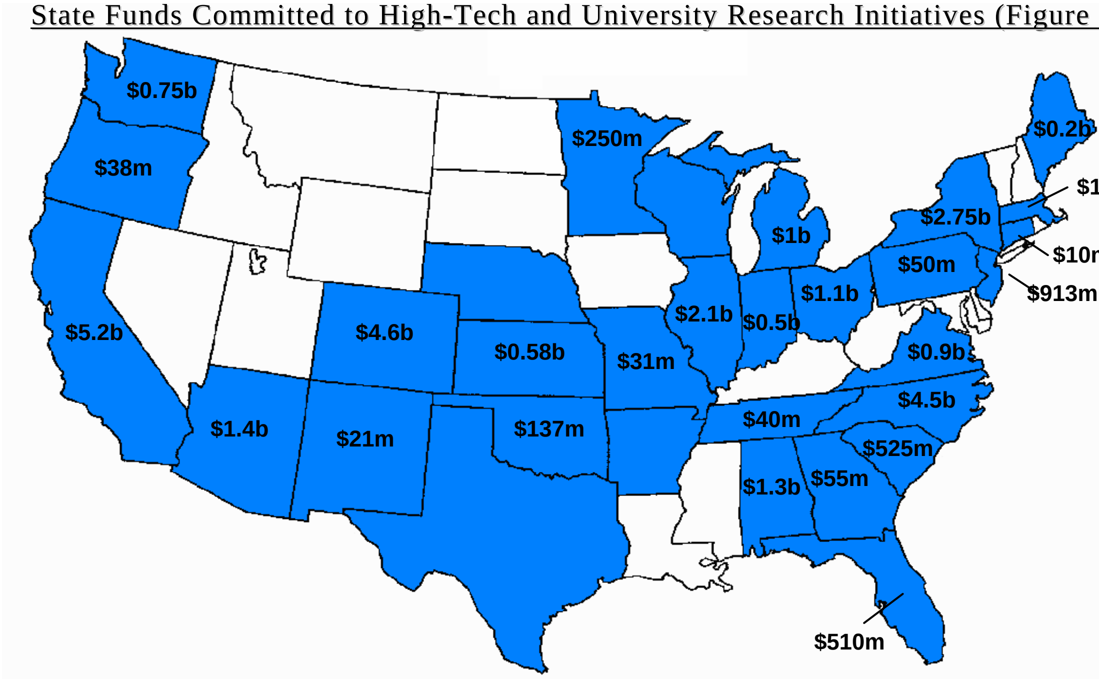
Nationwide Survey Of Economic Development Strategies Involving Public Universities

To compete in the modern knowledge economy, many states actively invest in higher education to promote innovation in promising advanced technology industries. States have offered considerable dollar bids for a foothold in emerging technology-intensive fields, especially biotechnology, nanotechnology, information technology, and genomics. Most states are investing in direct funding for research in one or more areas. Our nationwide survey reveals that 9 states have major long-term funding initiatives (over $1 billion) for high-tech academic research. Meanwhile, at least 31 states have committed considerable funding in this area (more than $10 million). Overall, our estimate of the total commitment to additional spending focused on high-tech/academic research since 2000 is $29.4 billion.

State Funds Committed to High-Tech and University Research Initiatives (Figure 1)



Sources: Original CPPA research, *National Competition for Emerging Technology Edge*. Brian Cummings, University of Texas-Austin. May 2005, and *Economic Development and the High Technology Industry in Utah*, Appendix 2. Janice Houston,

The USTAR comparative policy analysis research team investigated the economic development initiatives of other states in terms of what their purposes are, how they are structured, what outcomes have been achieved, and how Utah policymakers can learn from this wealth of collective experience. Since most of these initiatives have only recently emerged, the outcomes in many cases are not yet available. Where there is a track record, published outcomes are often produced by the agencies involved and have not been verified by rigorous evaluation.

This study undertook a broad survey of all states, relying largely on prior research in this area. Five states were studied in considerable depth: Arizona, Colorado, New Mexico, New York, and Nevada. A somewhat less probing inquiry was made into five other states: Indiana, Kansas, Maryland, Missouri, and North Carolina.

Economic Development Strategies

Generally speaking, there are two different categories of economic development strategies involving universities. The "research strategy" involves capacity building. Basic and applied research areas are strategically defined by the state and university; technology transfer to industry is promoted; and an economic impact is observed. In the contrasting "market strategy," industry coalitions or business outreach programs first identify the needs of industry for technology innovation. They broker existing innovations to meet a particular industry need, or the appropriate applied university research is commissioned, resulting in a positive economic impact. The research model is the category investigated by this report. In the research economic development strategy, universities play the crucial role. The following paragraphs describe and illustrate different approaches to building the research capacity of universities.

Building Research Infrastructure

State research funding must provide for research infrastructure, including faculty, buildings, lab space, and equipment. Clearly, funding research infrastructure is at the core of state strategies to support economic development through innovation.

