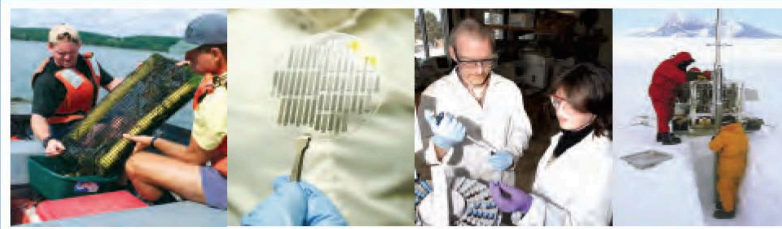




Strategic Implementation Plan for Enhancement of Research, Scholarship, and Creative Activity

*An Integral Part of the UMAINE and State S&T
Strategic Plans, Which Collectively Address Broader Academic and R&D Initiatives*



**University Research Council
January, 2012**

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The University Research Council (URC) 2011

The members of the University Research Council are shown below, and those who are also members of the URC Research Strategic Plan Subcommittee are identified with an asterisk.

URC Member	Unit
Paul Anderson	Director, Maine SeaGrant
Edward Ashworth	Dean, Natural Sciences, Forestry, & Agriculture
*Daniel Belknap	Earth Sciences
Emmanuel Boss	Marine Sciences
Ian Bricknell	Director, Aquaculture Research Institute
Stephen Butterfield	Education & Human Development
Max Egenhofer	Spatial Information Science & Engineering
Janet Fairman	Chair, Research & Scholarship Committee of Faculty Senate
Leslie Forstadt	Cooperative Extension
*Jason Harkins	Business
Mike Hastings	Research and Sponsored Programs
Susan Hunter	Provost
Len Kaye	Director, Center on Aging
*Andre Khalil	Mathematics
**Robert Lad	Director, LASST
Craig Mason	Education & Human Development
*Michael Mason	Chemical & Biological Engineering
Mohamad Musavi	Chair, Electrical & Computer Engineering
Anne Pooler	Dean, Education & Human Development
Terry Porter	Business
Joyce Rumery	Dean of Libraries

Daniel Sandweiss	Dean, Graduate School & Associate Provost
Mohsen Shahinpoor	Chair, Mechanical Engineering
Charlie Slavin	Dean of the Honors College
*Patrick Spinney	Graduate Student
Jake Ward	Assist. VP, Research & Economic Development
Michael Wittmann	Physics

** Member of URC Research Strategic Plan Subcommittee*

*** URC Research Strategic Plan Subcommittee Chair*

Although this implementation plan emphasizes research, it is acknowledged that research is intimately connected to teaching at the undergraduate and graduate levels. Moreover, the linkage of research and teaching could be strengthened by enhanced training of GK-12 teachers and involvement of middle and high school students in appropriate research activities.

HIGHLIGHTS

UMaine's research goals

- Increase research and development expenditures from \$100.6 million in FY2009 to \$125.0 million by FY2017.*
- Increase private foundation research funding from the FY2010 level of \$750,000 to \$3.0 million by FY2017.
- Increase the number of externally funded graduate students from the FY2010 level of 800 to 1,600 by FY2017.
- Increase the number of externally funded undergraduate students from the FY2010 level of 350 to 700 by FY2017.
- Increase national and international recognition of the quality of UMaine's research programs and associated faculty, including placement among the top 100 research institutions nationwide by FY2017 as measured by *The Top American Research Universities*.**
- Increase industry-funded research projects from the FY2010 level of \$4.5 million to \$9.0 million by FY2017. Includes revenue and contracts from the Department of Industrial Cooperation and ORSP and gifts from UMaine Foundation/Development from industry to support research.

* *Based on the NSF Survey of R&D Expenditures at Universities and Colleges*

** *Total research expenditures, National Academy memberships, faculty awards, doctorates granted, and postdoctoral appointees*

Strategic recommendations

1) Increase MEIF investment in UMaine's R&D, scholarship, and creative activity from \$11.7M/year in FY2010 to \$16.7M/year in FY2017

- The proposed increase is consistent with the Maine Science and Technology Action Plan issued in January 2010 entitled *2010 Science and Technology Action Plan: A Bold Approach to Stimulate Maine's Economy*.

2) Focus research and creative efforts, and promote interdisciplinary and emerging research

- Expand the number of new Major Program Investments, such as the Forest Bioproducts Research Institute and the Sustainability Science Initiative.
- Offer to non-tenure track research faculty members (soft-money) the opportunity to receive 40% of recovered indirect costs from their grants to invest in their research programs.

