

MAINE INNOVATION INDEX 2004

A Publication of:



Executive Summary

Prepared by:



June 2004



STATE OF MAINE
DEPARTMENT OF ECONOMIC
AND COMMUNITY DEVELOPMENT



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It is with tremendous pleasure that the Department of Economic and Community Development presents the *Maine Innovation Index 2004*. This report measures a broad range of indicators relevant to the technology-based economy, and highlights Maine's strengths and challenges.

The *Index 2004* shows that Maine has:

- Significantly increased our Research and Development (R&D) Capacity, surpassing the national average for R&D in the not-for-profit and federal funding indicators, fueled by a 30 fold increase in R&D investments over the past 10 years;
- Increased key areas of its Innovation Capacity, receiving more than \$2.5 million in federal grants and over \$14 million in venture capital to Maine companies, increasing its ranking among other states;
- Experienced significant growth in Employment Capacity, increasing the number of people employed in technology-intensive industries by 9.5% in just one year--more than triple the national average for this type of job growth;
- Improved important components of Education Capacity, including surpassing the national average by awarding more than three engineering or science degrees for every 1000 residents;
- Continued to increase our Connectivity Capacity, where Maine households have more computers than the average household nationally.

This report reflects the success of the investments the State has made in R&D, education and technology-based economic development over the last decade, and shows some areas that warrant additional attention. As these investments begin to pay off, Maine needs to stay on course to effect the long-lasting improvement that these indicators suggest is possible.

Governor Baldacci's economic development plan retains the strong commitment required to further develop Maine's innovation index. The newly created Office of Innovation will provide the focus and strategic direction Maine needs to improve its innovation index by growing the promising areas that build on Maine's strengths. Investments in innovation, technology and Maine's entrepreneurial creativity will help make Maine a magnet for creative people and the businesses they grow.

With the strong leadership of Governor Baldacci and the Maine State Legislature, Maine is building a platform for the 21st Century, so that everyone, no matter who, no matter where, has the opportunity to succeed in Maine.

Sincerely,

Jack Cashman
Commissioner

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Maine's Innovation Index 2004 is a compilation of 24 indicators measuring Maine's economic capacity and progress toward competing in an innovation-driven economy. The indicators are organized into five categories representing key components of an innovation-based economy:

- **Research and Development Capacity**
- **Innovation Capacity**
- **Employment Capacity**
- **Education Capacity**
- **Connectivity Capacity**

Research and Development Capacity - Research forms the basis for the successful development of new products, processes and services. The section on research and development (R&D) capacity provides measures of the dollar amount of R&D performance in the state as a percent of gross state product and per worker. The measures capture performance (as measured by spending) by the various types of entities engaged in R&D, including industry, academic institutions, and not-for-profit laboratories. Additionally, R&D contributions by the federal government and the state are considered within the R&D capacity section.

Innovation Capacity - Innovation describes the continuous process of generating and applying new ideas that lead to commercialization of new products, processes and services. The innovation capacity section of this report assesses Maine's potential for generating innovation by measuring key outputs, such as patents issued.

Employment Capacity - The depth and breadth of Maine's highly skilled workforce is perhaps the most important indicator of our ability to grow and sustain an innovation-driven economy. For Maine to remain competitive in today's marketplace we need to assure that technology and research-intensive businesses and institutions have a thick labor market of skilled and highly educated workers.

Education Capacity - Maine's economic future will depend heavily on the quality of today's education systems. Since knowledge is the raw material of innovation, our education systems must produce students capable of organizing and analyzing information, communicating effectively, and operating in both collaborative and independent settings. As a state, our success relies on our ability to increase access to a quality education system for all Maine residents.

Connectivity Capacity - The development and deployment of information technology (IT) has profoundly impacted the way we access and use information and is defining the way we learn, work, play, and communicate. The section on connectivity capacity measures Maine's ability to provide IT infrastructure to enable businesses, educators, students and citizens to easily access information. Connectivity capacity indicators include Internet host sites, household Internet connectivity and K-12 students per Internet connected classroom computer.