For his doctoral dissertation Teppo Felin, professor of organizational behavior and strategy at Brigham Young University, investigated the impact of "superstar" researchers on their institutions. He found that an unexpectedly large share of the success of an organization is due to accumulated, non-transferable assets embedded *in these talented individuals*, rather than being embedded in the organizational fiber of an innovative institution. Aware of this reality, Arizona's Proposition 301 Technology and Research Initiative Fund (TRIF) oversight group appropriates considerable money and effort to bring such best-in-class researchers to its universities. With $46.1 million spent at Arizona State University (ASU) in TRIF's first three years, these researchers and the new interdisciplinary research teams they joined attracted $47.7 million in increases of external research funding and produced 46 new patents and 10 new startup companies. As another example, the New York state-funded Faculty Development

Program spends some $7.5 million annually to help recruit and retain leading entrepreneurial research faculty in science and technology fields with commercial potential.

State research funding is more commonly channeled into providing the workspace for advanced research. Arizona, for example, also provided $400 million in bonding capacity to fund the “bricks and mortar” to house the expanded research activity. Thus, TRIF funds can be used almost exclusively to fund research. Benefiting research, health care, and higher education, Colorado has undertaken the $4.3 billion, 20 year development of a world class bioscience campus. Included in the plans is a research park where graduates and post-doctoral students can work alongside leading researchers to make advances in their fields. New incubator capacity will assist startup bioscience companies with affordable access to equipment and expertise. In general, even a cursory appraisal of state funding initiatives uncovers a veritable wave of funding to build or renovate facilities adequate for advanced research.

State research capacity building generally focuses on known areas of strength. Rick Heffernon[1], an authority on Arizona’s Proposition 301 in higher education, points out that the effectiveness of that spending at ASU increased dramatically after capable university leadership consolidated resources (formerly dispersed among some six different programs) for the benefit of a few key interdisciplinary research projects.

Outcomes (or expected outcomes) of state investments in university research are typically expressed in terms of the number and quality of jobs created; external funding received; direct and indirect economic impact in dollars; additional patents issued, licenses granted, and startups created; and students acquiring experience and expertise from participating in research. Unfortunately, the results of each program are neither directly comparable nor can they be aggregated because each state—and often each program within a state—demonstrates differently the return on investment. However, to give a couple of particular examples, the $580 million, 10-12 year Kansas Bioscience Initiative has the goal of creating 100 new bioscience companies that would employ more than 23,000 people using an assortment of the types of programs discussed in this report. Fifteen Centers for Advanced Technology (CATs) in New York absorb some $25 million annually in state funding for applied research. From 2000-2004, the CAT program alone

[1] Heffernon is a senior policy analyst at the Morrison Institute. A participant in the planning process for spending Proposition 301 TRIF funds in higher education, he now writes the reports evaluating its progress.

helped create or retain 2,600 jobs and generated more than $1.8 billion in private sector revenues, cost savings, and capital expenditures. The list of outcomes continues.

Technology Commercialization

Various states have identified the commercialization process as a constraint on the profitable application of university knowledge in industry. For example, Indiana will contribute 40 percent of a $360 million, 10-year allotment specifically to help move ideas to marketplace, with the larger portion being directed to research and technology. Without a specified change in funding, New Mexico has consolidated its commercialization efforts at NMSU to integrate at the Arrowhead Center the (formerly) disparate pieces of the university's interface with industry: intellectual property management, workforce development, entrepreneurship, the research park, and business incubation. The topic of funding and improving technology commercialization in Utah is explored in detail by another USTAR research team. With regards to the capacity of Utah's high-tech business community to make use of university research, it is noteworthy that reputable sources[2] rank Utah 9th among states for potential performance in today's knowledge economy and select Provo as the 3rd most innovative-entrepreneurial region in the country. Utah also has high rates of business creation and survival.

Catalyst for Out-of-State Research Funding

Leveraging state funding for university research, many states provide seed money and expert assistance to harness external research funding sources, particularly federal grants. Besides the Arizona example (pg. 3), New York, Indiana, and other states have successfully applied this model. In New York, state appropriations for its overarching NYSTAR initiative leverage federal, private, and university funds by a factor of 2.5 to 1. Through its Matching Grants Program, some $5 million a year is distributed in seed grants to help recipients qualify for major federal funding grants. In Indiana, $49 million in awards to joint university/private sector projects has leveraged $95 million in matching funds. A powerful incentive to provide state funding is the increased ability to attract matching funds from private and federal sources.

Workforce Development

To cultivate human capital expertise, many states emphasize the critical need for a skilled workforce in advanced technology fields. Kentucky has committed $120 million to "Bucks for

---

[2] The Milken Institute's National State Technology and Science Index, 2004 and The Innovation Entrepreneurship NEXUS: National Assessment of Entrepreneurship and Regional Economic Growth and Development, respectively.

Brains” to improve higher education. To reverse the emigration of Missouri math and science college graduates, the state has initiated a loan forgiveness program rewarding graduates who choose to work for in-state life sciences companies. Pennsylvania’s SciTech Scholarships provide university students up to $3,000 per year in financial assistance in exchange for a commitment to work in-state. Other scenarios may include funding for community college education or training programs that support targeted technology industries.

Conclusion and Recommendations

State policy varies with regard to economic development strategies involving public universities. However, our research gives rise to some important observations.

- *Most states directly fund high-tech research infrastructure.*
- *States generally concentrate in their respective areas of strength.*
- *It appears that ‘superstar’ researchers are critical to technology development.*
- *Utah cannot outspend the competition; there is a need for focus and alignment.*