The opportunities generated by the biopharmaceutical sector as a leader in innovation and high quality job creation are not limited to just a few states, but have a substantial national footprint across states. States proactively pursue the development of the biopharmaceutical sector because it represents: a large-scale, geographically dispersed supply chain spanning R&D through to production and distribution; a key driver of the economy including the recent economic recovery; and a sector paying high wage rates in quality jobs. States are deploying a range of programs and initiatives to support and grow the biopharmaceutical industry, including: comprehensive state development strategies; investments in R&D and related infrastructure; programs to boost venture capital, entrepreneurship, and innovation development; advanced manufacturing; economic incentive initiatives; and programs working to advance STEM education and training. The State of Minnesota has followed through on a strategy to advance biomedical development in the state via collaborative research funding that leverages R&D expertise within the University of Minnesota, the Mayo Clinic, and industry.

### Quick Guide: Minnesota’s Programs & Initiatives Advancing the Biopharmaceutical Industry

#### Comprehensive State Strategies to Support Biopharmaceutical Development:
- Minnesota Department of Employment and Economic Development
- LifeScience Alley and BioBusiness Alliance of Minnesota

#### R&D Investment:
- Minnesota Partnership for Biotechnology and Medical Genomics
- MN Drive
- Recruiting medical researchers

#### Biosciences Infrastructure Development:
- University of Minnesota’s Biomedical Discovery District
- Minnesota Innovation Park
- University of Minnesota Outreach, Research and Education Park

#### Venture Capital, Entrepreneurship, and Other Innovation Related Programs and Initiatives:
- University of Minnesota’s Commercialization Initiatives
- Mayo Clinic Business Accelerator
- Minnesota’s Angel Loan Fund Program

#### Advanced Manufacturing:
- The Biotechnology Resource Center at the University of Minnesota

#### Economic Incentives:
- R&D Tax Credit
- Angel Tax Credit

### STEM Workforce & Education:
- Minnesota Department of Education
- Minnesota High Technology Council
- BioTechnology Institute

### Impacts
- The Mayo Clinic Business Accelerator at the Minnesota BioBusiness Center in Rochester currently has 15 tenants, the majority of which are in the bioscience industry.

### Minnesota by the Numbers

- **R&D as a Share of GSP, 2010**
  - **MN**: 2.8%
  - **U.S.**: 2.6%

- **Persons in S&E Occupations as Share of all Occupations, 2012**
  - **MN**: 5.0%
  - **U.S.**: 4.6%

- **Patents per 1,000 people in S&E Occupations, 2012**
  - **MN**: 29.6 Patents
  - **U.S.**: 20.3 Patents

- **High-Tech Establishments as a Share of Total, 2010**
  - **MN**: 9.0%
  - **U.S.**: 8.8%

Source: National Science Foundation, Science & Engineering Indicators 2014.
Comprehensive State Strategies to Support Biopharmaceutical Development

Economic development is a function of the Minnesota Department of Employment and Economic Development (DEED) at the state level. Bioscience industry development is a listed focus for DEED, together with manufacturing, clean technology, call centers and data centers.

Biopharmaceuticals development in Minnesota is also a focus of LifeScience Alley, the statewide bioscience trade association, whose stated mission is to improve the operating environment for the life science industry in Minnesota. The association has a diverse membership including organizations involved in animal health, food production, environmental sciences, medical devices and pharmaceuticals. In 2010 LifeScience Alley and the BioBusiness Alliance of Minnesota (BBAM) formed a strategic affiliation to further coordinate life science development in Minnesota. Founded in 2004, BBAM was an outcome of the Governor's Bioscience Council. By leveraging the resources of both organizations, the affiliation has focused on strengthening the Minnesota bioscience economy by assisting in the growth of established and emerging industries, and attracting new companies, talent, and capital. In 2012, BBAM became a legal subsidiary of LifeScience Alley.

The Alliance has had sponsorship from both the private sector and the state for the industry assessment (released in 2006) and the Destination 2025 strategic roadmap (released in 2009). The overall strategy includes a specific recommendation to “develop a biologic and biopharmaceutical industry in Minnesota” that matches identified research strengths in both the University of Minnesota and Mayo Clinic, and which can assist the device sector in remaining a national leader.

The State of Minnesota has been active in providing funding support to the University of Minnesota and to Mayo Clinic to further basic and translational research, with the long-term goal of leveraging institutional R&D expertise into commercially viable innovations. A keystone of this strategy has been investment in the Minnesota Partnership for Biotechnology and Medical Genomics, a collaborative research program between the University and Mayo Clinic. The state is also funding the MNDrive Initiative at the University of Minnesota designed to facilitate collaborations and transdisciplinary R&D, with life sciences being a key component of MNDrive funding.

