and are not likely to return to Nevada to practice medicine. Robust economic expansion will be curtailed by the burden of unaffordable and inaccessible health care.

² Nevada State Health Division, *Healthy People Nevada 2010*, 2003

³ American Medical Association (AMA) Physician Characteristics & Distribution in the US, 2006; Innova Group *Nevada Physician Supply and Demand*, 2002

⁴ Department of Health & Human Services – *HRSA State and Attendant Workforce Profiles*, 2004

⁵ American Association of Medical Colleges (AAMC), 2004; LarsonAllen Residency & Fellow Comparison, March 17, 2006

⁶ AHRQ 2004 National Healthcare Quality Report: Nevada

⁷ Nevada State Health Division, *Healthy People Nevada 2010*, 2003

⁸ Las Vegas Review Journal, December 2005

⁹ US Census Bureau, 2001

¹⁰ US Department of Health and Human Services, 2000

¹¹ Nevada State Health Division, *Healthy People Nevada 2010*, 2002

These scenarios are simply not acceptable. In spite of these very severe problems with health care, Nevada has a number of assets which are beginning to make a difference. The decision in 2006 by Chancellor Jim Rogers and the Board of Regents to coordinate all 108 health-related programs from the eight NSHE institutions into a Health Sciences System (HSS) is already providing a more integrated approach to the State's educational needs and research efforts. One goal of the Health Sciences System is to coordinate and integrate the different health education programs from multiple institutions to create efficiency and effectiveness and to focus on specific and serious needs in Nevada. Initial legislative funding has been awarded to build facilities to support the education of additional doctors, nurses, public health officials, and other health care providers, but much of the funding to adequately address the serious shortages will need to come from a combination of public sources and private donations and grants.

In addition to NSHE colleges and universities, other institutions also strive to make the lives of citizens better through health care offerings. Institutions such as the Nevada Cancer Institute, the Lou Ruvo Brain Institute (now known as the Cleveland Clinic Lou Ruvo Center for Brain Health), the Whittemore Peterson Institute for Neuro-immune Disease, and many others provide research and services for Nevada's citizens. Nevada has a network of hospitals and clinics that provide health care directly and medical associations north, south, and rural to address quality issues in health care.

Since Nevada does not have sufficient doctors, nurses, or allied health providers to address its needs, many of the problems in health care are associated with building more education and training of health care providers at all stages of the pipeline. Building this educational pipeline must be accompanied by the concurrent increase in federal research grants and contracts to build a vibrant medical research center here in Nevada.

Nevada Health Care Access & Research Goals

Goal 1: Improve health care access to all Nevadans by making health care education, research, and training a top priority in Nevada.

Goal 2: Deliver or facilitate essential health care services proactively to ensure families are strengthened, public health is protected, and citizens achieve their highest level of self-sufficiency.

Goal 3: Develop and expand a statewide biomedical/health research effort that supports economic development, technology transfer, and educational opportunities.

Goal 4: Expand the production of trained technicians, health care professionals, and policy analysts to provide quality health care for all Nevadans.

NSHE Strategies to Support State Goals

- Build and expand the education pipeline for health care workers at all levels by offering coordinated certificate programs, minors, majors, graduate, and professional degrees to respond to market demands.
- Pursue the development of inter-institutional health sciences programs to promote integration, collaboration, and synergy among health professions.
- Engage statewide stakeholders in developing and implementing strategies for meeting the immediate and future workforce demands.
- Develop statewide multi-use facilities for health care education and research.
- Manage public-access clinics that provide in-service training for students while benefiting low-income residents.
- Enhance opportunities and funding for medical and dental residencies, nurse practitioners, and other advanced health care training.
- Provide state-of-the-art continuing health professions education for Nevada health care workers.
- Strengthen and expand the research infrastructure for health sciences programs at NSHE institutions.
- Help develop a statewide, electronic medical information management system.

V. PUBLIC HEALTH

Public health agencies are responsible for monitoring and maintaining the quality of public health services; maintaining the quality of medical services through licensure and certification of facilities; protecting individuals, families, and the community from threats such as epidemics and environmental contaminants; promoting healthy living conditions and lifestyles; and communicating both surveillance and epidemiologic data to public health officials, health care providers, industries, and community members. It includes working with communities continuously to communicate relevant information, assist their mobilization efforts, and provide technical assistance and consultation.

