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# ARIZONA'S BIOSCIENCE ROADMAP

2014-2025

Advancing the  
Biosciences  
and Improving  
Health Outcomes

**SUPPLEMENT:**

## Summary of Goals, Strategies, and Potential Actions

APRIL 2014

# ARIZONA'S BIOSCIENCE ROADMAP

ARIZONA'S BIOSCIENCE ROADMAP is a long-term strategic plan to make the state globally competitive and a national leader in select areas of the biosciences.

"Arizona's Bioscience Roadmap 2014-2025: Advancing the Biosciences and Improving Health Outcomes," identifies five overarching goals, 17 strategies, and 77 potential actions to make Arizona's bioscience vision a reality. In this supplement to the Roadmap report, the goals and strategies are presented with the corresponding 77 potential actions.

The actions were developed by Battelle Technology Partnership Practice based on research plus interviews and focus groups with more than 150 Arizona bioscience leaders. The input includes feedback from members of Arizona's Bioscience Roadmap Steering Committee and the Flinn Foundation, which commissioned this update and the original Bioscience Roadmap launched in 2002.

Over the course of the next decade, these specific actions will evolve. Some of the 77 items will be reworked or eliminated while others will be added to align with bioscience industry trends and the state's priorities. They are meant to be optional and flexible, and not all are of equal value. Some will require preceding actions or the collaboration of many individuals and organizations to bring the action to fruition. The initial actions are being prioritized by Arizona bioscience leaders based on their degree of impact and the feasibility of their implementation.

The potential actions are posted online at [www.flinn.org](http://www.flinn.org) and will be updated periodically.

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**The Flinn Foundation** is a privately endowed, philanthropic grantmaking organization established in 1965 by Dr. Robert S. and Irene P. Flinn to improve the quality of life in Arizona to benefit future generations. The Phoenix-based foundation supports the advancement of the biosciences in Arizona through grants, the convening of Arizona's Bioscience Roadmap Steering Committee, and the commissioning and coordination of the Bioscience Roadmap and its metrics. The Foundation also supports a merit-based college scholarship program, arts and culture, and the Arizona Center for Civic Leadership.

**Battelle** is the world's largest independent research and development organization, headquartered in Columbus, Ohio. The Battelle Technology Partnership Practice has provided research and facilitation for Arizona's Bioscience Roadmap since its inception.

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The complete Arizona's Bioscience Roadmap report can be found at [www.flinn.org](http://www.flinn.org).

**GOAL 1: ENTREPRENEURIAL HUB**

*Form a hub of bioscience entrepreneurs and new enterprises across Arizona*

**STRATEGY 1A:**

Address capital needs of bioscience firms from startup to expansion through pre-seed funds, seed funds, fund of funds, investments by wealthy individuals, crowdfunding, Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grants, a resident-based venture industry and out-of-state venture capital, as well as by linking to key target markets outside Arizona

**POTENTIAL ACTIONS:**

- 1A-1** Create a state Bioscience Portfolio Advisor to help firms locate financing and other services to survive the formative stages until revenues are flowing; and create a Bioscience Catalytic Capital Network to provide information on sources of capital and stage events to link ideas and entrepreneurs with capital
- 1A-2** Form a fund-of-funds risk capital pool
- 1A-3** Develop a directory of pre-seed and seed funding sources and requirements for startup enterprises, as well as a directory of services and functions of organizations within the "Valley of Death"
- 1A-4** Create an integrated system of technical assistance, support, and funding to ensure commercialization services and support for bioscience entrepreneurs
- 1A-5** Initiate Kickstarter and crowdfunding technical assistance for startups
- 1A-6** Expand the pool of wealthy individuals contributing to the three angel funds based in Arizona
- 1A-7** Ensure sufficient seed capital in amounts between \$500,000-\$1.5 million to build a stronger pipeline of successful bio startups that have passed the proof-of-concept/prototype/pre-seed stage
- 1A-8** Increase outreach, training, and technical assistance to improve securing SBIR/STTR funding
- 1A-9** Examine the feasibility of providing matching grants to Phase II SBIR award-winners to allow recipients to focus on commercialization
- 1A-10** Offer more bioscience business plan competitions with prizes and awards, and increase bioscience entrepreneurial networking opportunities
- 1A-11** Review Arizona Commerce Authority's Innovation Challenge program to assess whether modifications are needed to meet bioscience industry needs

