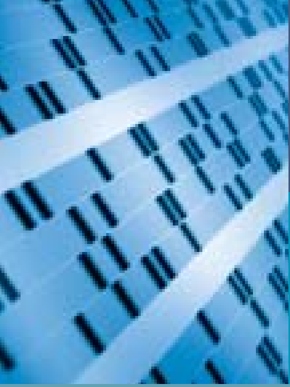
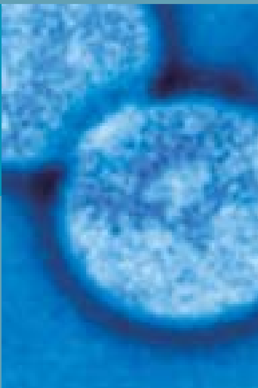


Arizona's Bioscience Roadmap

A 10-YEAR VISION FOR ARIZONA IN THE BIOSCIENCES



HIGHLIGHTS OF THE 2002 BATTELLE ARIZONA STUDY

Mapping a Plan for Arizona in the Biosciences

WHAT IS THE BATTELLE STUDY?

In Spring 2002, the Flinn Foundation commissioned the Battelle Memorial Institute – a worldwide leader in the development, commercialization, and transfer of technology – to assess Arizona's competitive position in the biosciences and to develop a biosciences economic roadmap for the next decade. The study was guided by a 25-member steering committee comprised of business, economic development, government, and university leaders. This publication summarizes Battelle's work and presents strategies that can define Arizona's long-term biosciences plan. An executive summary of Battelle's findings and recommendations is available at **www.flinn.org.**

WHAT ARE THE BIOSCIENCES?

The nation's economy is changing at a dramatic pace as technology increasingly fuels economic growth. Today's emerging markets access and control knowledge, especially in the biosciences.

The biosciences encompass many subsectors and various economic opportunities:

» DEFINITION OF BIOSCIENCES – FIVE SUBSECTORS »

Product-Oriented
- Organic and Agricultural Chemicals
- Drugs and Pharmaceuticals
- Medical Devices and Instruments

Service-Oriented
- Hospitals and Laboratories
- Research and Testing

Why Arizona Should Invest in the Biosciences

» Bioscience is one of the **fastest growing** sectors of the 21st Century economy.

» Bioscience research will lead to the availability of **new medical treatments** for Arizona residents.

» The biosciences represent a chance to build a **higher-wage, skilled, and technology-driven** employment base.

» The bioscience sector offers employment opportunities, **providing jobs** at various skill levels.

» The bioscience sector **builds upon Arizona's strengths** in electronics, optics, and advanced manufacturing.

» The bioscience sector can bring **stability to Arizona's economy** by balancing more cyclical industries.

RETURN ON INVESTMENT

If Arizona invests an additional $140 million a year in the biosciences for the next 10 years, it could generate . . .

» More than **$6 in return for each $1 invested** to leverage other financial support – similar to the experience of leading states.

» More than **triple its current annual funding** from the National Institutes of Health (NIH) and **match the annual growth rate** of the top-10 states.

» More than **32,000 direct and indirect jobs** and **120 bioscience firms.**

More than one-quarter of the annual investment goal is already met through existing commitments and resources.

The Journey has Begun

The Battelle 10-year goal for Arizona in the biosciences: *Arizona is a leading southwestern state in selective biosciences, built around world-class research, clinical excellence, a growing base of cutting-edge enterprises, and supporting firms and organizations.*

By initiating bold action, Arizona can become a biosciences leader and ensure long-term prosperity for its citizens. In fact, the journey has already begun. An **unprecedented coalition** of university, state, local, healthcare, medical research, and business leaders has made a commitment to seeing this vision become a reality. Their efforts helped "fast track" Arizona on this path to biosciences excellence by creating the Translational Genomics Research Institute **(TGen)** and persuading the International Genomics Consortium **(IGC)** to locate in Arizona. State voters have approved two initiatives to increase research support, and Arizona universities have begun construction of new research and laboratory facilities.

TO MAINTAIN THIS MOMENTUM AND FURTHER THIS VISION, ARIZONA MUST:

» Continue to mobilize **public and private leadership**, and increase the general public's knowledge and **understanding** of the biosciences and its impact on the quality of life in Arizona.

» Invest in **higher education** research excellence, as well as bioscience facilities, labs, and faculty at the state's public universities.

» Attract a **greater share** of federal bioscience research funding.