The frontier nature of most of Nevada leads to many challenges in developing a public health delivery system in the State, which is compounded by a lack of providers for both primary and specialty care that is found even in the most urban communities. Among Nevada's 17 counties, approximately 87 percent of the State population resides in two urban areas: Clark and Washoe counties. Carson City and Elko are designated as a Small Metropolitan Area. Douglas, Lyon, and Storey counties are rural; and Esmeralda, Humboldt, Lander, Lincoln, Mineral, Nye, Pershing, and White Pine are frontier counties.¹²

Rural and frontier residents, while comprising a small portion of the State's population, often require unique responses to their health care needs. They are generally older, poorer, and have fewer health resources than their urban counterparts. Given the provider shortages that are common in many rural areas, some rural clients drive more than 100 miles to access care.

¹²Nevada Five-Year Maternal and Child Health Needs Assessment Report, 2006-2010

Nevada's public health statistics are daunting. In general, Nevada ranks 48th in public health funding per person.¹³ When it comes to children, a survey conducted by Kids Count and Nevada Kids Count¹⁴ ranked Nevada 32nd among the 50 states on the overall well-being of children. This ranking has improved from 35th in 1996. Among the benchmarks cited in the most recent survey (on a scale of 1-50, with 50 being the worst):

- Nevada ranks 22nd (7.6%) in the percent of low birth weight babies for 2001. This ranking improved from 25th in 1996.
- Nevada ranks 9th in the infant mortality rate (5.7 deaths per 1,000 live births) for 2001 (improved from 13th in 1996).
- Nevada ranks 21st in the child death rate with 22 deaths per 100,000 children ages 1-14 (improved from 34th in 1996).
- Nevada ranks 22nd (14%) in the percent of children under age 18 who live in families with incomes below the U.S. poverty threshold (ranked 14th in 1996).

In addition, the January 2009 Nevada Health Scorecard¹⁵ ranked Nevada 50th on children immunized and 39th in adequacy of prenatal care. If the State's rankings are to improve, close collaboration will be required among government officials, public and private health providers, and NSHE faculty to address these indicators effectively.

Overall, there needs to be more communication and less fragmentation of services among policy-makers, state agencies, health systems, tribal health systems, and between some public and private providers in the State of Nevada. It is essential to have the data needed to educate policy-makers who make funding decisions on local, State, and national level. This will help forge the path necessary to build and strengthen the current public health system as Nevada moves into the future.

Nevada Goals for Public Health

Goal 1: Protect and advance public health, safety, and quality of life for the well-being of all Nevadans as well as visitors to the State.

Goal 2: Deliver or facilitate essential public health services and prevention programs to protect and improve the lives of Nevada residents.

Goal 3: Help identify and work to eliminate health disparities through directed public policy.

Goal 4: Collect and make available data needed by policy-makers who fund public health services.

¹³ United Health Foundation, America's Health Rankings 2008

¹⁴ Annie E. Casey Foundation 2001

¹⁵ Nevada Academy of Health, Nevada Health Scorecard, January 2009

NSHE Strategies to Support State Goals

- Develop and expand statewide academic programs in public health at all levels by offering coordinated certificate programs, minors, majors, graduate, and professional degrees to respond to market demands.
- Engage statewide stakeholders in developing and implementing strategies for addressing public health needs.
- Establish foci of research in areas of critical public health challenges like immunization practices, tobacco cessation, alcohol and drug addiction, domestic violence, unplanned pregnancy, and mental health by identifying and applying for funding sources in all related areas.
- Help address the growing needs of and health disparities among target populations in Nevada, such as rural residents, minorities, and children, through public service programs and faculty research.
- Promote initiatives and research in critical environmental challenges such as water quality, air quality, lead exposure, and radiation exposure.
- Translate university research and expertise into information that can be used by government agencies to promote appropriate policy decisions.
- Have NSHE institutions serve as repositories of integrated statewide and regional public health data.