**STRATEGY 1B:**

Accelerate the commercialization of discoveries and advancements from research-performing institutions to industry

**POTENTIAL ACTIONS:**

- 1B-1** Eliminate barriers to seamless intellectual property flow between research-performing institutions and industry, particularly startups; devolve disclosure, conflict of interest, and faculty entrepreneurship approvals from the Arizona Board of Regents (ABOR) to the campus level
- 1B-2** Work closely with research-performing institutions' tech transfer and commercialization programs to help bio startups
- 1B-3** Ensure adequate proof-of-concept funds at every university and research-performing institution
- 1B-4** Encourage university tech transfer/commercialization units to expand functions to teaching hospitals and other research-performing institutions, while increasing linkages to organizations focused on entrepreneurship
- 1B-5** Consider the feasibility of in-state licensing of technologies prior to licensing out of state as well as phased-in fees/royalties for Arizona startups
- 1B-6** Increase the number of technology showcase and partnering events to expand knowledge and awareness

**STRATEGY 1C:**

Maintain and improve state and local competitive business climate through the implementation of stable and predictable tax and regulatory policies

**POTENTIAL ACTIONS:**

- 1C-1** Review state's R&D tax credit and other tax policies, and propose changes to assist the growth of bioscience firms
- 1C-2** Support efforts of local officials to offer tax and regulatory climates conducive to the growth of the biosciences

**GOAL 2: RESEARCH INTO PRACTICE**

*Increase the ability of research-performing institutions to turn bench research results into improved disease/illness prevention, detection, and treatment, plus bio-agriculture and industrial biotechnology products*

**STRATEGY 2A:**

Develop a premier research leadership stature in Arizona and increase the competitiveness of the state and its institutions for R&D funds from industry, government, and philanthropy, with a focus on core niches, unique disease populations, and demographics emphasizing areas that can lead to disease/illness prevention, a holistic approach, and reflect the state's population

**POTENTIAL ACTIONS:**

- 2A-1** Establish a statewide Translational Bioscience and Health Outcomes Research Fund to help build Arizona's research base, particularly around applications and development—not in basic discovery
- 2A-2** Convene conference of state leaders to help identify the focus of near-term research
- 2A-3** Form and support scientific technical networks in key focus areas
- 2A-4** Study the impact and contributions of the Technology and Research Initiative Fund (TRIF), identify any changes in structure, fund use, or objectives, and secure its renewal in 2020

**STRATEGY 2B:**

Scale up and initiate major strategic partnerships among research-performing institutions, industry, and foundations, as well as others focused on Arizona's disease/technology platforms

**POTENTIAL ACTIONS:**

- 2B-1** Form consortia of physicians, scientists, and others involved in Arizona disease focus areas, based on the success of the Arizona Alzheimer's Consortium
- 2B-2** Convene key university and nonprofit players on a regular basis who can identify and collaboratively pursue major federal and industry partnerships both within and outside Arizona
- 2B-3** Consider the feasibility of developing private industry-aligned institutes within the walls of public universities (e.g., German Fraunhofer)
- 2B-4** Build on Arizona's unique strengths in molecular manufacturing through strategic manufacturing partnerships
- 2B-5** Expand efforts to build common clinical infrastructure and Institutional Review Board capabilities to promote collaboration
- 2B-6** Secure a Clinical and Translational Science Award grant and program for Arizona

**STRATEGY 2C:**

Support and fully operationalize Science Foundation Arizona

**POTENTIAL ACTIONS:**

- 2C-1** Secure support from the Governor and Legislature to reinstitute public funding of Science Foundation Arizona
- 2C-2** Work with Science Foundation Arizona and its board to assess ways the organization can help implement the updated Roadmap

**GOAL 3: BIO-TALENT**

*Make Arizona a bio-talent powerhouse where such talent is developed, educated, trained, and retained*

**STRATEGY 3A:**

Increase the state's supply of executive-level serial entrepreneurial talent within the bioscience industry

**POTENTIAL ACTIONS:**

- 3A-1** Assess the feasibility of a broader Executive-in-Residence (EIR) program that would provide interim to permanent executive-level talent to new and growing bioscience firms
- 3A-2** Increase connections nationally with EIRs to augment the skills of EIRs in Arizona
- 3A-3** Offer idea and network exchanges for EIRs working in Arizona