» Build "**trees of talent**" by encouraging, developing, and retaining scientific and technical talent in the state.

GETTING THERE WILL TAKE:

» **Patience and long-term commitment.** This journey will take a decade or more for measurable returns. Arizona is playing catch-up to states with a 15-year lead.

» **Champions.** Leaders are needed to champion this effort, bring the appropriate players together, and implement the action steps recommended in *Arizona's Bioscience Roadmap.*

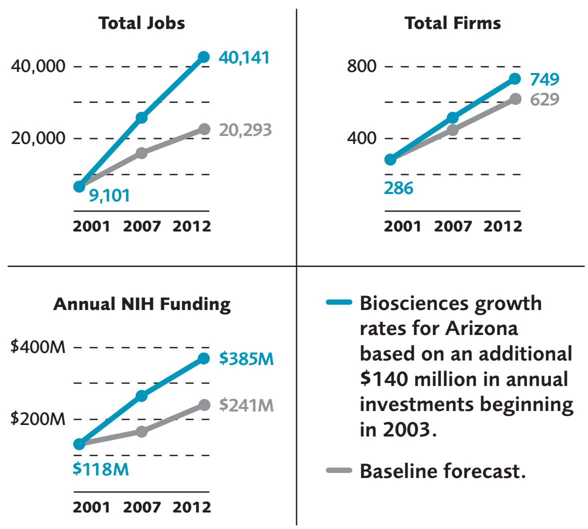
» **Strategic focus.** Investments should target research niches where advantages already exist or are emerging.

» **Strong public/private partnerships.** Collaboration through strong working partnerships between and among higher education, industry, nonprofit, and philanthropic leaders is vital.

» **Active state and local government support.** A supportive government sector must work to leverage federal dollars and create the business climate in which growth can occur.

» **Collaboration of Arizona research institutions.** Partnerships are essential to create an optimum environment for leveraging additional research funding.

» INVESTMENTS NOW = GROWTH TOMORROW »



Arizona's Place on the National Biosciences Map

Several messages emerged from data compiled by the Battelle team — some encouraging and some challenging:

ENCOURAGING

- Arizona's economic base in the biosciences is small but **expanding**, outpacing national trends.
- Arizona's public research universities have proven they can **leverage federal dollars and establish research excellence**, as they have already done within the physical sciences.
- Arizona is well positioned to take advantage of **niche markets** that benefit from the trend toward convergence of technologies in electronics, information, optics, materials, and biosciences.

CHALLENGING

- Arizona's **growth in basic research has slowed** as state support of our universities has decreased. In the biosciences, Arizona's **universities lag** the national average.
- Arizona **must invest** in university faculty, laboratories, and state-of-the-art equipment to take advantage of increases in federal medical and life sciences funding. Failure to do so means the state will continue to **miss out on a key driver** of future economic growth.
- Arizona's fiscal policy and tax base were designed in an old economy. Arizona must provide an adequate **economic development "tool kit"** to attract, retain, and grow bioscience firms.

Making a Mark on the Biosciences Map

NEAR-TERM TECHNOLOGY PLATFORMS (5 YEARS)

A flourishing future in the biosciences hinges on the presence of a **world-class research base.** This is essential to compete with states that have well-developed programs and major funding commitments. Arizona's research institutions and medical centers have essential competencies and a critical mass of seasoned investigators that can gain national prominence in select fields within the next five years if well organized and funded:

- **Neurological sciences:** Neural engineering, imaging, and clinical research with applications to Alzheimer's disease, Parkinson's disease, and Epilepsy.
- **Cancer therapeutics:** Advancing new cancer therapies and developing anti-cancer drugs.
- **Bioengineering sciences:** Providing a strong base for medical applications in imaging and diagnostics, implants, and prosthetics.

LONG-TERM TECHNOLOGY PLATFORMS (5–10 YEARS)

Four additional platforms that offer the most potential for long-term growth:

- **Infectious diseases:** Microbiology research to address prevention and treatment of communicable diseases.
- **Asthma:** Clinical studies of this debilitating respiratory condition.
- **Diabetes:** Clinical investigation into a disease that affects Arizonans at an alarming rate.
- **Agriculture biotechnology:** Exploration of plant genomics in developing new crops and identifying nutraceuticals.

Paving the Way

Battelle proposes four strategies to develop Arizona's bioscience research base and build a critical mass of bioscience companies:

Strategy One: Build research **infrastructure** of talent, facilities, and equipment around selective technology platforms and core competencies.