VI. AGING SERVICES

Nevada continues to lead the nation in senior population growth. In 2007, *USA Today* analysts reviewed Census data and reported that Nevada will have a 264 percent increase in persons age 65 and older between 2000 and 2030, the highest senior growth rate in the nation. Reasons for this growth in Nevada's senior population are attributed to issues such as immigration of retirees, aging of the existing population, and the out-migration of younger people, especially in rural environments. While these reasons vary, the impact of the senior population is multi-faceted, affecting all aspects of Nevada communities. This population change will impact transportation needs, housing requirements, workforce pools, and health care costs to name a few.

Among the statistics cited in *Services for Nevada's Elders*¹⁶ are the following issues facing the State's elder population:

Race/Ethnicity: Nevada is becoming more diverse in terms of the racial/ethnic and cultural characteristics of its population. Projections indicate Nevada's population self-identifying as a minority will increase from 37.9 percent of the total population in 2005, to 41.5 percent in 2011. In view of this, the State will need to increase its efforts during the next four years to find effective outreach and service mechanisms to meet the needs of these seniors.

¹⁶ State Plan: Services for Nevada's Elders, Nevada Division for Aging Services, October 1, 2008 to September 30, 2012

Disability and Aging: Nevada is ranked 36th in the nation, with 38.7 percent of Nevadans age 65 and older having a disability (U.S. Census Bureau, 2006 American Community Survey). Minnesota has the least percentage of disabled elders, 34.8 percent, and Mississippi has the highest percentage at 52 percent. Of the 214,065, non-institutionalized Nevadans, age 65 and older, 40.5 percent or 86,816 self-identify as having a disability (Census 2000). These disabilities are self-reported in the following categories: sensory, physical, mental, self-care, and/or homebound.

Suicide and Aging: Nevada has had the highest suicide rate in the nation for more than 20 years for seniors, age 65 and older, according to Nevada's 2007-2012 State Plan for Suicide Prevention. Major depression is the most common psychiatric disorder among the elderly, but this is not being identified by loved ones or care takers, including many primary care physicians. Stigma relating to seeking help reduces older adults' access to mental health professionals.

Chronic Disease: Data provided by the Nevada State Health Division, Bureau of Community Health, indicate Nevadans age 65 and older had a reduced incidence of angina, heart attacks, and stroke between the years 2005 and 2007. However, the incidence of diabetes, high blood pressure, and smoking increased in the same time period.

Alzheimer's Disease: The Alzheimer's Association *2008 Alzheimer's Disease Facts and Figures* projects that, by 2010, Nevada is expected to have more than 29,000 seniors, age 65 and older with Alzheimer's disease. This is the fifth highest Alzheimer's disease growth rate among individuals age 65 and older in the nation.

Fragile seniors, opting for provision of services at home or in the community as opposed to institutional placement, experience wait lists and delays due to limited availability and increased demand. Rural seniors find services particularly inadequate. Waiting periods for mental health services in rural Nevada extend over one year. Pending federal and state budget cuts will further reduce access. Lack of qualified, trained personnel exacerbates the issues.

The Nevada Division of Health and Human Services determined how long seniors are waiting for services by conducting a survey of funded programs in May 2008. Ten services with the longest wait list, ranked from longest to shortest wait list, are: Geriatric Health and Wellness, Personal Emergency Response System, Caregiver Supportive Services, Home Care Services, Mental Health, Senior Community Service Employment Program, Alzheimer's Diagnostic Services, Durable Medical Equipment and Health Care Products, Nutrition Services, and Respite and Supportive Services.

Nevada Aging Services Goals

Goal 1: Provide an efficient support services delivery system to improve the independence and dignity of older Nevadans.

Goal 2: Empower older adults and their families to make informed decisions about and be able to access a comprehensive array of information, referral intake assessment, and eligibility determination services.

Goal 3: Empower older adults to stay active and healthy through evidence-based health promotion/disease and disability prevention programs.

Goal 4: Provide an efficient system to promote and protect the safety and rights of older Nevadans.