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Within each capacity area there are two types of indicators. The first measures the relative strength of the “raw materials” essential to the growth of Maine’s innovation economy. Examples include: R&D spending, education attainment, venture capital investments, and Internet connectivity - all necessary inputs that serve as the foundation for innovation-based economic growth. The second type of indicator assesses the performance of Maine’s innovation-driven economic growth by measuring key outputs and products. Examples include: patents issued, technology-business formations, and technology employment. These indicators tell us how Maine’s innovation economy is performing and the degree to which inputs are leading to desired outputs and outcomes. In addition to the 24 key innovation indicators, related sub-indicators are presented that further describe Maine’s performance in growing and sustaining the innovation economy.

In order to assess Maine’s performance on the indicators relative to other states and regions, the data for Maine is compared with data for relevant comparison, or reference groups. The reference groups are the U.S. as a whole, the New England states, and the states that are included in the Experimental Program to Stimulate Competitive Research (EPSCoR).¹ The comparison with the U.S. provides the benchmark most commonly used by similar studies that measure a state’s performance. The comparison with the New England states allows for an assessment of how well Maine is doing relative to the state’s geographic neighbors with whom Maine competes for innovation resources and industry. The comparison with EPSCoR states provides the most analytically sound benchmark because it compares Maine to states that are similar in terms of their historical performance on R&D indicators. Most of the EPSCoR states are rural and lack a high concentration of industry and related innovation resources.

Table 1 presents a summary of Maine’s performance for the 24 primary innovation indicators. It is important to note that for some of the indicators, data for the reference group comparisons and five-year trends is not available. The indicators presented are not meant to be the sole-source, definitive assessment of whether Maine is succeeding in building and sustaining an innovation economy. Like all states, Maine has indicator areas that represent strengths or assets that will serve as the building blocks for the future economy. It also has areas requiring improvement in order for the state to foster innovation, leading to commercialization and economic growth. In many of these areas Maine has made significant progress in the last five years.

Existing areas of strength for Maine in building and sustaining an innovation driven economy - The following are indicators for which Maine’s performance exceeds that of the nation as a whole in the latest year for which data is available:

- 4 - Not-for-Profit Laboratory R&D Performance
- 11 - High Technology Employment Percent Change
- 15 - Science and Engineering Degrees Awarded
- 16 - Higher Education Enrollment among Young People
- 22 - Household Connectivity
- 23 - High Speed Internet Access

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Areas in which Maine showed improvement during the last five years in building and sustaining an innovation driven economy - The following are indicators for which Maine experienced a trend of improvement during the last five years:

- 1 - Total R&D Performance
- 2 - Industry R&D Performance
- 3 - Academic R&D Performance
- 4 - Not-for-Profit Laboratory R&D Performance
- 5 - Federal R&D Obligations
- 6 - State R&D Investments
- 7 - Research Equipment Expenditures at Academic Institutions
- 8 - SBIR/STTR Funding
- 9 - Venture Capital Investments
- 10 - Patents Issued
- 14 - Education Attainment
- 16 - Higher Education Enrollment among Young People
- 19 - Percent of High Schools Offering Advanced Placement Courses
- 20 - Ability to Pay for College
- 21 - Internet Connectivity
- 22 - Household Connectivity
- 24 - Classroom Connectivity

Areas in which Maine outperforms its EPSCoR peers - Success in economic development does not occur overnight, and Maine, building from a position well behind other states, still has a way to go to successfully compete with the top tier states. However, in several indicators, Maine outperforms its peer states as defined by the EPSCoR program. The following are indicators for which Maine's performance exceeds the EPSCoR states as a whole in the latest year for which data is available:

- 4 - Not-for-Profit Laboratory R&D Performance
- 5 - Federal R&D Obligations
- 8 - SBIR/STTR Funding
- 9 - Venture Capital Investments
- 11 - High Technology Employment
- 12 - Net High Technology Business Formations per 10,000 Business Establishments

Existing areas requiring improvement for Maine in building and sustaining an innovation driven economy - The following are indicators for which Maine's performance lags behind the nation as a whole in the latest year for which data is available:

- 1 - Total R&D Performance
- 2 - Industry R&D Performance
- 3 - Academic R&D Performance
- 7 - Research Equipment Expenditures at Academic Institutions