3) Enhance human resources and administrative procedures

- A key resource/investment needed to increase research output is to restore faculty positions in specific strategic areas and to find creative ways to reduce teaching loads of faculty members in those areas.
- Encourage an increase in the quality and the number of graduating doctoral students from 59 in FY2009 to 75 by FY2017 by investing an additional \$75,000 annually to the \$100,000 already provided by the VP for Administration and Finance. It is recommended that \$50,000 be used to increase the number of participating students, and \$25,000 be used for bridge funding or selectively increasing stipends. These funds should be distributed by the Executive Committee of the Graduate Board.
- Currently, an out-of-state graduate teaching or research assistant (whether internally or externally funded) must be appointed at 50% (20 hours/week) or more to trigger an automatic in-state tuition rate. Set the minimum load to trigger the in-state rate at 25% instead of the current 50%. This would increase the number of out-of-state graduate students with a lower burden on faculty financial resources.
- The VP for Research should continue to invest \$400,000/year (MEIF) in the Graduate School of Biomedical Sciences and \$100,000/year (MEIF) for doctoral students in their terminal year.
- Further integrate research experiences into the undergraduate curriculum and provide faculty with resources and recognition for their contributions, including increasing VP for Research administrative support from the current level (\$3,000 per year) to \$10,000 per year (by FY2017) for the Center for Undergraduate Research to encourage leveraging of State of Maine and federal funds (including, NSF, NIH, and NASA).
- Additional resources are needed to support grant preparation and investment. For example:

Increase funding equivalent to two additional grant specialists in ORSP. Streamline administrative procedures to improve efficiency by increasing administrative support such that, where possible, the administrative burden is shifted away from PI's.

Hire a grant-writing specialist whose primary focus is to help streamline the proposal submission process and expand the number of proposal submissions and increase the success rate. This specialist should primarily support the Major Program Investments discussed above.

4) Invest in sustainable research infrastructure

- Establish a process whereby each funded grant that employs high-technology equipment would have a budget created by the VP for Research that totals 2% of the total equipment costs. The monies would be available to the Faculty member/Unit that is responsible for the equipment for the duration of the grant, plus an additional period of time equal to the life of the equipment. These funds could be used for maintenance contracts, technical support, or replacement of equipment. This program will be evaluated to determine whether 2% is sufficient.
- Continue and evaluate, with the potential for expansion, the high-technology equipment infrastructure program supporting pilot projects in the emerging areas of science that require high-performance instruments to collect preliminary data for subsequent proposal submissions and/or manuscript preparations.
- Develop a schedule to upgrade research lab facilities, coordinating with the Provost, VP for Administration and Finance, and Director of Facilities and Maintenance.

5) Promote excellence in research, scholarship, and creative activities

- Develop a sustainable program for the return of indirect costs recovered from grants and contracts. It is recommended that one aspect of this program should be at least a \$100,000 increase for the Faculty Awards Program that has a selective advantage for non-MEIF areas and for tenure-track Assistant Professors in non-MEIF areas. Another aspect should be the development of a mechanism to return a portion of the indirect costs recovered to the PI of a grant as well as a portion to their associated academic home/Research Unit; this investment should be used only for furthering research, scholarship, and creative activity.
- Develop separate faculty reward mechanisms, including funded annual VP for Research awards for research excellence, and unfunded research excellence awards, to provide a competitive environment for growth of research and development. This should include awards for each college, research unit, and cooperative extension. Unfunded departmental-level awards should also be considered.

6) Outreach, public awareness, and stakeholder involvement

- Wherever practicable, opportunities will be sought to apply the research and education capacity of UMaine towards current and future challenges faced by Maine's people and businesses.
- UMaine will engage industry and communities in the research enterprise by using Cooperative Extension, Maine Sea Grant, and other programs to gain valuable insight when planning proposals and projects.
- Promote the integration of educational outreach and research opportunities through enhanced

communication.

Introduction

This Strategic Implementation Plan for Enhancement of Research, Scholarship, and Creative Activity is part of the University of Maine's (UMaine) Strategic Plan, which addresses broader academic initiatives. While this plan focuses on research, scholarship, and creative activity, it will be integrated into UMaine's overall Strategic Implementation Plan, so that all aspects of UMaine's mission of teaching, research, and public service are enhanced.

UMaine's research mission is

To facilitate growth and development of knowledge and application through research, scholarship, and creative activities of faculty, staff, and students at the University of Maine.

UMaine's research vision is

To provide the research infrastructure and environment necessary to foster innovation within the State of Maine and the Nation and to educate students to become the future workforce by providing them with access to cutting-edge research opportunities driven by societal needs.