NSHE Strategies to Support State Goals

- Develop and expand the focus on aging and its impact on overall health and well-being in all applicable academic programs to prepare graduates for the breadth of professions that serve older Nevadans.
- Focus faculty research on addressing the needs of Nevada’s aging population by identifying and applying for funding sources in all related areas.
- Address the growing needs of and health disparities among the elderly through public service programs and faculty research.
- Provide access to lifelong learning programs and services for older Nevadans.
- Expand partnerships with public and private institutions that provide research and services for Nevada’s elderly population.

INFRASTRUCTURE AND TECHNOLOGY

As communities throughout the U.S. increasingly confront growth-related concerns ranging from the availability of water to transportation and affordable housing, many recognize the critical importance of addressing issues of growth and sustainability. A 2008 report by the Brookings Institution, *Mountain Megs: America's Newest Metropolitan Places and a Federal Partnership to Help Them Prosper*,¹⁷ highlighted the need for metropolitan communities in the West to work together so the region can prosper. These issues have become progressively more important in recent years to both the urban and rural areas of Nevada, given the tremendous population growth in the State. Nevada's population has doubled from 1.2 million in 1990 to more than 2.5 million in 2007.¹⁸ During this time, Southern Nevada experienced a 125% increase to nearly 1.8 million people. Nevada is one of the fastest-growing states in the U.S., leading the nation in population growth for 19 of the last 21 years.

Although technology means different things to different people, the term "technology" here is the application of science and engineering for practical purposes, with growth being one example. Nevada ranks near the bottom in almost all measures of technology development. In the recent Milken Report of state rankings,¹⁹ Nevada's overall technology rank in 2008 was 45th, 43rd in 2004 and 42nd in 2002. Research and Development investment in Nevada places the State at 42nd and human capital investment at 50th in 2008. The only category where the State is ranked higher than the bottom 10 percent is in technology concentration and dynamism. Here Nevada ranked 23rd in 2002, 28th in 2004, and 23rd in 2008.

VII. TRANSPORTATION

In terms of square miles, Nevada is ranked the seventh largest state in the nation, and, as a result, its population centers are spread across many miles. The recent Brookings Institution report addressed transportation as a key infrastructure issue. Nevada and the region as a whole lack the robust and supportive multi-modal transportation network that is critical to its economic and ecological future.

Travel demands due to population growth are escalating. As reported by the Nevada Department of Transportation (NDOT), Las Vegas is the tenth most congested city in the United States. By 2030, driving times during commute hours will exceed those currently experienced in Los Angeles. From 1990 to 2003, vehicle miles traveled on all of Nevada's streets and highways increased from nine billion to 19.46 billion, and by 2010 it is expected to reach 35 billion miles of travel annually. These increases demand interdisciplinary and creative new solutions if quality of life is to be sustained in Nevada.

¹⁷ *Mountain Megs: America's Newest Metropolitan Places and a Federal Partnership to Help Them Prosper*, The Brookings Institution Metropolitan Policy Program, July 2008.

¹⁸ U.S. Census Bureau Population Finder, <http://factfinder.census.gov/>, August 1, 2008.

¹⁹ Ross DeVol, Anita Charuorn, with Soojung Kim, *2008 State Technology and Science Index*, Milken Institute, June 2008.

As noted in the Brookings *Mountain Megs* Report, infrastructure networks provide essential linkages to urban systems by clustering related economic activity, providing access to jobs and education, and adapting to climate and resource challenges. This is especially true in the western states when factoring in not only the large population centers, but also the volume of commercial traffic en route to other destinations.

There are a total of 34,624 centerline miles of roads in Nevada, with 29,202 miles maintained by local agencies and 5,422 miles (16%) maintained by the Nevada Department of Transportation.²⁰ The sixteen percent of roadways maintained by NDOT, however, carry 56 percent of the total vehicle miles of travel. The State-maintained system also carries 83 percent of all truck traffic and 87 percent of the heavy truck traffic. Annual vehicle miles of travel on all Nevada roads increased from 9 billion in 1990 to 22 billion in 2006. That number is expected to increase to 35 billion vehicle miles by 2010.²¹

In Nevada, truckers are the third largest motorists group using highways, after commuters and tourists. Interstate 15 and Interstate 80 are among the busiest truck-freight corridors in the nation, and that traffic is expected to increase significantly in the future. Railroads are also key players in moving freight and, to some extent, passengers. The coordination among these modes is critical for the movement of goods and services in and through the State.

