

Evaluation of Maine's Investments in Research & Development 2005-06 Report Highlights

This fifth annual assessment of Maine's investments in R&D was conducted during 2005-06. With respect to the three core questions posed by the Maine legislature, we find significant progress as well as continuing challenges to make Maine more competitive in the knowledge economy of the 21st century.

Question 1: How competitive is Maine's sponsored R&D and has it improved over time?

Answer: While the Goals established in the "Science and Technology Action Plans for Maine" are ambitious, the impressive progress the state has already achieved in this decade gives credence to the State's ability to attain the goals set for 2010.

Progress in R&D capacity has attained momentum

Maine's strengthened institutional R&D position has been achieved through consistent and strategically focused investment by the state. This commitment has produced increased current R&D capacity and a sense of momentum necessary to achieve the longer-term goals described in the S&T Action Plan.

The early investments made in Maine's R&D capacity took some time to overcome the state's R&D "inertia". Once achieved, however, the pace of progress has accelerated. Most of the progress identified in the 2001-2005 Evaluations was achieved in the period from 2003 to 2005 when:

- institutional personnel in R&D increased 67%
- faculty involved in R&D grew 66%
- institutional R&D space grew 40%

If the state's R&D capacity could be viewed as a single research institution, the progress achieved in this decade would gain Maine recognition as an increasingly formidable R&D performer:

- Enrolls 3,248 undergraduates and 790 graduate students in science and engineering degree programs and awards 350 science and engineering degrees annually
- Employs 7,000 personnel in R&D, including 1,989 faculty and other Principal Investigators, as well as 4,988 support personnel
- Possesses 400,000 square feet of R&D space valued at \$442 million

Question 2: What is the impact of Maine's R&D investment on the development of its R&D industry?

Answer: Maine's new R&D strength is paying off for the state financially and academically.

R&D academic and economic returns are accelerating

Since 2003, the improved competitiveness of Maine's R&D institutions has produced academic and economic outcomes at an increasing pace.

- Secured \$492 million in R&D funding from government and private sources, including \$171 million in 2005 alone, a 42% increase in just two years
- Published 3,148 scientific peer-reviewed journal articles, 353 book chapters, 115 books published, and more than 2,286 other papers in 2003-2005
- Applied for 43 patents, signed 155 licenses, and spun-off 13 new ventures
- Generated \$1.1 million in License income, including \$458,000 in 2005, an increase of 64% from 2003's total

Question 3: What is the impact of Maine's R&D investment on the level of innovation and innovation-based economic development?

Answer: The ultimate objective of economic development is being realized but pace suggests significant challenges.

Innovation-based economic development is being achieved

A substantial portion of Maine's public investment in R&D is for programs supporting private sector activities. The support provided is in many forms, from patenting advice and assistance to research funding to growth capital. The 2005 Evaluation found that Maine's R&D investment is increasing the level of innovation and innovation-based economic development in the state.

Maine's company assistance programs are well established and effective

- Maine's R&D support programs reach a cross-section of firms across the state
- They provide high quality, high value assistance deemed important by the companies being served
- The programs are effective in assisting targeted companies in the development of new products or services

Support of R&D companies is creating tangible economic benefits

- 592 firms surveyed in 2005 employed an estimated 6,266 people with a total payroll exceeding \$310 million
- The average client firm employed 11 people at an average 2005 wage of \$49,605

Maine's Challenge: Build on R&D Momentum to Achieve Larger Goals

Maine's hard won recent gains in R&D competitiveness are the result of consistent support of competently executed strategies and programs. While successfully established, these efforts must be maintained and built upon to achieve the greater ambitions of the S&T Action Plan.

1. Strengthen Maine's R&D position through institutional collaborations

The 2005 Evaluation found that Maine's R&D institutional capacity has strengthened. To realize greater benefit from these gains, the state should identify and capitalize on synergies between and among the state varying institutional R&D performers.

Fortunately the 2005 R&D Evaluation found positive trends developing in inter-institutional collaborations in Maine:

- 28% of competitive research proposals submitted by Maine institutions were joint proposals involving multiple institutions within the state, an increase of 163% from 2003's total
- proposals submitted jointly with non-Maine institutions increased 158% over the same period

This is an important organic trend, recognized and build upon in the Maine S&T Action Plan. That plan establishes benchmarks for 2007 that create explicit incentives and/or requirements that all institutions requesting state funding will demonstrate collaborative multi-institutional efforts.

2. Leverage successful company assistance programs to increase economic benefits

The proven capabilities of Maine's R&D company assistance programs can yield increased economic development benefits if leveraged to better serve the State's innovative entrepreneurs and existing industry:

- While many of Maine's entrepreneurs already benefit from multiple programs, their utilization of this assistance could be optimized through a cogently packaged program of targeted delivery
- Maine is also home to many innovative existing firms not yet engaged in the State's assistance system. A proactive outreach program targeting existing small and medium industries would leverage the more specialized and high valued aspects of Maine's R&D assistance among firms with higher probabilities of success
- Maine is home to pioneering examples of synergistic co-locations of university and private sector research activities, such as the Aquaculture Center "research campus" in Franklin. The lessons drawn from those experiences should be

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codified and deployed strategically throughout the State's Advanced Technology Development Centers (ATDCs)

3. Increase private R&D commercialization by addressing growth capital scarcity

The economic growth benefits of Maine's innovation-based economy would be increased by better access to growth capital. The 2005 Evaluation found that a meager growth capital market for Maine's innovative young firms continues to limit the economic potential of the state's investments in R&D.

- only 10% of firms surveyed in 2005 received new equity capital, a decrease from the 12% reported in 2004 and the 17% reported in 2003
- the average \$325,000 of equity capital invested per firm in 2005 was a big decrease from the \$496,000 average in 2004 and the \$2 million average in 2003
- the steepest decline was in equity financing received from venture capital funds, down to an average of \$102,000 in 2005 from the \$1.1 million average in 2003

The Maine S&T Plan has appropriately made addressing the capital market constraints a major objective of its strategy. Among its 2007 benchmarks is the development of public and private funding sources that support early stage research-intensive business development.