R&D Investment Programs and Initiatives

The Minnesota Partnership for Biotechnology and Medical Genomics. Founded in 2003, the Minnesota Partnership for Biotechnology and Medical Genomics (Minnesota Partnership) is a collaborative venture between Mayo Clinic, the University of Minnesota, and the State of Minnesota. State funding for the Minnesota Partnership is allocated as a recurring item in the Minnesota budget, and funds are competitively awarded to projects prioritized by the Partnership’s Steering Committee.

- The majority of operational funding is awarded to collaborative teams for competitive research projects, with most of the remainder allotted for joint equipment and technology awards.
- For 2015, the Partnership funded six major projects, totaling $5.5 million, with four of the six focused on therapeutics development and therapeutics effectiveness investigations.

MN Drive. This program represents a commitment by the Minnesota Legislature of $36 million in funding to support collaborative, transdisciplinary research across University of Minnesota colleges and campuses and state industries. Covering several areas of advanced technology, MN Drive’s biomedical focus is in “Discoveries and Treatments for Brain Conditions.” For the 2014-2015 biennium, the university received its first $18 million recurring MNDrive appropriation. While still in its early funding round, the Brain Conditions work that is currently funded is oriented toward neuromodulation, neurostimulation technologies and fundamental mechanisms investigation.

Recruiting medical researchers. The Governor has proposed $30 million over the current two-year budget cycle to support the University of Minnesota in recruiting more medical researchers. The Governor has expressed a goal of increasing that to $50 million in the following biennium and envisions special investment in biomedical researcher recruitment at the University by the state to total $230 million over the next decade.
Programs and Initiatives to Build Bioscience Infrastructure

**University of Minnesota's Biomedical Discovery District.** The University of Minnesota, in partnership with the State, has developed a Biomedical Discovery District, designed to facilitate collaborative and translational research across the University's Academic Health Center. Comprising five major buildings and 700,000 square feet of space, the District is intended to be an incubator for new ideas and products and expected to become an anchor for university and industry collaborative research and the development of new biomedical business enterprise.

- The Discovery District's main assets include a Stem Cell Institute, the Center for Infectious Disease and Microbiology, the Center for Magnetic Resonance Research housing the world's largest imaging magnet, and heart and cancer care institutes within a flexible and collaborative research space.

- One of the five buildings is the McGuire Translational Research Facility (opened in 2005) which is home to the Stem Cell Institute as well as the Center for Infectious Diseases and Microbiology Translational Research and researchers from the College of Pharmacy. The building also houses the University's Induced Pluripotent Stem Cell (iPS) Facility.

**Minnesota Innovation Park.** LifeScience Alley and the private developer The Wall Companies have been in discussions with the University of Minnesota and other key stakeholders regarding developing a university research park, called Minnesota Innovation Park, on property adjacent to the Biomedical Discovery District.

The University of Minnesota is also developing the **University of Minnesota Outreach, Research and Education (UMore) Park** on a 5,000-acre site owned by the University. Located approximately 20 minutes from the Minneapolis-St. Paul Airport and equidistant to the two downtown areas, UMore Park is an experiment in creating a highly integrated live, work, play planned community with a dedicated focus towards attracting R&D operations of companies.

Venture Capital, Entrepreneurship, and Other Innovation Related Programs and Initiatives

**Innovation Development**

**University of Minnesota’s Commercialization Initiatives.** The University of Minnesota, as the largest state-supported university in Minnesota, is proactive in seeking to commercialize biomedical innovations. The **Office of Technology Commercialization (OTC)** has a specialized life science team, and the University’s **Committee for Pharmaceutical Development (CPD)** has been formed to identify, develop, and commercialize pharmaceutical products by forming networks and fostering dialogue between University of Minnesota researchers and industry experts.

- The Office of the Vice President for Research and the Office of the Vice President for Health Sciences serve as the sponsors of the CPD, which includes University staff and external advisors with drug-development experience.

- The CPD provides guidance and funding, with potential matching funds from philanthropic and industry partners. Funding emphasis is placed on research translation activities and work in preclinical and clinical research phases.

- In 2005, the University of Minnesota’s McGuire Translational Research facility opened with a mission to advance new discoveries from research laboratories to real-life clinical and commercial applications.

- The OTC’s **Minnesota Innovation Partnerships (MN-IP)** program is designed to streamline and facilitate University-industry sponsored research and research commercialization. MN-IP significantly streamlines the negotiation of licensing rights to intellectual property developed during industry funded research and allows companies who sponsor University of Minnesota research to pay a relatively small up-front fee that enables the company to retain exclusive worldwide rights where royalties only accrue in extreme commercial successes.