There is one major railroad operating in Nevada: Union Pacific with 1,091 miles of track. Nevada recently received \$45 million through the SAFETEA-LU Technical Corrections Bill to continue environmental studies on the proposed high-speed, magnetically levitated train from Anaheim, California, to Las Vegas, Nevada. In addition, environmental work for a high-speed diesel-electric passenger train between Las Vegas and Victorville, California, is being completed by a private company. Maglev train technology is not currently in commercial service in the U.S.; therefore, this 270-mile corridor could showcase this technology.

Because of the State's geography, aviation plays a critical role in bridging the vast distances between our communities. Nevada's public-use airports include two international, three commercial-service, and 47 general aviation facilities. McCarran International Airport in Las Vegas is the fifth busiest airport, by traffic movement, in the world, and it is currently at capacity. A new commercial airport 30 miles southwest of Las Vegas (Ivanpah Valley) is currently being planned. Ivanpah Valley Airport is expected to be open in 2017 and will serve the projected 55 million passengers annually with 14-gate terminals and two parallel runways for concurrent takeoff and landings.

Many of the elderly, disabled, tribal reservation members, and the general public in rural areas depend on transit services. Each year more than one million rides are given on vehicles provided through NDOT with Federal Transit Administration funding. These rides contribute to the quality of life and independence for many of rural residents by providing access to employment, medical, shopping, and government services.

²⁰ Statewide Transportation Plan, Moving Nevada Through 2028

²¹ NDOT Fact Book January 2009

Amid a statewide transportation funding deficit expected to reach the multibillion-dollar mark over the next few years, NDOT has established the Pioneer Program²² to investigate public-private partnerships as one avenue to provide less congested freeways, greater road funding, and quicker project delivery. While toll roads and lanes are a primary example of public-private partnerships, Pioneer Program innovations could also take the form of design-build projects, developer-paid projects, availability payment programs, as well as asset management programs that could allow outside companies to provide certain road services.

Nevada Transportation Goals

Goal 1: Create an effective and innovative combination of federal, state, and local highways, high-speed and light rail, and air connections to reduce congestion, improve connectivity, and shape economic development within the State and region.

Goal 2: Preserve and manage the State's existing transportation assets and increase the number of transportation choices within the State and region, with emphasis on innovative financing options and attention to the needs of elderly, disabled, tribal, and rural populations.

Goal 3: Participate in regional governance efforts to establish coordinated mechanisms to address transportation needs.

Goal 4: Optimize safety on Nevada transportation corridors and develop policies and procedures that reflect a coordinated approach to traffic incident management.

NSHE Strategies to Support State Goals

- Organize and focus existing research talent and resources on transportation issues facing the intermountain west.
- Create a statewide database of expertise in the area of transportation and infrastructure to foster communication and collaboration.
- Serve as the non-partisan convener of high-level meetings of key officials within Nevada and among the intermountain west states to discuss common issues and strategies for addressing transportation and infrastructure needs.
- Translate university research and expertise into information that can be used by government agencies to promote appropriate policy decisions.
- Increase faculty research and development (R&D) in multi-modal transportation and traffic safety by identifying and applying for funding sources in all related areas.
- Cultivate public/private partnerships among researchers, business executives, and venture capital to identify, commercialize, and fund promising technologies resulting from faculty R&D.
- Address the economic aspects of multi-modal transportation by providing research and expertise on cost-benefit analyses, economic impact studies, rural transportation needs, and innovative financing.

²² NDOT Fact Book January 2009

- Provide faculty research expertise on major transportation projects like the Ivanpah Valley Airport and the high-speed train.