The objective of this implementation document is to realize Maine's research mission as outlined above. In this context, research is defined as the wide range of intellectual, scholarly, and creative activities, which generate new knowledge. While this document is inspired by UMaine's unique role as the Land Grant University in Maine and the State's primary PhD-granting institution, it represents the aspirations of UMaine's faculty to enhance our research mission; therefore, this document's implementation will proceed forward as an UMaine initiative.

As with all other states in the nation, Maine's economic and social prosperity will increasingly depend on the degree to which it can compete in an innovation-driven economy. Competitive states invest significantly in their research universities owing to the crucial role these institutions play in the development of a sustainable and vibrant economy. Research universities act as economic engines, fueling creativity and innovation, and providing the human capital that underlies prosperity. Federal funding sources invested \$113.2 billion in FY 2008¹ for science and engineering research, including R&D facilities and fixed equipment. Through a continuous flow of creative discovery, and the production of highly skilled and educated workers, research universities are essential contributors to the creation of jobs and new companies. They are also essential contributors to community well being, typically providing the most advanced training grounds for the nation's biomedical and psychosocial workers. In addition, by virtue of their academic programs and high-quality faculty, research universities provide some of the finest undergraduate liberal arts educations in the nation, adding richness to the human experience. Thus, investments in the University of Maine - the State's only high-research university - is vital for the future of Maine and its citizens.

¹<http://www.nsf.gov/statistics/fedfunds.htm>

Although this implementation plan emphasizes research, it is acknowledged that research is intimately connected to teaching at the undergraduate and graduate levels. Moreover, the linkage of research and teaching could be strengthened by enhanced training of GK-12 teachers and involvement of middle and high school students in appropriate research activities.

A Shared Strategy for Maine's Future

UMaine faculty have demonstrated that a relatively small investment in research can return immense benefits to Maine and to its students, with a direct dollar return on investment of 5 to 1. Since 1998, when Maine made its first targeted investments through the Maine Economic Improvement Fund (MEIF), UMaine has increased its external grant and contract expenditures to \$100.6 million²; increased its patent portfolio to more than 100 patents, patent applications, and international patents; and increased spin-off businesses to more than 40. Through improvements to its research infrastructure, UMaine has also increased its ability to compete for federal grants and contracts and its capacity to serve its students, business, and industry. In this plan, detailed strategies will be proposed to accelerate the successful invigoration of research activities, while doing significantly more to strengthen research, scholarship, and creative activities across all disciplines at UMaine.

UMaine's ability to strengthen its research mission while enhancing its teaching and public service missions is increasingly challenged by the continuing reductions in state funding and increases in health care and other operating costs. In the upcoming academic year, state appropriations will represent 39% of the UMaine budget, down from 68% in 1990. The increased teaching burden on many departments due to potential further reductions in staffing will affect their ability to continue to accelerate growth in research, scholarly, and creative activities. A key resource/investment needed to increase research output is to restore faculty positions in specific strategic areas and to find creative ways to reduce teaching loads in those areas. The main premise of this implementation plan is the following:

Enhancing UMaine's research mission will require new, significant, and sustained investments

Both nationally and internationally, whether in North Carolina or in Ireland, substantial long-term investment in research universities has proven to be crucial to economic, social, and cultural prosperity. Investments in research and development are vital to the overall investments in an educated community that can compete and thrive and that can be leaders in an innovation-driven economy. While our recommendations quite properly center on research and in particular on research that contributes to economic prosperity for the people of Maine, it is important to emphasize that investments in research must be part of a larger, long-term investment in higher education that will enable the people in Maine to create a prosperous and sustainable economic, social, and cultural future for themselves and for their children. As Maine's only high-research-intensive university, UMaine is committed to making such a future, in all its dimensions, a reality.

²<http://www.nsf.gov/statistics/rdexpenditures/>

The following plan is built around justifying new investments, and the plan's implementation will depend on how fast the investments materialize. The new investments will be from public sources as well as private giving, industry support, and foundations. The plan also ensures that the new investments can support all aspects of research, scholarship, and creative activity on campus. The document does not, however, create an entitlement program. New resources will be carefully invested, and additional resources will be tied to performance, so as to maximize the benefits to Maine and to UMaine's students.

Maine has been faced with significant financial difficulties, including major budget deficits, requirements for significant borrowing and bonding to pay the past expenses, downgrading of the State's bond ratings, and federal base closures. So where will the new public investments come from? The bond houses, in downgrading ME's bond ratings, cited the "lack of a long-term strategy" and "using short-term borrowing options" that do not solve long-term problems but exacerbates them. This document offers the following proven long-term strategy for Maine that has worked and continues to work for many other states and other countries:

Maine must make significant, sustained, and long-term investments in Research and Development as a cornerstone of a long-term strategy to ensure Maine's future economic vitality.