- Another investment designed to facilitate University of Minnesota industry/university research and research commercialization is the **University Enterprise Laboratories, Inc. (UEL)**. Opened in 2004, the UEL is a $24 million collaborative research center and nonprofit located in St. Paul, Minnesota. With 126,000 square feet of space, the UEL...
Aims to incubate early stage bioscience ventures. The facility contains wet lab and office facilities. Funding is being sought for a 40,800 square foot expansion of additional wet lab space to meet anticipated space demands.

**Entrepreneurial Development**

The **Mayo Clinic Business Accelerator** at the **Minnesota BioBusiness Center** in Rochester is a Mayo Clinic initiative supported by Rochester Area Economic Development, Inc. (RAEDI) and the city of Rochester which aims to leverage the innovation of Mayo Clinic and other southeast Minnesota organizations into new commercial business ventures. Mayo Clinic also operates Mayo Ventures to manage Mayo innovations and form commercialization partnerships with experienced companies and entrepreneurs who can bring innovations to market to benefit patient populations.

- **Outcomes:** The Business Accelerator currently has 15 tenants.

**Venture Financing**

**Minnesota's Angel Loan Fund Program (ALF).** The primary program operated by the State of Minnesota to encourage start-up business investment is Minnesota's ALF program which provides a funding option for businesses certified to participate in Minnesota's Angel Tax Credit Program.

- The program provides a direct loan for 10 percent of the total amount of equity investment received in the businesses-approved funding round. Only one loan may be issued to each business for the duration of the ALF.

- At least one equity investment must be made by an investor that is both certified by the MN Angel Tax Credit Program and qualified as an Accredited Investor per the U.S. Securities and Exchange Commission regulations.

- Businesses certified to participate in the Angel Tax Credit Program during any of the program years must have fewer than 500 employees to be eligible.

- Funds may be used for start-up costs, working capital, business acquisitions and expansions, franchise financing, equipment loans, inventory financing, construction, and commercial, non-passive real estate acquisitions.

- The maximum funding available is 10 percent of equity raised after program enrollment, with a $20,000 minimum loan amount and a $250,000 maximum. Financing is provided at zero-percent interest with a seven-year term.

**Advanced Manufacturing Programs and Initiatives**

**The Biotechnology Resource Center (BRC) at the University of Minnesota.** In addition to housing faculty research, the BioTechnology Institute (BTI) at the St. Paul Campus of the University of Minnesota has also established the BRC, which is a process-scale pilot plant accessible to industrial and academic scientists for collaborative and contract research. The BTI also coordinates an active industrial outreach program which sponsors short courses and mini-symposia. The State of Minnesota has provided ongoing funding to the BTI.

**Economic Incentives**

**R&D Tax Credit.** Companies that engage in certain research and development (R&D) activities in Minnesota may qualify for the Credit for Increasing Research Activities (an R&D tax credit). The R&D credit is equal to 10 percent of qualifying expenses up to $2 million, and 2.5 percent for expenses above that level. Qualifying expenses are the same as for the federal R&D but must be for research undertaken in Minnesota. C-corporations qualify, and Individuals involved in partnerships, S-corporations and limited liability companies are allowed to claim the credit against their individual income taxes.

Minnesota also offers an **Angel Tax Credit** which provides a 25 percent credit to investors or investment funds that invest in startup companies focused on high technology, new proprietary technology, or a new proprietary product, process or service in specified fields. The maximum credit is $125,000 per person, per year ($250,000 if filing jointly). The credit is refundable. Residents of other states and foreign countries are eligible. A total of $16 million in tax credits is available.
STEM Workforce & Education Programs and Initiatives

In STEM education, the Minnesota Department of Education is providing schools with guidance and technical assistance on implementation of academic standards, current literacy best practices, multi-tiered systems of intervention, and STEM policy administration. The Department of Education also operates the Minnesota Mathematics and Science Teacher Academy (MSTA), comprising regional teacher centers that provide professional development to teachers in mathematics and science.

The Minnesota High Technology Council has also collaborated with the Minnesota Department of Education to develop the getSTEM web portal as a sharing network, allowing schools to request materials and human resources such as equipment, volunteers, speakers, and judges. Businesses are participating and providing materials, programs, and presentations to schools.

BioTechnology Institute. At the higher education level, the BTI at the St. Paul Campus of the University of Minnesota provides advanced research, training, and university-industry collaborations in biological process technology, a major area of biotechnology research. Since 1990, the Institute has been the recipient of the NIH Training Grant in Biotechnology which provides financial support to graduate students completing degrees in biochemistry, microbiology, chemical engineering, chemistry, genetics, computer science, biomedical engineering, plant sciences, mathematics, health informatics, and electrical engineering. The Institute offers a Master of Science degree in Microbial Engineering providing graduates with capabilities sought by industry, including cross-training in biological sciences and engineering.