VIII. MATERIALS SCIENCE

Nevada has a number of nationally and internationally competitive research groups working on synthesis, processing, fabrication, characterization, and modeling of materials at both of the State's universities. UNR is particularly interested in "smart materials." Smart materials^{23,24,25,26} are new and emerging substances that exhibit controllable properties by external stimuli. There are a number of types of smart materials including piezoelectric materials, thermo- and magneto-responsive materials, pH-sensitive materials, electroactive materials, light-sensitive materials, as well as many more. For example, in medicine, the use of thermo-responsive shaped memory alloys is well established for human implants. Smart materials and systems use principles of operation resembling nature-built structures. They have great potential for being applied to the entire spectrum of modern life including commercial, medical, entertainment, aerospace, and military uses as smart textiles, artificial muscles, smart optics, and embedded smart sensors. Emerging application areas of interest to Nevada include, but are not limited to 1) energy harvesting, 2) design of smart structures, and 3) structural health monitoring.

UNLV's materials science research groups are clustered in both the sciences and engineering, with many interdisciplinary teams working on projects with exciting commercial potential. The sciences cohort focuses on the synthesis, characterization, and modeling of materials for energy conversion, in particular for hydrogen production, storage, and consumption (fuel cells), as well as for organic electronics, electrochemical applications, solar cells, light-emitting diodes, biofuels, nuclear fuel, and other materials with nuclear applications. The engineering cohort is conducting research on ceramic and metallic alloys, plastics and polymers, electron emission of metals, pulsed power systems, semiconductor materials, materials in extreme environments, composite prosthetic braces, and orthodontic materials.

The Nevada academic research community has integrated well with industry to further economic development in Nevada in this area. However, the faculty is dispersed in different institutions and departments and has not reached its full potential.

Nevada Materials Science Goals:

Goal 1: Advance and strengthen development and use of smart materials and systems in Nevada by supporting additional research, development, and deployment capabilities in smart materials technologies.

Goal 2: Assist local industry in improving their position as leaders in smart materials technology and strengthening working partnerships with government, universities, and private industry to support economic development and technology transfer.

²³ M.V. Gandhi and B.S. Thompson, *Smart Materials and Structures*, Chapman and Hall (1992).

²⁴ R.C. Smith, *Smart Material Systems*, SIAM (2005).

²⁵ L. Dai, *Intelligent Macromolecules for Smart Devices*, Springer (2004).

²⁶ K. Kim and S. Tadokoro, *Electroactive Polymers for Robotics Applications*, Springer (2007).

Goal 3: Attract smart materials companies and services to Nevada.

NSHE Strategies to Support State Goals

- Hire faculty researchers and obtain equipment to fill key gaps and integrate Nevada's *Smart Materials and Systems* (SMS) researchers into a single nationally competitive research team.
- Increase faculty research and development (R&D) in materials sciences by identifying and applying for funding sources in all related areas.
- Make closer connections between local industry, the legislature, citizens, and the academic community about the value of smart materials and systems.
- Assist the Nevada Development Authority, the Economic Development Authority of Western Nevada, and the Northern Nevada Development Authority – as well as the State Division of Economic Development – with their efforts to actively recruit high technology companies to Nevada.
- Cultivate public/private partnerships among researchers, business executives, and venture capital to identify, commercialize, and fund promising SMS technologies resulting from faculty R&D.

IX. BIOTECHNOLOGY

Biotechnology encompasses many uses of living cells, their products, and their processes for the betterment of mankind, and this area of research has rapidly expanded since completion of the Human Genome Project in 2003. Biotechnology can be used to fight disease through the genome and epigenetics, to treat cancer through development of new and existing proteins, to create new body parts and prosthetics, to support the field of forensics, to create fuels from algae and bacteria, and to produce new foods. As of 2006, biotechnology revenues exceeded \$58 billion, with 1,452 biotechnology companies in the U.S. alone employing more than 180,000 people.

Biotechnology in Nevada centers on the two urban areas: Las Vegas and Reno. Reno companies have begun to develop as the result of faculty research and development at UNR. The research is enhanced not only by these companies but by the collaboration between UNR researchers and the Whittemore Peterson Institute for Neuro-immune Disease. In Las Vegas, biotechnology development has taken nearly two decades to take hold. UNLV has attempted to attract biotechnology companies through formation of a Biotechnology Center, which supported high-level training, service, and entrepreneurial assistance at its Shadow Lane Campus. DRI also has a growing biotechnology program focused on microbial genomics and beneficial products. The Nevada Development Authority supported a biotechnology committee for the purpose of attracting biotechnology companies to southern Nevada but, without business members, the committee eventually disbanded.