**STRATEGY 3B:**

Establish Arizona as the national leader in deploying, assessing, and strengthening Science, Technology, Engineering, and Mathematics (STEM) education at both the state and local levels in K-12, community colleges, and the universities; make improvements in science and math in K-12 through the STEM Network, bioscience academies, and statewide career and community-focused technical preparation programs to form lifelong career pathways in the biosciences

**POTENTIAL ACTIONS:**

- 3B-1** Stay focused in STEM on core and next-generation standards with an emphasis on quick implementation through visits, mentoring, and internships
- 3B-2** Build internship requirements into STEM programs where they are not now required
- 3B-3** Investigate need for labs, equipment, and related materials to offer bioscience education programs across all levels, in addition to STEM teacher preparation in math and science
- 3B-4** Address the STEM challenges of minority communities through pre-collegiate programs
- 3B-5** Promote continued articulation and linkages among K-12, community colleges, and universities to offer lifelong-learning career opportunities
- 3B-6** Review and ensure career technical education and other job training programs are customized to maximize employer needs

**STRATEGY 3C:**

Dramatically expand student entrepreneurship programs both at the K-12 and college levels, as well as internship opportunities to thousands of enrollees in private businesses and nonprofit organizations

**POTENTIAL ACTIONS:**

- 3C-1** Use incubators, community colleges, and STEM education to link firms with the next generation of workers, and enable students to use and learn about tools and product development through expanded internship and apprenticeship programs
- 3C-2** Encourage the universities via ABOR to make student entrepreneurship a distinguishing feature, generating college graduates who are workforce-ready upon graduation and helping to retain them in Arizona
- 3C-3** Create a state internship incentive fund
- 3C-4** Create internships that enable students to solve health clinical problems and learn about regulatory processes

<p><b>STRATEGY 3D:</b></p> <p>Develop the talent base by attracting and retaining top graduate students, doctoral and post-doctoral candidates and trainees, and physician-scientists to research opportunities in Arizona, including clinical research</p>	<p><b>POTENTIAL ACTIONS:</b></p> <p><b>3D-1</b> Have ABOR examine graduate medical education need and demand, and recommend appropriate actions such as doctoral and postdoctoral research fellowships and physician-scientist recruitment packages to address Arizona deficiencies</p> <p><b>3D-2</b> Assess additional ways the universities could offer entrepreneurial education and training programs to bioscience graduate and postdoctoral students</p> <p><b>3D-3</b> Examine creation of fellowships for recent graduates and postdoctoral students to transition from academia to industry, such as North Carolina's Industrial Fellowships, while also launching fellowships that would allow faculty to work in industry</p> <p><b>3D-4</b> Consider two-tier, or joint, appointments of key faculty across research-performing institutions</p> <p><b>3D-5</b> Broaden interdisciplinary clinical and research opportunities and academic programs for both undergraduates and graduates, and encourage professional science master's programs</p> <p><b>3D-6</b> Invest in and expand veterinary medical education to link animal, plant, and the human sciences</p>
<p><b>STRATEGY 3E:</b></p> <p>Promote health care delivery reforms that will make Arizona a national leader and overcome the discovery-to-delivery disconnect</p>	<p><b>POTENTIAL ACTIONS:</b></p> <p><b>3E-1</b> Position Arizona to lead the efforts to create new models of health care delivery and rationalization over the next decade</p> <p><b>3E-2</b> Make Arizona a place to try advanced medical procedures and clinical trials by offering a regulatory and legal climate that allows new applications to flourish</p> <p><b>3E-3</b> Offer clinical performance incentives, such as prizes and awards, for Arizona health care innovations</p>
<p><b>STRATEGY 3F:</b></p> <p>Develop programs to educate health care providers about delivering precision medicine to the patient</p>	<p><b>POTENTIAL ACTIONS:</b></p> <p><b>3F-1</b> Ensure a focus on physician training in molecular and precision medicine, the use of scientific and clinical data, and the pursuit of further research while in clinical practice</p> <p><b>3F-2</b> Increase the size of the state's production of general practitioners, the number of available graduate medical education slots, and the development of nationally recognized health care delivery models</p> <p><b>3F-3</b> Address the infrastructure, program, regulatory, and clinical and research needs involved in the expansion of the University of Arizona College of Medicine-Phoenix, the Mayo Medical School presence in Arizona, as well as osteopathic and other health care education and training facilities; these include Northern Arizona University allied health, Arizona State University nursing, and UA's plans for veterinary medical education and related programs</p>