This long-term investment must be made on a bipartisan basis, and written into State law, so that it will survive changing administrations and changing legislatures. Billions of dollars invested over 50 years created the prestigious Research Triangle in rural, resource-based North Carolina. Likewise, Ireland and Finland in the early years of the 21st century used strategic investment plans to turn their economies around. Similarly, Maine's investment must be at least comparable to the investments being made by other states in competing research areas. While the majority of the investment must be focused, the higher education part of this investment must also foster research across all academic disciplines, to insure a vibrant research university that will create a highly educated work force, able to tackle the challenges of the future.

How does Maine Compare with Other States in University-Based Research?

To provide one measure for enhancing research activity at UMaine, a peer group of Land-Grant universities without an associated medical school was identified on the basis of state population (≤ 1.5 million) and number of undergraduate students (9,000 - 12,000). The seven universities, including UMaine, who fit these criteria, are listed in Table 1. The Table provides information on R&D expenditures collected by a 2007 National Science Foundation (NSF) survey and data from the 2007 Integrated Postsecondary Education Data System (IPEDS). NSF-calculated expenditures for UMaine and for the peer institutions are listed (col. 6); per capita collective expenditures for all universities in a state (col. 7); and per capita expenditures for the individual peer universities (col. 9); NSF's overall state rankings for collective university-based R&D (col. 8); and the number of full-time faculty at each university (col. 10). The last column in the Table (col. 11) provides the 2007 R&D expenditures per full-time faculty in each institution, calculated using the NSF data and the number of fulltime faculty obtained from the IPEDS.

Table 1: Comparative Land-Grant Universities ¹ - (2009 Data)										
Peer State	Population ²	Peer Land Grant University	Undergraduate Students ³	Graduate Students ³	Expenditures X 1000	All Univ. in the State R&D \$/Capita ^{2,4}	Peer State Rank for Univ R&D ⁴	Peer Univ R&D \$/Capita ^{2,4}	Full time Faculty ³	R&D Generated per full time faculty ^{3,4}
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
ID	1,567,582	UID	9,343	2,614	88,242	115	49	56	685	128,824
ME	1,328,361	UM	9,511	2,383	100,580	124	47	76	608	165,428
MT	989,415	MSU	10,762	1,586	115,045	184	43	115	639	180,039
ND	672,591	NDS	12,086	2,103	113,214	278	41	169	604	187,440
RI	1,052,567	URI	13,233	3,156	83,375	245	39	79	726	114,842
SD	814,180	SDS	10,794	1,582	55,334	125	51	68	663	83,460
WY	563,626	UWY	9,748	2,679	77,633	139	52	138	1,106	70,193

¹ Peer Universities with 9,000 - 13,000 undergraduates, populations ≤ 1,500,000; and without an associated medical school

² 2010 estimate of US Census Bureau.

³ 2009 IPEDS data (<http://nces.ed.gov/ipeds>)

⁴ 2009 NSF-calculated (<http://www.nsf.gov/statistics/>)

While Table 1 is by no means the only measure of research, it provides readily available objective and unbiased data as one measure of research activity collected by the NSF. In reference to the data in Table 1, the following important observations are made:

1. The State of Maine ranks 47th in the US in overall University-based research per capita (see col. 8 in Table 1). This number represents the sum of all annual R&D research expenditures at all universities in a state divided by the state population, \$76/person/year in Maine in 2009.
2. UMaine ranks third in its peer group of six other institutions in research expenditures adjusted for the number of full-time faculty members. This number is \$165,428/full-time faculty at UMaine as shown in Table 1, Column 11. UMaine has next to the smallest number of full-time faculty in its peer group (608).

These two observations demonstrate that UMaine faculty are working hard and is one of the leaders among the six peer institutions in attracting research funding; while Maine as a State still ranks 47th in overall university-based research funding.

While Maine has begun to invest in research and development since 1998, other states have made larger investments in the same period so that Maine as a whole still ranks 47th in overall University R&D. Strategic Direction 1 in this plan addresses this situation by recommending that Maine increase its university research investment from \$15M/year to \$20M/year by 2017 (\$16.0M for UMaine). This is consistent with the *2010 Science and Technology Action Plan for Maine Plan: A Bold Approach to Stimulate Maine's Economy*.

Demonstrated Benefits to Maine

Since 1998, when the State of Maine made its first investments through the Maine Economic Improvement Fund (MEIF) to support research and development at the University of Maine, UMaine has consistently demonstrated its ability to substantially leverage this funding to bring in additional federal and private funding. UMaine also demonstrated this ability with EPSCoR and State match long before MEIF. In the 13 years since Maine invested the first MEIF funds, UMaine has grown its grants and contracts by 234% (see Figures 1, 2 & 3). Through improvements to its research infrastructure, UMaine has also increased its ability to compete for federal grants and contracts and its capacity to serve business and industry. UMaine's efforts are

focused on Maine's priorities; it is the only research institution in the state that conducts research in all seven of the state's targeted technology sectors³, and UMaine has emphasized technology transfer and commercialization as indicated by the rapid growth of its patent portfolio and its recent record of spinning-out as many companies as much larger research universities. This activity benefits Maine's citizens through contributing to economic development, educational and cultural advancement, health and welfare, and improvements to our living and working environments.

Figure 1

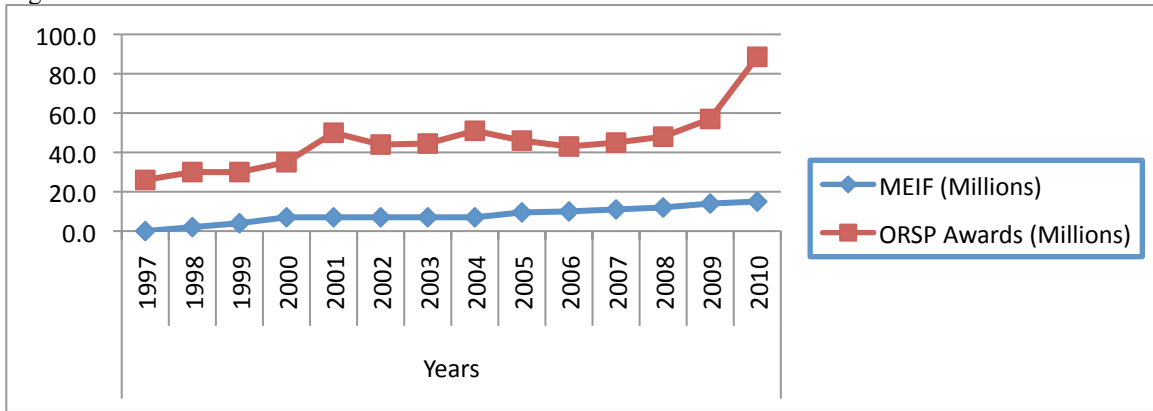
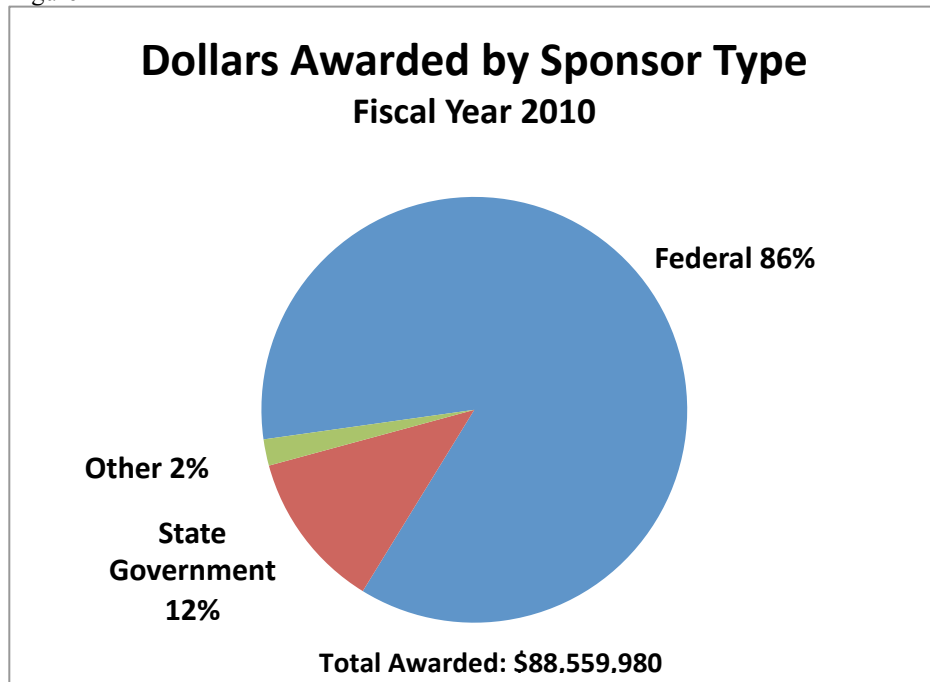
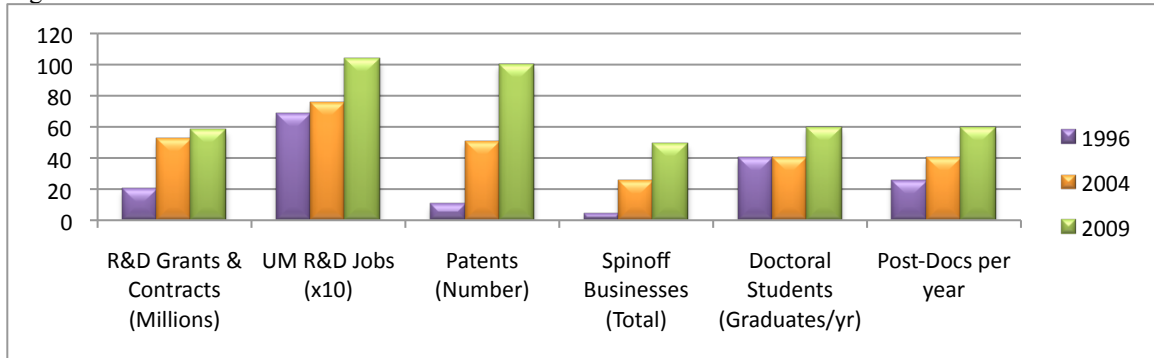