In the meantime, companies from San Diego, Los Angeles, and San Francisco have begun to take refuge in Nevada from the high taxes in California. The proximity of Reno to San Francisco and Las Vegas to San Diego/Los Angeles has made these two locations desirable for California

companies. Some companies and entrepreneurs moved their headquarters to Las Vegas but do not conduct research and development or manufacturing in Nevada. Very recently, a grass roots organization called the Nevada Biotechnology and Bioscience Consortium has successfully brought together a group that meets monthly for the southern Nevada biosciences community. The Nevada Development Authority named Life Sciences as one of its primary targets for new and relocating businesses. Other developments that have spurred interest in biosciences in Nevada are the formation of the Nevada Cancer Institute and the Lou Ruvo Brain Institute. These two institutes have the ability to attract world class researchers and clinicians to southern Nevada and have already done so.

With recent renewed interest for life sciences development, the Nevada Development Authority re-established its committee and named it Life Sciences. At this time there is interest by not only academicians but also business owners and entrepreneurs to attract additional businesses and maintain a biosciences community in Nevada. However, these communities and the number of businesses are still quite small.

Faculty research efforts in biotechnology are leading to promising developments in such areas as using robotic equipment in human prosthetics, improving medical treatment for cancer through developments in radiation chemistry, using industrial enzymes in biomass applications, creating methods for stopping anthrax, studying cellular responses to DNA damage, examining new catalysts for production of biofuels, and improving cardiovascular functions.

A related effort in bioinformatics seeks to accelerate biological research at UNLV, UNR, DRI, and affiliated research centers like the Nevada Cancer Institute by assisting investigators with the application of computing to biological problems and providing preliminary data for grant applications.

The Nevada System of Higher Education has a wealth of faculty expertise and infrastructure to support world class research and educational programs in biotechnology. To date, however, these resources have mostly not been integrated either geographically or institutionally to permit them to reach their full potential.

Nevada Biotechnology Goals

Goal 1: Develop a state plan on biotechnology development and life sciences opportunities for the State's economy that will attract related companies and services to Nevada.

Goal 2: Support biotechnology and applied life sciences research at UNLV, UNR, and DRI that can lead to technology transfer and commercialization of research and development efforts.

Goal 3: Support the production of a trained workforce for new or relocated life sciences businesses.

NSHE Strategies to Support State Goals

- Increase faculty research and development (R&D) in biotechnology by identifying and applying for funding sources in all related areas.
- Assist the Nevada Development Authority, the Economic Development Authority of Western Nevada, and the Northern Nevada Development Authority – as well as the State Division of Economic Development – with their efforts to actively recruit biotechnology and biomedical companies to Nevada.
- Develop more degree and certificate programs at the universities and colleges to support life sciences employers.
- Engage and advise researchers, experienced entrepreneurs, business executives, and venture capital to identify, commercialize, and fund promising biotechnologies resulting from faculty R&D.

COMMON THEMES FOR NEVADA

Nevada is not currently performing at the level needed in many of the areas critical for the future of the State. National reports on education, health, technology, and research indicate that the State is performing near or at the bottom in many of the categories that would normally provide attractive assets to families and businesses considering moving to Nevada. The State can no longer do “business as usual” if it is to prosper.

This Nevada Science and Technology Plan contains several recurring themes in all of the focus areas needed to support the State moving forward.

Communication and public awareness

Solutions to the State’s most serious problems must be based on science, research, and data. This requires transmitting information to the public, from K-12 to adult retirees, about the critical importance of these focus topics. Policymakers and government officials particularly need to become knowledgeable to make informed decisions.

For example, public awareness about the need to develop alternative and renewable energy sources and to protect water resources seems essential as quality of life issues for all Nevadans. A better informed public can support the difficult decisions that policymakers and administrators will have to make.

Workforce training and education

In every focus area, new education and training opportunities will need to be begun or augmented to accompany science and technology development. Ultimately this education and training will lead to higher-wage employment and a population prepared for the future. Without this targeted education and training, only the most basic entry jobs will be available to too many current Nevada citizens. Start-up companies will not develop. Out-of-state businesses will not relocate to this State.