Strategy Two: Build a **critical mass** of bioscience firms and encourage the commercialization of research discoveries.

Strategy Three: Offer a **business environment** that supports, sustains, and encourages the growth of bioscience enterprises – to start, expand, and remain in Arizona.

Strategy Four: Encourage the **state's citizens** to become more informed and young people to explore and pursue scientific and technical careers.

A list of 19 action steps related to these strategies is presented in Battelle's executive summary, available at **www.flinn.org**.

In 2003, Phase II of the Battelle study will focus on implementing these strategies and action steps. The Flinn Foundation will make available to interested organizations the expertise of the Battelle team in furthering Arizona's biosciences sector.

Achieving the Goal

The following proposed performance measures should be used to chart Arizona's progress:

- Ensure start-up and survival rates of Arizona bioscience firms exceeding the average of benchmark states.
- Leverage federal and other dollars at least 3:1 to local investment.
- By 2005, generate bioscience venture investments totaling $100 million to Arizona biosciences firms.
- By 2007, increase Arizona's NIH funding in bioscience research and development at a rate equal to or greater than the historical growth rate of the top-10 states.
- By 2007, secure total funding of $214 million.
- By 2007, increase concentration of bioscience companies in at least two industry sectors to 20 percent more specialized than the nation.
- By 2007, support university-related start-up bioscience companies equal to top quartile of all universities.
- Progress on the proposed actions: 70 percent substantial achievement within three years and 90 percent substantial achievement within five years.

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Harry Beaty, M.D.
Former Dean, Northwestern University School of Medicine
Adviser to the Flinn Foundation

Len Becker
Vice President, Economic Development
Greater Phoenix Chamber of Commerce

Michael Berens, Ph.D.
Vice President, Research
Translational Genomics Research Institute

Kendall Bert
Director, Department of Economic Development
City of Tucson

Linda Blessing, Ph.D.
Executive Director
Arizona State Board of Regents

Margie A. Emmermann
Director
Arizona Department of Commerce

Jonathan Fink, Ph.D.
Vice Provost for Research
Arizona State University

The Honorable Susan Gerard
Arizona State Senate

David J. Gullen, M.D.
Mayo Community Internal Medicine
Chairman
The Flinn Foundation

The Honorable Deb Gullett
Arizona House of Representatives

Michelle Hanna, Ph.D.
President and CEO
Designer Genes, Inc.

Robert Melnick, Ph.D.
Director
Morrison Institute for Public Policy

Gary M. Munsinger, Ph.D.
President and CEO
Research Corporation Technologies

John W. Murphy
Executive Director
The Flinn Foundation

Richard Powell, Ph.D.
Vice President for Research and Graduate Studies
University of Arizona

Dawn Schroeder, DDS, MA
Director
Arizona Disease Control Research Commission

Sheryl Sculley
Assistant City Manager
City of Phoenix

Joan Shapiro, Ph.D.
Vice President of Research
Barrow Neurological Institute

Stephen Todd
Executive Vice President
Sun Community BanCorp

Paul Waddell
Director of Economic & Community Relations
Pinnacle West Capital Corporation

Steve Weathers
President and CEO
Greater Tucson Economic Council

Rick Weddle
President and CEO
Greater Phoenix Economic Council

Steven M. Wheeler, Esq.
Senior Vice President, Transmission Operations, Regulation & Planning
Pinnacle West Capital Corporation

Raymond Woosley, M.D., Ph.D.
Vice President
University of Arizona Health Sciences Center

Flinn Foundation Staff

Saundra E. Johnson
Associate Director for Public Programs
The Flinn Foundation

William A. Read, Ph.D.
Associate Director for Policy & Evaluation
The Flinn Foundation

For More Information:

Brad Halvorsen
Director of Communications
The Flinn Foundation
Tel: 602.744.6803

Walter H. Plosila, Ph.D.
Vice President for Public Technology Management
Battelle Memorial Institute
Tel: 216.898.6403

An executive summary of the Battelle team's research and recommendations can be found on the Flinn Foundation's Web site, **www.flinn.org.**

The Battelle Memorial Institute is the world's largest private, nonprofit research and development firm. The Arizona study was directed by its Technology Partnership Practice.

The Flinn Foundation is a private, nonprofit philanthropic endowment based in Phoenix.

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1802 N. CENTRAL AVENUE

PHOENIX, AZ 85004-1506

PHONE 602.744.6800

INFO@FLINN.ORG

WWW.FLINN.ORG