Figure 2



³agriculture and forestry, marine sciences and aquaculture, precision manufacturing, biomedical technology, environmental and energy technology, information technology, advanced materials/composites

Figure 3



FY 10: \$96.2M in external grants and contracts.

UMaine researchers were awarded \$96.2M in overall external grants and contracts in FY10. This includes \$88.6M external agencies, \$3.6M industrial grants, \$1.1M through the Development Office, and \$2.9M through USDA Hatch funds. This amount constituted a 50 percent increase over the previous year and produced the highest total in UMaine history. Of that total, \$69.1M was linked directly to the strategic use of MEIF funding to leverage federal and private research grants and contracts, resulting in a 6:1 return on the State's investment of \$11.7M. Research and scholarly activity by UMaine faculty and staff resulted in more than 5,259 publications, papers, and presentations in FY10. UMaine also experienced a 24 percent increase in R&D contracts with businesses and industries, spurred by UMaine's improved R&D infrastructure and research capacity.

FY 10: Technology transfer and commercialization: UMaine patent portfolio > 100

UMaine continues to expand its technology transfer and commercialization program. The University's total patent portfolio now contains more than 100 patents, patent applications, and international patents. In FY10, UMaine filed 15 new patent applications, and four new U.S. patents were issued. Also in FY 10, UMaine signed five license agreements with Maine companies to commercialize Maine patents, and UMaine helped start or spinoff three new companies.

Process Used in Developing This Plan and Timeline

This is a dynamic, faculty-generated plan that has been and will be continuously adjusted, as more input is obtained and as it is implemented.

The following pages outline six strategic recommendations, with deliberations and discussions among the URC members, and further input from many individuals and groups on campus, including the deans.

The previous *Strategic Implementation Plan for Enhancement of Research, Scholarship and Creative Activity* proposed eight strategic recommendations. The recent financial downturn has caused us to re-evaluate those recommendations and to focus on six recommendations for the next five to seven years.

Research Goals

- Increase research and development expenditures from \$100.6 million in FY2009 to \$125.0 million by FY2017.*
- Increase private foundation research funding from the FY2010 level of \$750,000 to \$3.0 million by FY2017.
- Increase the number of externally funded graduate students from the FY2010 level of 800 to 1,600 by FY2017.
- Increase the number of externally funded undergraduate students from the FY2010 level of 350 to 700 by FY2017.
- Increase national and international recognition of the quality of UMaine's research programs and associated faculty, including placement among the top 100 research institutions nationwide by FY2017 as measured by *The Top American Research Universities*.**
- Increase industry-funded research projects from the FY2010 level of \$4.5 million to \$9.0 million by FY2017. Includes revenue and contracts from the Department of Industrial Cooperation and ORSP and gifts from UMaine Foundation/Development from industry to support research.

* Based on the NSF Survey of R&D Expenditures at Universities and Colleges

** Total research expenditures, National Academy memberships, faculty awards, doctorates granted, and postdoctorates

Strategic Recommendations

The research goals will be accomplished by implementing the following recommendations.

1) **Increase MEIF investment in UMaine R&D, scholarship, and creative activity from \$11.7M/year in FY2010 to \$16.7M/year in FY2017**

MEIF investments began in 1998, and UMaine experienced a significant growth in awards processed through ORSP (see Figure 1).

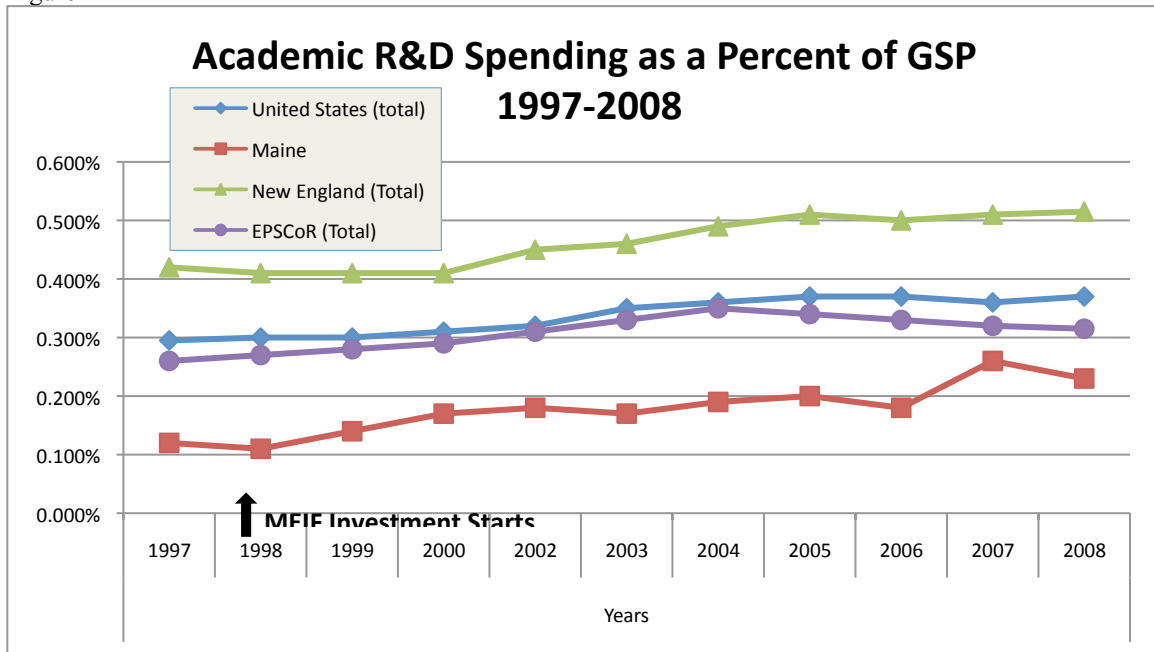
Over the next seven years, a modest increase in research investment is necessary to meet State expectations for the continued growth of R&D. A prudent and compelling rationale for increasing research investment is based on past performance and demonstration of the ability to accelerate achievement of outcome goals. UMaine's measures of performance indicate an accelerated growth in research that warrants additional investments to allow it to further benefit UMaine's ability to attract the best faculty and students, jumpstart the creative economy through vibrant Arts and Humanities programs, create new industries, jobs, and better enable its current industries to compete in national and international markets.

The above performance documents with objective measures that UMaine has accelerated its R&D efforts, and to maintain and capitalize on this momentum, ***it is recommended that Maine modestly increase its investments from \$11.7M in FY2010 to \$16.7M by FY2017.*** The proposed increase is consistent with the *2010 Science and Technology Action Plan: A Bold Approach to Stimulate Maine's Economy*.

Maine's per capita investment in R&D remains the lowest in the U.S. Unfortunately, continued investments at the proposed rate will not change Maine's standing and will inhibit Maine's economy from improving in comparison to other states. However, it is unrealistic to expect Maine to invest more than proposed.

Between 1993 and 1998, prior to MEIF investments in university research, R&D performed by Maine's academic institutions remained relatively constant (see Figure 4). In contrast, as MEIF investments began in 1998, Maine's growth in academic R&D outpaced the reference groups between 1998 and 2009 (**in percent growth but not in absolute dollars**).

Figure 4



↑

2) Focus research and creative efforts, and promote interdisciplinary and emerging research

In research, scholarship and creative activity, critical mass is often necessary to support sustainability and achieve accelerated growth. The question is how many such world-leading programs can UMaine afford to build, and how can this be accomplished while strengthening individual faculty research and strengthening scholarship and creative efforts across all areas on campus?