In addition to certificates, associate degrees, and bachelor’s degrees, advanced education is key to science and technology development. Opportunities for graduate students to attend the universities and to work with a mentor through research projects are the only ways that students dedicated to solving Nevada’s problems will be found. Graduate students who are educated and trained in Nevada most often pay special attention to solving Nevada’s problems.

Collaboration among business/industry, government, and college and university faculty

In almost every focus area, collaborations with industry have been proposed as a road to future success. Partnerships with industry and business, either to support education proper or to invest in technologies and practices for the development of new ideas and inventions, provide ways to help financially, educationally, and economically. Industry leaders will need to help support and define their educated employees of the future in order to build the essential workforce.

Support of research and development projects that lead to new ways of doing business, new tools for better business success, or business spinoffs that promote economic development and diversity is a partnership that requires two-way communication between faculty, researchers, and business leaders. Ways of making that collaboration successful and removing bureaucratic impediments to working together must be found. Greater economic diversity in Nevada is essential to avoid future economic fluctuations caused by an economy defined by only one or two industries.

Information Technology

In this day of advanced information technology, large amounts of records are accumulated and kept in databases. There is a need and a desire by both NSHE and the State to share electronic data and common databases in order to better understand and solve some of the critical problems (such as water resources) and to provide improved healthcare services (electronic health records). Shared physical resources also make sense. Nevada cannot afford duplication of efforts and facilities when so many important problems face the State and resources are limited. Obvious areas of sharing resources include renewable energies, business practices, software development, and engineering design for building, bridges, and roads.

NSHE's ability to excel in science, technology, engineering, and mathematics is greatly dependent on having good broadband connectivity intra-campus, inter-campus, and to points beyond the state. NSHE has made great strides in connectivity in recent years, but with technology constantly changing, NSHE needs to keep current in this area of cyberinfrastructure. NSHE's capacity to be competitive depends on it.

Research infrastructure investment

Nevada's science and technology infrastructure has been greatly enhanced by EPSCoR and IDeA programs supported by federal agencies. The intent of these programs is to provide the "seed corn" that helps scientists become nationally competitive in world class research. NSF, NASA, Space Grant, DOE, DoD, and NIH programs to stimulate competitive research have provided Nevada with \$51 million in research support for equipment and facilities and to pay for research done at its research institutions. Along with research infrastructure goes human infrastructure. Most of these programs provide graduate and undergraduate support for students to pursue their interests in STEM fields. Further, many of them develop opportunities for "at risk" students to participate and be stimulated by science and technology. From middle and high school through the community college level, these students take part in science and technology education and research that builds a pipeline of future workers in key areas in support of Nevada's economic future. All NSHE institutions, including Nevada State College and the community colleges, participate in the various pipeline activities.

This investment is essential if Nevada is to move forward in research, technology transfer, and economic development. But EPSCoR and IDeA programs are not sufficient. The State of Nevada, along with private donors, must step forward with more financial building blocks essential for Nevada's three research institutions to be nationally and internationally competitive. It is an investment that will yield returns for the future far beyond the cost.

CONCLUSION

These nine focus areas and five common themes provide a broadly written blueprint for the investment of resources and the development of new programs in science and technology for Nevada. These lists are not exhaustive by any means. DRI, UNLV, and UNR each have specific areas identified for excellence by their scientists, engineers, researchers, and faculty. NSHE community colleges and the state college have an active role in providing the educational unpinning necessary in all science and technology efforts. Often workforce needs arise that cannot be anticipated, just as do research opportunities. Therefore, the lists are not intended to represent all of the potential opportunities that may come Nevada's way or rule out other areas requiring attention.

But Nevada's success in the years ahead will require higher education and the State working together in a focused manner to build science and technology infrastructure and to make difficult choices among the many opportunities. It will require the recruitment of the nation's best and brightest scientists who can work in the laboratory and in the field to build a better Nevada. It will require sacrifices of less-important initiatives to focus on the critical ones facing the State. This Plan is a beginning design to help shape that conversation.