**GOAL 4: CONNECTIVITY**

*Promote Arizona to economic partners in neighboring states, Canada, and Mexico as a place where bioscience research, health care delivery, and commercialization seamlessly intersect*

**STRATEGY 4A:**

Develop a consistent statewide strategy to form linkages of universities, private research institutes, firms, investors, and entrepreneurs in key target markets, such as Utah, Washington, Oregon, Southern California, Mexico, and Canada; these close connections can help Arizona become recognized as the key center to turn research into practice, form firms, develop products, run clinical trials, and seamlessly deliver health prevention and treatment from development to delivery

**POTENTIAL ACTIONS:**

- 4A-1** Develop a coordinated effort among the bioscience community to raise the visibility of Arizona biosciences and health outcomes in key target locations where capital and scientific collaborators are located
- 4A-2** Identify the key supplier assets Arizona offers, or needs to offer, to make these strategic linkages stronger and be able to attract investment, firms, and expansions to Arizona
- 4A-3** Establish an informal targeted plan for bio-related deals to use the Arizona Commerce Authority deal-closing fund, particularly in ways that reinforce target location relationships and brand Arizona on its successes and unique attributes
- 4A-4** Increase knowledge and visibility to non-bioscience industries and the public within Arizona of the opportunities and linkages to bioscience and health outcomes
- 4A-5** Increase Arizona's bioscience visibility nationally and globally among large firms, investors, suppliers, research-performing institutions and others in select target areas to position Arizona as the center that integrates these efforts

**STRATEGY 4B:**

Encourage creative private-public partnerships and financing mechanisms to address needed infrastructure investments such as research facilities, spec multi-tenant facilities, incubators, accelerators, research park developments, additional biomedical anchors, and shared core laboratories and prototyping facilities

**POTENTIAL ACTIONS:**

- 4B-1** Educate and inform developers on space needs and requirements of the bioscience industry
- 4B-2** Undertake a study of space needs of Arizona's public universities to accommodate projected research in the coming decade, and develop a consolidated capital budget plan
- 4B-3** Develop private-public options to finance research facility needs, such as underutilized current assets and state-owned lands
- 4B-4** Explore creation of a statewide revolving-loan bioscience facilities fund

**GOAL 5: COLLABORATION**

*Pioneer a new level of commitment to partnerships to sustain and enhance the state's "collaborative gene" reputation*

**STRATEGY 5A:**

Remove growing impediments to collaboration between and within institutions through incentives for collaboration and performance accountability

**POTENTIAL ACTIONS:**

- 5A-1** Bring young and innovative entrepreneurs into Arizona's bio and life sciences leadership such as through a Bioscience Leadership Academy
- 5A-2** Encourage the Bioscience Roadmap Steering Committee to host mini-workshops and seminars on issues requiring collaboration, including regional collaboration, while increasing its catalyst role by fostering conversations about the state's needs
- 5A-3** Form a conference for state leaders that would meet at least quarterly to increase and improve communications
- 5A-4** Provide awards and prizes for outstanding collaboration
- 5A-5** Undertake a study and review of entrepreneurial assistance programs to develop a less fragmented and more streamlined structure
- 5A-6** Focus on breaking down institutional barriers to collaboration, including among hospitals, by creating an honest-broker function with supporting resources
- 5A-7** Convene interested parties to build a "home brew" model of collaboration in diagnostics that links all three regions of the state

**STRATEGY 5B:**

Strengthen bioscience advocacy at the local, state, and national levels

**POTENTIAL ACTIONS:**

- 5B-1** Strengthen trade association efforts to educate and lobby on behalf of biosciences at the state and local levels, and form alliances with patient advocacy, hospital, and physician groups that can be partners in a common agenda
- 5B-2** Position the Steering Committee and its members to be more active with respect to advocacy
- 5B-3** Identify strategic opportunities to develop federal centers and labs, such as the National Biomarker Development Alliance, and to generate major science and technology awards, and federal research and technology investments
- 5B-4** Increase elected officials' knowledge of the bioscience and health industries, as well as research, through education forums and other outreach activities

**STRATEGY 5C:**

Ensure the updated Roadmap has built-in accountability for performance

**POTENTIAL ACTIONS:**

- 5C-1** Ensure the updated Roadmap has built-in performance accountability