Executive Summary

The University of Maine has engaged in a detailed and diverse strategic planning process since the Spring of 2004. The UMS Strategic Plan recognizes the national and international scope of UM and that our leadership is in natural resources and engineering and graduate education and research that supports basic discovery and economic development, and lead in service and outreach (1). In addition it is noted that we have prominence in marine sciences, biological sciences, humanities and K-12 preparation (2). The goal of the UMS strategic plan is to “..enhance the University of Maine’s areas of national prominence and build new strengths that will best serve its students and the state.(3)” (see Excerpts from UMS Strategic Plan attached to this document). We are directed to pursue new revenue streams through increased student enrollment, partner-ships and reallocation of existing resources (4). This mid-year report will document actions taken in all of these areas to further the mission of UMaine and the achievement of the UMS strategic plan. It is important to note that this is clearly a work in progress and that faculty and senior leadership of the institution are continuing the dialogue. The final shape of the strategic plan for the University is yet to be de-termi ned and this report should only be seen as suggestive as to future actions and directions. The numbers in bold in parenthesis will be utilized below to link actions and recommendations with the UMS Strategic focus for this campus. In addition, numbers in red will refer to specific UMS strategic directions.

Process

Given the diversity and breadth of UMaine’s activities, the process involved simultane ous activities in virtually all strategic areas and enormous and varied participation of faculty, staff, and students. In the Spring of 2004 three sets of committees began work on the strategic plan. The first was the overall strategic planning committee for the University as a whole (see the Strategic Planning Committee Structure and Staffing attachment). This committee was tasked with the overall coordination of strategic planning and they formed various subcommittees. Approximately 75 faculty, staff and students have been involved in this process to date, and the results so far are shown in attached Strategic Planning Committee Interim Report. A read of this document will show that the Committee and sub-committees have made differential progress. This is an ongoing activity and will involve campus open meetings in the Spring.

The University Research Council (URC) established a process to evaluate research at the University and to propose concrete actions to improve the research output and enhance the economic activity of the state of Maine. This report, Strategic Implementation Plan for
Enhancement of Research, Scholarship and Creative Activity, is attached. Approximately 170 individuals have been involved in the crafting of this document, and it has received the approval of the University’s Board of Visitors and the endorsement of Chancellor Westphal. The work of this Committee is largely completed and we are now moving into the implementation phase.

A separately constituted committee addressed teaching and research at the Graduate level. This committee differed from the Research Committee noted above in that it explicitly linked the missions of teaching and research in its deliberations and considerations. Its report, Graduate Research, Scholarship and Education at The University of Maine: Meeting the Challenges Of the University of Maine System Strategic Plan is also attached. Over 30 faculty, staff and students representing the Faculty Senate, the Maine Graduate Faculty Board, the University Research Council and the UMaine Association of Graduate Students participated in the development of this document. The work of this committee is largely completed and various units within the University are undertaking the action steps as we move forward.

Other documents attached that reflect movement in graduate education, in creative partnerships that will improve the economic climate of the state, attract students, yield new revenues and build new strengths include: A Proposal to Establish a Graduate School of Biomedical Sciences, efforts at retention noted in the University of Maine Connections Program, better use of financial aid as noted in the Revised Financial Aid Strategies and clear outreach and economic impact in the CenTRO: The Center for Tourism and Outreach document.

Specific Actions Undertaken to Date/Recommendations

Virtually every document attached to this report lists actions and recommendations. We will only note some of the more noteworthy actions/recommendations (that are also reflected in the decision-matrix below):