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- 8 - SBIR/STTR Funding
- 9 - Venture Capital Investments
- 10 - Patents Issued
- 12 - Net High Technology Business Formations per 10,000 Business Establishments
- 13 - Ph.D. Scientists and Engineers in the Labor Force
- 14 - Education Attainment
- 19 - Percent of High Schools Offering Advanced Placement Courses
- 20 - Ability to Pay for College
- 21 - Internet Connectivity

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Table 1- Maine Innovation Index 2004 – Indicator Performance Summary				
Indicator	1-Year Trend	5-Year Trend	Maine in Comparison to EP-SCoR Most Current Year	Maine in Comparison to U.S. Most Current Year
Research and Development Capacity				
1-Total R&D Performance	↑	↑	↓	↓
2-Industry R&D Performance	↑	↑	↓	↓
3-Academic R&D Performance	↑	↑	↓	↓
4-Not-for-Profit Laboratory R&D Performance	↑	↑	↑	↑
5-Federal R&D Obligations	↑	↑	↑	↔
6-State R&D Investments	↑	↑	N/A	N/A
7-Research Equipment Expenditures at Academic Institutions	↑	↑	↓	↓
Innovation Capacity				
8-SBIR/STTR Funding	↑	↑	↑	↓
9-Venture Capital Investments	↓	↑	↑	↓
10-Patents Issued	↑	↑	↓	↓
Employment Capacity				
11-High Technology Employment - % Change	↑	N/A	↑	↑
12-Net High Technology Business Formations per 10,000 Business Establishments	↓	N/A	↑	↓
13-Ph.D. Scientists and Engineers in the Labor Force	↓	↔	↔	↓
Education Capacity				

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Table 1- Maine Innovation Index 2004 – Indicator Performance Summary

Indicator	1-Year Trend	5-Year Trend	Maine in Comparison to EP-SCoR Most Current Year	Maine in Comparison to U.S. Most Current Year
14-Education Attainment - % of Population 25 and older with Bachelor's Degree or More	↑	↑	N/A	↓
15-Science and Engineering Degrees Awarded	↑	↓	N/A	↑
16-Higher Education Enrollment among Young People – Chance for College by Age 19	↓	↑	N/A	↑
17a-Math Skills of High School Students 11 th Grade MEA Scaled Scores	↔	↔	N/A	N/A
17b-Science Skills of High School Students – 11 th Grade MEA Scaled Scores	↔	↔	N/A	N/A
18-Math Gender Equality among High School Students	↔	↔	N/A	N/A
19-Percent of High Schools Offering Advanced Placement Courses	↑	↑	N/A	↓
20-Ability to Pay for College	↑	↑	N/A	↓
Connectivity Capacity				
21-Internet Connectivity	↑	↑	N/A	↓
22-Household Connectivity	↑	↑	N/A	↑
23-High Speed Internet Access	↑	N/A	N/A	N/A
24-Classroom Connectivity	↑	↑	N/A	↔
Key:				
 = Improving Trend or Higher than U.S. Average  = Decreasing or Lower than U.S. Average  = No Change or Equal to U.S. Average N/A = Not Applicable or Data Not Available				

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Acknowledgements -

This report was completed by PolicyOne Research for the Maine Department of Economic and Community Development (DECD). PolicyOne would like to thank Peggy Schaffer, Policy Specialist for DECD, for managing the project. We would also like to thank Janet Yancey-Wrona, Director of the Maine Technology Institute; Phil Helgerson, Director of Maine's Applied Technology Development Centers; Jeff Sosnaud, Deputy Commissioner of DECD; and David Keeley, Senior Planner, Maine State Planning Office for providing direction, review, and comments on the report.

About PolicyOne Research –

PolicyOne Research of Portland, Maine is owned by Jim Damicis and A. Mavourneen Thompson. Damicis and Thompson each have over 15 years' experience in public policy research and analysis. PolicyOne leverages the principals' broad experience in core research and analysis techniques to provide clients with a full range of services within the areas of economic and community development, education policy, science and technology policy, program and service evaluation, state and local fiscal analysis, demographic analysis, survey design and analysis, and research and analysis to support advocacy.

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