- Major Program Investments - The Board of Trustees has recently approved an UMaine Aquaculture Research Institute and a Forest Bioproducts Research Institute. The current NSF EPSCoR grant (\$20 million over five years) proposes to establish a Sustainability Science Program that includes the hiring of three UMaine tenure-track faculty members. Other potential major programs should be identified and supported, including the hiring of tenure-track faculty positions.
- In addition to these three major programs, **it is recommended that non-tenure track research faculty members be offered the opportunity to receive 40% of recovered indirect costs from their grants to invest in their research program.**
 1. This would be a competitive program that could be offered to all soft-money research faculty members.
 2. A current faculty award committee or a new one will develop criteria for selection, duration of participation, and evaluation criteria.

3) Enhance Human Resources and Administrative Procedures

- A key resource/investment needed to increase research output is to restore faculty positions in specific strategic areas and to find creative ways to reduce teaching loads of faculty members in those areas.
- It is recommended that the quality and number of graduating doctoral students be increased to 75 by 2015. **This will be encouraged by investing an additional \$75,000 to the \$100,000 already provided by the Vice President for Administration and Finance from indirect cost recovery (F&A).** It is recommended that \$50,000 be used to increase the number of participating students, and \$25,000 be used for bridge funding or selectively increasing stipends. These funds should be distributed by the Executive Committee of the Graduate Board.
- The VP for Research should continue to invest \$400,000 (MEIF) in the Graduate School of Biomedical Sciences and \$100,000 (MEIF) for doctoral students in their terminal year.
- Currently, an out-of-state graduate teaching or research assistant (whether internally or externally funded) must be appointed at 50% (20 hours/week) or more to trigger an automatic in-state tuition rate. Set the minimum load to trigger the in-state rate at 25% instead of the current 50%. This would increase the number of out-of-state graduate students with a lower burden on faculty financial resources.
- Further integrate research experiences into the undergraduate curriculum and provide faculty with resources and recognition for their contributions, including increasing VP for Research administrative support from the current level (\$3,000 per year) to \$10,000 per year (by FY2017) for the Center for Undergraduate Research to encourage leveraging of State of Maine and federal funds (including, NSF, NIH, and NASA).
- Additional resources are needed to support grant preparation and management, for example:

Increase funding equivalent to two additional grant specialists in ORSP.
Streamline administrative procedures to improve efficiency by increasing administrative support such that, where possible, the administrative burden is shifted away from PI's.

Hire a grant-writing specialist whose primary focus is to help streamline the proposal submission process and expand the number of proposal submissions and increase the success rate. This specialist should primarily support the Major Program Investments discussed above.

4) Invest in Sustainable Research Infrastructure

- Establish a process whereby each funded grant that employs high-technology equipment would have a budget created by the VP for Research that totals 2% of the total equipment costs. The monies would be available to the Faculty member/Unit that is responsible for the equipment for the duration of the grant, plus an additional period of time equal to the life of the equipment. These funds could be used for maintenance contracts, technical support, or replacement of equipment. This program will be evaluated to determine whether 2% is sufficient.
- Continue and evaluate, with the potential for expansion, the high-technology equipment infrastructure program supporting pilot projects in the emerging areas of science that require high-performance instruments to collect preliminary data for subsequent proposal submissions and/or manuscript preparations.
- Develop a schedule to upgrade research lab facilities, coordinating with the Provost, VP for Administration and Finance, and Director of Facilities and Maintenance.

5) Promote Excellence in Research, Scholarship, and Creative Activities

- Develop a sustainable program for the return of indirect costs recovered from grants and contracts. It is recommended that one aspect of this program should be at least a \$100,000 increase for the Faculty Awards Program that has a selective advantage for non-MEIF areas and for tenure-track Assistant Professors in non-MEIF areas. Another aspect should be the development of a mechanism to return a portion of the indirect costs recovered to the PI of a grant as well as a portion to their associated academic home/Research Unit; this investment should be used only for furthering research, scholarship, and creative activity.
- Develop separate faculty reward mechanisms, including funded annual VPR awards for research excellence, and unfunded research excellence awards, to provide a competitive environment for growth of research and development. This should include awards for each college and cooperative extension. Unfunded departmental-level awards should also be considered.

6) Outreach, Public Awareness, and Stakeholder Involvement

- Wherever practicable, opportunities will be sought to apply the research and education capacity of UMaine towards current and future challenges faced by Maine's people and businesses.
- UMaine will engage industry and communities through several UMaine programs, including Cooperative Extension, Maine SeaGrant, and others to gain valuable insight when planning proposals and projects.

- Promote the integration of educational outreach and research opportunities through enhanced communication.