1. A clear research plan for the University with widespread internal and external support, clearly articulated goals, and a five-year horizon (1, 3, 4, 5).
2. Building on the research plan, new revenue streams and programs, the proposal for the establishment of a Graduate School of Biomedical Sciences in a statewide private-public partnership for approval by the Board of Trustees (1, 2, 3, 4, 5).
3. Measurable progress on CenTRO for a key economic area of the state in yet another private-public partnership and with the potential for new research, revenue streams and academic and professional programs (1, 3, 4, 5, 8).
4. We continue to spin off corporations and businesses and add to our patents (5).
5. The recent approval of the University’s Comprehensive Campaign for Excellence to fund scholarships, endowed professorships, capital improvements and a fund for excellence (1, 2, 3, 4, 1, 2, 3, 4, 5, 7, 9).
6. The cooperation with USM to offer an undergraduate degree in Mechanical Engineering in Portland thereby preserving scarce resources while simultaneously meeting a demonstrated need. It is a model that can be repeated in other areas of academic endeavors (1, 3, 4, 3, 5).
7. Establishment of New Media as an Academic Department and the successful accreditation of the College of Education and Human Development by NCATE (1, 2, 3,
8. Improved enrollment in every major area (undergraduate, graduate, doctoral and out of state students) (4).
9. Significant improvement of graduate stipends that aid in the attraction of a better student and allow us to compete for out of state students (1, 2, 3, 4, 1, 2, 3).
10. The initiation of “Sports Done Right:” within the College of Education and Human Development that has received national attention (1, 2, 3, 4).
11. The establishment of a School of Forestry that will result in a slight decrease in expenses and a better focusing of research, teaching, and outreach (3, 4, 1, 3, 7).
12. The proposal to establish a Center for Research on Sustainable Forests that will lead to increased external funding, visibility and multidisciplinary research (1, 3, 4, 1, 3).
13. The Congressional award to the MCS Center to establish a Maine Rural Substance Abuse Partnership (1, 2, 3, 4, 1, 3, 7, 8, 9).
14. The Maine Academic Prominence Initiative that steers new funding to non-MEIF areas in the delivery of innovative undergraduate education (3, 4, 1, 3).
15. The establishment of a university wide minor in Innovation Engineering that is interdisciplinary in focus and delivery (3, 4, 1, 3, 7).
16. The establishment of a University Teaching Council to insure that teaching is kept as a major component of University life, and that it is adequately rewarded and fostered.

Specific Recommendations:
1. Increase MEIF funding from $16 million a year in 2005 to $60 million a year in 2010, with dedicated funding for humanities and the arts (1, 2, 3, 4, 1, 2, 3, 7).
2. Focus research and creative efforts and promote interdisciplinary and emerging research (1, 3, 4, 1, 3).
3. Enhance human resources (for example, cluster hiring of faculty in specific areas) physical facilities (especially the library) and administrative procedures (4, 1, 3, 4, 7).
4. Reward excellence in research, scholarship and creative activities (1, 2, 3, 4, 1, 3, 7).
5. Increase research commercialization and technology-transfer (1, 4, 1, 5, 7, 8).
6. Institutionalize training, mentoring, retention and support for researchers.
7. Strengthen research, scholarship and creative activities in impacting Maine’s economy, social environment, culture and quality of life (1, 2, 3, 4, 1, 3, 5, 7, 8, 9).
8. Establish and maintain a competitive financial package for recruiting and retaining high quality graduate students in today’s markets. Move to a minimum stipend of $13,400 per year for masters students and $16,000 per year for doctoral students. Stipends need to be increased yearly to maintain competitiveness. Health services need to be fully subsidized (1, 2, 3, 4, 1, 3, 5, 7).
9. Increase the number of institutionally funded graduate teaching and research assistants across the campus (1, 2, 3, 4, 1, 3, 7).
10. Fill to capacity our full time doctoral students in those department granting doctoral degrees—develop bridge awards to fund student for four years (1, 2, 3, 4, 1, 3, 5, 7).
11. Work to establish a Maine Doctoral Fellowship Program for competitive Maine residents who wish to pursue a doctorate and who will commit to remaining in Maine (1, 2, 3, 4, 1, 3, 5, 7).
12. Evaluate doctoral programs more rigorously and either improve marginal programs or eliminate them (1, 2, 3, 4, 1, 3, 7).
13. The strategic plan/vision statement should make it clear that we are ambitious and competitive and that the graduate and undergraduate mission should be promoted with equal strength (1, 2, 3, 4, 1, 3, 7, 8, 9).
14. Departmental promotion and tenure guidelines should place appropriate emphasis on graduate education, research and scholarship consistent with our Carnegie status. Where departments do not have strong graduate programs, encouragement should be made to develop interdisciplinary programs (1, 2, 3, 4, 1, 2, 3, 7).
15. Initiate a highly prestigious Maine Legislative Fellowship program to fund outstanding graduate students across the various colleges. These fellows would serve as ambassadors for UMaine, communicate the vitality of our programs and our vision of the future to external constituencies (1, 2, 3, 4, 1, 3, 7, 8, 9).
16. Publicize the achievements of our graduate students (1, 2, 3, 4, 7, 8, 9).
17. Increase journal collections at Fogler Library (1, 2, 3, 4, 2, 3, 4, 5, 7).
18. Ensure that expensive analytical equipment is maintained and upgraded.
19. Develop on campus housing for graduate students.
20. Where the need is clear, cross-campus collaboration should be formalized for the purpose of offering selected Master’s degrees statewide. The University should manage such programs it participates in to ensure quality and credibility.

Numerous other recommendations are embedded in the attached documents.

Unfolding Actions/Plans

1. Implementation of the Graduate School of Biomedical Sciences and the admission of the first class in September, 2006 (1, 2, 3, 4, 1, 3, 4, 5, 7).
2. The establishment of a Research Corporation that will accelerate research, new revenue streams and afford additional opportunities for private-public partnerships and increased economic activity in the state (1, 2, 3, 4, 5, 7, 8, 9).
3. Renovation of Camden Hall at UCB and a closer partnership with UCB and EMCC to deliver education in the Bangor Area (1, 2, 3, 4, 1, 3, 5, 7).
4. Assessment of our presence in the mid coast region (FHC at Belfast) as a result of the merger of MBNA and Bank of America.
5. The establishment of an Innovation Center to spur Innovation across every endeavor and that will serve the needs of the state and the system (1, 2, 3, 4, 1, 3, 5, 7).
6. The visit of five world class nursing faculty to aid in a strategic assessment of Nursing within the context of the University, the profession, and the needs of the state (1, 2, 3, 4, 1, 3, 7).
7. Filling several critical vacancies in both faculty and senior administrative ranks.
8. Continued efforts at reallocation of resources internally to meet our mission and role in the state and national arenas (1, 2, 3, 4, 1, 3, 7).
9. Continued and renewed emphasis on diversity in the faculty and student populations.
10. Improved marketing of the University to its varied constituencies and improved communications to and with those same constituencies (8, 9).
11. Improved decision-making and greater responsiveness and speed of decisions.
12. Development of learning communities, improved outreach and better integration of Cooperative Extension into the main campus.
13. Lead the development of the Creative Economy for the state.
14. Move more toward interdisciplinary programs and research (of which the GSBS and the Innovation Center are two examples).
15. Development of a state wide initiative in every high school—ACADEM-E (1, 2, 3, 7, 8, 9).
16. The University is a partner in the Maine Institute for Human Genetics and Health with Eastern Maine Healthcare System and Jackson Laboratory. The University holds a seat on the Institute Policy Committee (IPC) (1, 2, 3, 4, 5, 8, 9).

Budget for the Strategic Directions

There are budgetary data and information in the attached document. One area of concern is the recent federal action to dramatically reduce student aid. At this time final action has not been taken, but House action has resulted in a multi-billion dollar recommend-ation reduction.

Decision Making Matrix

The decision-making matrix is on the next page. In light of this discussion and the accompanying materials we believe that it is self-explanatory.

Implementation Time Line

The implementation of these recommendations and plans is discussed in many of the attached documents.

Conclusion

We believe that much has been done, and that a great deal remains to be done. The University is moving in teaching, in research, in economic activity, in communications to our diverse constituencies and in soliciting funds in our unfolding comprehensive campaign. The future is bright and one that we can shape ourselves.
Decision-Making Matrix:

<table>
<thead>
<tr>
<th>Priority (urgency, benefits)</th>
<th>Cost (financial and effort)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Maine Academic Prominence Initiative</td>
</tr>
<tr>
<td>Medium</td>
<td>School of Forestry, Center for Research on Sustainable Forests</td>
</tr>
<tr>
<td>Low</td>
<td></td>
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</tbody>
</table>
The University of Maine

Strengthening the University of Maine and positioning it for significant enhancement is a major goal of this Plan. As Maine’s land- and sea-grant university, U-Maine’s mission is unique. With a 137-year record of State-wide outreach and a service presence and infrastructure in all 16 counties, the University’s outlook is both national and international in scope. Its leadership within the UMS in natural resources and engineering, State-wide service and outreach, graduate education, continuing education, and research that supports both basic discovery and economic development, is significant.

UMaine is a nationally recognized research university enjoying prominence in areas including marine sciences, biological sciences, humanities, and K-12 preparation. It is Maine’s only Carnegie Doctoral Research Extensive institution; 92% of all federal research dollars coming to academic institutions in the State are awarded to UMaine. A goal of this Strategic Plan is to enhance the University of Maine’s areas of national prominence and build new strengths that will best serve its students and the State.

UMaine’s charge is to sharpen its focus and achieve excellence in all aspects of its mission. It will prepare its students for today’s knowledge-based, entrepreneurial, global economy through outstanding programs in the liberal arts, sciences, engineering, business, public service, and education. It will work actively with the regional universities and Community College System to develop a strong transfer system, enabling students to progress to UMaine for upper-division and post-baccalaureate work. It will also employ the best Distance Education technologies to make UMaine’s upper-level and graduate courses available nationwide, with special emphasis on accessibility within Maine.

Administrative support will be provided centrally at the university and System levels, with “front-line” services for students and other constituencies provided locally. Through a priority-setting process, UMaine will pursue new revenue streams through increased student enrollment, partnerships, grants, contracts, and private giving, as well as reallocate existing resources to support its expanding role. Cooperative Extension will continue to serve as an entity of UMaine that serves as the System’s primary, but not exclusive, public service outreach entity. Other institutions within the University System will provide out-reach and public service in ways that are consistent with their respective missions and which complement, not duplicate, other System-related programs and services.

Source: University of Maine System Strategic Plan (p. 30 – 31), April, 2004
Strategic Planning Committee Structure and Staffing

• Strategic Planning Committee

<table>
<thead>
<tr>
<th>Sharon Barker</th>
<th>Julie-Ann Scott</th>
<th>Lavon Bartel</th>
<th>Mary Malone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howard Patterson</td>
<td>Charlie Slavin</td>
<td>James Sulinski</td>
<td>David Townsend</td>
</tr>
<tr>
<td>Kate Beard-Tisdale</td>
<td>Kathleen March</td>
<td>Michael L. Peterson</td>
<td>Carol Wood (co-chair)</td>
</tr>
<tr>
<td>Tony Brinkley</td>
<td>Julia McGuire</td>
<td>Dan Sandweiss</td>
<td></td>
</tr>
</tbody>
</table>

(UMS Strategic Directions #1, #2, #3, #6, #7 & #9)

“Strengthening the University of Maine and positioning it for significant enhancement is a major goal of this Plan. As Maine’s land- and sea-grant university, UMaine’s mission is unique... A goal of this Strategic Plan is to enhance the University of Maine’s areas of national prominence and build new strengths that will best serve its students and the State... While the University of Maine enjoys national name recognition, confusion has arisen over the use of its name at multiple universities and the System Office, impacting its institutional ranking. This Strategic Plan seeks to strengthen the University of Maine’s identity by allowing it to solely use its name.”

Tactical Planning Committees for addressing the UM System Strategic Plan

- Higher Education Park Education/Outreach Centers
  (UMS Strategic Directions #1, #3 & #6)
  (UMS Strategic Directions #2 & #3)
  Disbanded.

- Fogler Library
  (UMS Strategic Direction #4)
  • Faculty Senate Library Comm.
  Elizabeth Barry
  Kathryn Braggins
  Rodney Bushway
  Cynthia Crosser
  James Patterson
  Mary J. Perry
  Robert Rice
  Joyce Rumery (chair)
  Nick Runco
  Philip Trostel

- Graduate Education & Research
  (UMS Strategic Directions #2, #3 & #5)
  • Coordinating statewide graduate education and research
  James Acheson
  Cindy D’Angelo
  Scott Delcourt
  Liz DePoy
  Marie Hayes (co-chair)
  Jeff Hecker
  Scott E. Johnson (co-chair)
  Harlan Onsrud
  Mike Trainor
  Nathan Wilke

- Distance
  (UMS Strategic Directions)
  Kristi Crowe
  John Gregory
  John Jemison
  Jonathan LaBonte
  Alfred Leick
  Kathleen McIntyre
  Cathy Newell
  Kenneth Nichols
  Tina Passman
  Owen Smith
  Janet Spector
  Mary Tyler
  Anatole Weick
  Bob White (chair)

Interim Reports: December
Final Reports: April – May
Implementation: June – onward
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Subcommittee on Research, Scholarship and Creative Activity Report
Subcommittee on Undergraduate Education
Introduction

The Strategic Planning Committee (SPC) received its charge from Provost ad interim John Mahon in the latter part of the Spring 2005 semester. The full Committee of 16 members of faculty, students, and staff then met in late April with Provost Mahon. President Robert Kennedy spoke briefly about his perspective on the Committee’s function when the full committee met again in early May, and the SPC met again in late May to lay groundwork for the coming academic year. Co-chairs Sandweiss and Wood met with the Chairperson of the University’s Strategic Committee on Research early in the summer for the purpose of clarifying the function of that committee’s work as related to the overall SPC. Since the start of the Fall 2005 semester, the SPC has been meeting weekly, in plenum and in sub-committees (see below).

Structure of Strategic Planning at UMaine during 2005-2006

According to President Kennedy, the SPC is the lead organization in the establishment of a Strategic Plan for the University of Maine in the years 2005 to 2010. Three other University committees with a more singular focus (Graduate Education and Research, Libraries, and Distance Learning) are functioning concurrently. It is our expectation that those committees will report to the SPC, and that we will then incorporate those reports into the final Strategic Plan. A separate entity, The University Research Council’s (URC) Research Planning Committee began its work at the start of 2005 and produced a plan at the end of the summer. That plan has now been accepted by the Vice-President for Research, the Provost, the President, and the Chancellor. The SPC will not repeat items covered in that plan, though we will consider broader research issues not covered by the URC plan.

Vision

During the Spring 2005 meetings and at the suggestion of Provost Mahon, we invited committee members to express their vision for the mission and future of the University of Maine. The vision statements arising from this process have in common a standard of excellence combined with the need for a broader perception of this excellence. In the year 2010, we see the University of Maine as the university of choice for traditional and non-traditional students in Maine, for excellent students beyond our borders, and as an academic environment that will appeal to all members of the university community. Stated from another perspective, our vision reflects our charge: the University of Maine will be a nationally known center of innovation in teaching, service, and research. The tripartite mission will be fulfilled in a deliberate manner, with a balance of learning, discovery, and engagement.

Process

At the start of the Fall 2005 semester, the Committee began twice-weekly two-hour meetings. Due to the size of the Committee, it was not possible to get all members in one place at one
meeting time. Until a single one-hour meeting time was reached, co-chairs Sandweiss and Wood met with half the committee at one time during the week, and the other half of the committee at a different time each week. In an effort to encourage greater cohesiveness and participation, we then opted for one-hour meetings at a time when nearly all members indicated availability. In mid-October, we combined the two weekly meetings, so that the full SPC now gathers in a single weekly meeting. Some of the original 16 members have been replaced due to a lack of availability for the process, and the SPC now consists of 17 members who represent faculty, staff, and students. Nevertheless, attendance is generally limited to a core group of about 10-12 SPC members.

Early in the Fall 2005 semester, the SPC identified 6 areas of greatest concern to the mission of the SPC. We were deliberate in our effort to be far-reaching and purposely did not closely examine previous strategic planning documents until we had identified these 6 areas. As a committee, we determined that these 6 focus areas would be most efficiently addressed through subcommittees that met separately from the SPC and reported back to the SPC. Subcommittees were to identify their specific mission, invite key informants to participate in subcommittee work as appropriate, and spend the semester gathering information. The 6 subcommittees are as follows:

Undergraduate Education
Graduate Education
Research, Scholarship, and Creative Activity
Service/Outreach
Governance
Environment

On later reflection, we could see that Graduate Education was sufficiently covered by the separately constituted Graduate Education and Research Committee (GERC), so we disbanded this sub-committee. One of our SPC members serves on GERC and brings in the ongoing perspective of that group. Graduate education is also directly addressed within the Research, Scholarship and Creative Activity subcommittee.

During the past two months, the five remaining sub-committees have diligently gathered information and had frequent discussions. In weekly subcommittee meetings as well as the larger SPC meetings, each of the 5 major areas of concern are discussed, debated, and carefully considered with respect to each other as well as to more fundamental principles of the role of the University. The abbreviated interim reports of each sub-committee are included with this document. Each subcommittee was asked to relate its charge to the University of Maine Strategic Plan 2000-2005, and to the University of Maine System Plan 2004. Related elements of each plan are included at the end of each subcommittee report.

In December, the SPC will hold an additional 3 hour meeting to discuss the book The Future of Higher Education: Rhetoric, Reality, and the Risks of the Market (Authors Newman, Couturier and Scurry, 2004). The book was one of the results of the Futures Project: Policy for Higher Education in a Changing World and the Provost’s Office purchased copies for all SPC members
after a recommendation from Dave Townsend. This text addresses “risks inherent in the trend toward making higher education a market rather than a regulated public sector”.

Committee members have noted that our level of discourse has moved beyond reporting on subcommittee progress to more substantive discussion, leading to agreement that we need a longer period of time to develop complex issues. On January 11, the SPC will hold a one-day retreat. The purpose of that retreat will be not only to identify the strategic directives that will inform the Strategic Plan for 2005 to 2010, but also to clearly delineate the procedure for broad presentation and discussion of those directives during last 3 months of the strategic planning process.

We will have an abbreviated draft plan in February 2006 that will state our strategic directives. The SPC will establish sub-committees to elaborate on these directives, with action items and benchmarks—the strategies for achieving our goals. We will conduct open hearings with all constituencies: students, faculty, staff, support services, the broader University community, legislators, citizens of Maine, and where possible and relevant, those outside the borders of Maine. We will have a final plan by April 2006.

**Recurring Themes**

After review of the five sub-committee reports, the co-chairs have identified the following recurring themes. These themes are repeated directly or indirectly in each subcommittee report, and in the full SPC meetings. No doubt these themes will be incorporated into the summative Strategic Plan, through specific directives as well as strategies for achieving our goals:

- **Ownership:** The University must encourage the sense of ownership for the University within all partners in its mission. Responsibility for one’s role relative to the University is directly related to the sense of ownership. Good citizens of any institution feel ownership in that institution.

- **Diversity/Inclusiveness:** The University must continue to value and foster an inclusive environment, encouraging diversity and inclusiveness through multiple venues. Venues will include but are not limited to financial support, physical accommodations, and responsibility for an inclusive atmosphere among all members of the University community.

- **Communication:** The University must facilitate good communication between and among all interested parties—students, administrators, faculty, staff, the public within Maine and outside of Maine, and between the University and external partners such as the legislature of Maine. Improved communication on multiple levels is essential to achieve many objectives of the Strategic Plan. For example, an improved information flow will help alter the perception of the University in accordance with our vision statement (i.e., better PR). Efficient and effective communication will be fundamental to: better relations with the business community and potential students, more harmonious interaction between...
staff, faculty, and administration, development of more interdisciplinary work, and so on. Effective communication is a task for all partners in the University community.

- **Transparency/Deliberateness**: To foster ownership, inclusiveness, and better communication, the processes of decision-making need to be both deliberate and transparent. This transparency and deliberateness must include but is not limited to budgetary and financial issues. The structure of decision-making must be laid out clearly for all major categories of internal decisions that affect the University community. For example, in the System Strategic Plan 2004, there is a statement about “…moving from an incremental budget decision-making process to an accountability-and performance-driven decision-making process.” (p. 16). We believe this is a reasonable and sound direction, but one that will require widespread understanding of concepts of accountability and performance, hence the need for greater transparency (leading to better acceptance) of decision-making.

- **Accountability**: All partners in the University community (from President through faculty to staff and students) must agree to define and apply standards of accountability to their University-related actions. Rewards must be tied to accountability. This theme is fundamental to excellence, and will necessarily be considered in conjunction with ownership for one’s role at the University.

- **Simplification**: The University must strive to simplify its operations. Transparency, good governance, more cost-effective management, better approximation of performance with reward—all are compromised in the complex system that has evolved over time. The Strategic Planning process is relatively new, and both the System Plan and the most recent University of Maine Strategic Plan call for simplification.

- **Responsiveness/Flexibility**: The University must make its decision-making process faster and more flexible. This theme is closely tied to and will be a likely consequence of simplification. The University must tailor its decision-making process toward a more flexible approach to gathering and analyzing data, solving problems, taking advantage of new opportunities, and anticipating state, national, and international needs.

The Strategic Planning Committee has begun to develop some specific strategic directions and action items, however these have not been fully developed with all committee members. A few select examples include tailoring the Plan to appeal to multiple partners; establishing a standing committee to assess progress toward benchmarks on an annual basis; creating a “compact for excellence” to enhance faculty productivity; and improving vertical integration, e.g. faculty-postdoctoral grad students-undergraduate students.

### SPC Reading List

Members of the SPC have a much higher level of awareness about the broader context for higher education than they did before the SPC began meeting. Various readings, reports, and references have been eagerly shared among committee members, and some of these are listed below, following the two Strategic Plans of primary interest:
University of Maine Strategic Plan, 2000-2005

University of Maine System Strategic Plan, Sept. 2004


Strategic Planning Committee Presentation/Report of the Distance Education/Outreach Center, 2005

Toward More Productive Higher Education Systems, by R. Fischbach, from Thought and Action, Fall 2005


The Best Class Money Can Buy, by M. Quirk, in the Atlantic Monthly, Nov. 2005 (College 2005 series)


What Does College Teach? By R. Hersh, in the Atlantic Monthly, Nov. 2005 (College 2005 series)

Signage and Wayfinding at the University of Maine, Assessment Report 2005

Building Room Report from the UMS Facilities Office (complete inventory of UM buildings)

Samples of structure of governance from Syracuse University and University of Maryland

Strategic Plan from University of California, Davis

Council on Women, Synopsis from spring, 2005 public forums

The University of Maine’s Strategic Plan: An Assessment of Progress and Challenges. June 2004

Graduate Research, Scholarship, and Education at the University of Maine: Meeting the Challenges of the University of Maine System Strategic Plan. Produced by the 2005 University of Maine Coalition on the Graduate Environment

Strategic Implementation Plan for Enhancement of Research, Scholarship and Creative Activity. Produced by the University Research Council, July, 2005

Graduate Education at University of California, Davis: Interdisciplinary Approaches and Program Ranking, produced by UCDavis Graduate Studies (year unknown)


Subcommittee on Environment Report

Mission

The Environment Committee of the Strategic Planning Committee will consider factors that influence how people experience the University of Maine. This will include the physical environment as well as the culture of the institution, the feeling of ownership and inclusiveness by those who work and attend school at the University of Maine as well as the citizens of the state who lay claim to the university as the landgrant institution.

Members of the Subcommittee on Environment:

Sharon Barker, Chair
Carol Wood
Mick Peterson
Colleen Willett
Lauri Sidelko
Eric Landis
Bonita Grindle
Gail Dana

Guests:
Jerry Ellis
Michael Hermann
Martha McNamara
Sandy Caron

Meetings

Environment Committee meetings are held every Thursday afternoon from 2:00 – 3:00 in the Conference Room in 101 Fernald Hall.

Process:

- Distributed a number of reports/articles/examples including: Space allocation document for UM; Summary of open meetings of President’s Council on Women from Spring ’05; Examples of governance structures at Syracuse University and University of Maryland; “Personal Economies” white paper describing economic inequities of UM classified staff.

- Presentation by Michael Hermann, Senior Cartographer at the Canadian-American Center, “Signage and Wayfinding at the University of Maine”

- Appointment made for members to attend the Council on Disabilities

- Developed a framework within which we can review and organize our ideas: Challenges/Threats to the University of Maine
Opportunities
Cautions/Barriers to change

Issues Addressed by the Subcommittee on Environment:

Cultural:

- Inclusion/Diversity
  - How to ensure participation by other than “usual suspects”
  - Improve services to nontraditional students and alumni
- Communication; Clarity of objectives
- Sense of Community
  - Developing a feeling of collective ownership of campus
  - Better informed and motivated workplace
  - Engage campus community in improving service excellence
- Critique of process of planning and soliciting input (surveys, focus groups)
- Have our processes support our values and goals
- More investment in workforce; focus on professional development; support ongoing learning and development opportunities for all employees
- More representative governing/advisory body for UM

Budget:

- Transparency of budget and revenue; budget linked to strategic planning priorities
- Identifying and funding general university priorities (that extend beyond departmental interests)
- Importance of planning and having decisions reflect stated priorities
- Need for long-term view
- Increasing efficiencies and effectiveness

Physical:

- Accessibility of campus; aesthetics; developing a more welcoming campus for visitors as well as those who work and attend school at UM
- Historic preservation issues
- Having our campus reflect its interests, history, and priorities (e.g. representation of indigenous people and their connection with UM and Marsh Island)
- Challenges to maintain physical plant and facilities
- Campus Master Plan
- Space allocation and decision-making reflect campus priorities reflected in campus planning documents

Relationship to UM Strategic Plan and UMS Strategic Plan

Goal # 6 in the UMS System Plan
Goal #4, #5, and #7 in the UM Plan
Subcommittee on Governance Report

Mission

The mission of the subcommittee on governance is to explore the structure of decision-making at the University of Maine, with the goal of identifying practices that enhance optimum development and use of resources, bring together the strategic planning and economic considerations of the University, and address the need for balance between responsibility and accountability.

Governance of an institution is the process by which priorities are set, decisions are made, conflicts are resolved, and the rights of all members of the institution are established and protected. