

RAISING ARIZONA

Unburdened by tradition, funders are backing all kinds of innovative work in Arizona. **Gene Russo** looks at opportunities on the rise.



At first glance, misty Ireland and sunny Arizona seem to have little in common. But William Harris, former director-general of the government agency Science Foundation Ireland, believes that his country's science boom has important lessons for the desert state, where science is on the up. Harris, hailed as a leading architect of Ireland's economic and research success (see *Nature* **444**, 396–397; 2006), went to Arizona 18 months ago to help spur investment in the state. He now heads Science Foundation Arizona (SFAz), a non-profit organization that seeds promising research in biosciences, sustainability, and information and communications technologies. SFAz was set up last year with \$135 million in state funding over its first five years, much of which is likely to be matched by private money. It is part of a statewide funding and research surge that has brought new institutes, facilities and big companies to Arizona, and to Phoenix in particular — the fastest growing city in the United States.

Striving to replicate Ireland's success in Arizona, Harris notes that the economies are of a similar scale; state investment is plentiful; and both attract talented recruits. Yet the contrasts and challenges are many. Harris feels the US education system is inadequate at all levels up to the end of high school; on the other hand, he admires the much greater amount of philanthropic funding available in Arizona.

One of Harris's plans is to start a scholars programme to bring young talent to Arizona for three to six months, then convince them to stay. The state's higher-education sector is already blossoming. Arizona State University (ASU) in Tempe, not traditionally known

as a research institution, has started some thriving interdisciplinary programmes. Its president, Michael Crow, has a vision of the 'new American university' that embraces interdisciplinary science at every turn (see *Nature* **446**, 968–970; 2007). And ASU is just one of several institutions benefiting from a flurry of state and philanthropic investments.

Individual researchers such as Stephen Macknik at the Barrow Neurological Institute in Phoenix, are seeing the results. A few years ago, the US National Science Foundation (NSF) sent Macknik a strange message. His grant application had been successful but, because of budget cuts, the funding amount was for zero dollars. He turned to the SFAz, which kept his research going, and the following year he was finally awarded NSF funding.

Sales for science

Research initiatives have been buoyed by a state sales tax passed in 2000 that will generate about \$1.5 billion in research and science infrastructure money for state universities between 2002 and 2022. ASU and the University of Arizona (UA) in Tucson currently each get about \$30 million a year.

One major ASU initiative is the 32,500-square-metre Biodesign Institute, which has an interdisciplinary philosophy. Projects are chosen by institute members, then interdisciplinary teams are formed to tackle the challenges. Stephen Johnston, director of Biodesign's Center for Innovations in Medicine, says he enjoyed his previous job running the Center for Biomedical Inventions at the University of Texas Southwestern in Dallas, but lamented its lack of emphasis on translational research and the difficulty getting funding



Cutting edge: Phoenix's Biodesign Institute (above left) and, down the road in Tucson, BIO5 at the University of Arizona.

for his edgy ideas. Some potential funders even laughed. "I came here, and they may have laughed but they gave me the money to try it," Johnston says.

To come to ASU, you have to be something of an "intellectual cowboy", says Biodesign physicist Stuart Lindsay, a 28-year veteran of ASU. "You have to want to build something." You also have to like the desert and not mind the 43 °C summer heat. Occasionally, Lindsay notes, a recruit or spouse takes one look at the environment and says: "Oh my God, I could never live here." Still, the institute continues to grow, with two more buildings in the pipeline, and plans to hire two or three tenure-track faculty members and more than a dozen postdocs, according to Johnston. Current Biodesign projects include a vaccine against various cancers and a system to clean chemicals from drinking water.

ASU's innovative new School of Sustainability focuses on problems of urbanization, biodiversity, and energy and water use. It grew from ASU's Global Institute of Sustainability, set up in 2004 with \$15 million in start-up funds from chewing-gum tycoon turned philanthropist Julie Ann Wrigley, who added another \$10 million in June to recruit and provide seed money for researchers studying energy, business, climate and systems science.

A new ASU School of Earth and Space Exploration focuses on issues such as the origin of life, the distribution of life in the Universe and the formation of stars and galaxies. Founding director Kip Hodges — who joined from Massachusetts Institute of Technology last year after 23 years as a faculty member — relished the idea of building a new programme that all but requires collaborations among scientists and engineers. "We're going to forget about whether these are engineers or scientists," says Hodges. "We're training to solve big scientific problems." The school will be housed in a new 14,000-square-metre building. With 37 faculty members now, Hodges plans to almost double that number in the next five years.

Also in Phoenix, the International Genomics Consortium (IGC), started in 2001 with county and local government support, houses a biorepository of 1,900 patients' tumour samples. The IGC later created the Translational Genomics Research Institute, which, along with other organizations around the world, uses the IGC's tissue samples to research cancer. A spin-off called the Molecular Profiling Institute is attempting to

commercialize findings based on the samples. The three institutes combined have just 35 employees, but they plan to grow to about 90 in the next few years, says IGC founder Richard Mallery, who chose Arizona over several other candidate locations. "It didn't have many old institutions. We had a blank slate," he says. Arizona's established resources included strength in biology at UA, infectious-diseases research at Northern Arizona University in Flagstaff and bioengineering at ASU. "We took what was here and built on it," says Mallery.

And after much political wrangling (see *Nature* 446, 968–970; 2007), Phoenix will soon have a medical school, a UA–ASU collaboration that's an extension of UA's medical school in Tucson. At present, Phoenix is the only major US metropolitan area without one.

Research rivals?

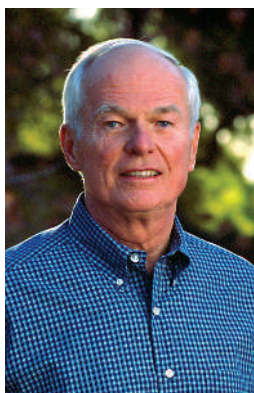
The state's traditional research powerhouse, UA, 185 kilometres southeast of Phoenix, boasts several good programmes, including optics and aerospace. It's a traditional rival of ASU, although the two are finding ways to collaborate. "I'm of the opinion that the rivalry should stay on the athletic field," says Vicki Chandler, director of BIO5, an interdisciplinary UA institute.

Like Biodesign, BIO5 was started with state funds. Most members are in other UA departments: the '5' represents science, agriculture, medicine, pharmacy and engineering. Recent BIO5 recruit Maggie So came from the Oregon Health and Science University, where she feared the administration was starting to devalue basic research. Soon after she arrived at BIO5, So, a microbiologist, established a collaboration with an engineer to examine the forces at work in bacteria during division. "It would've taken me years to find her if I'd been in the traditional campus setting," she says. So will be starting a pathogenesis programme at UA; she plans to hire about ten people in the next eight years.

In planetary and space science, collaborations can be trickier, says Jonathan Fink, director of ASU's Global Institute of Sustainability. ASU and UA have two of the country's top programmes and routinely compete for NASA funding.

"The University of Arizona used to be the only research institute in the state," says Fink. "Sharing that stage is new, and, for some people, uncomfortable." For now, it seems that stage can take multiple players. ■

Gene Russo is acting editor of *Naturejobs*.



Vicki Chandler (top) and Richard Mallery.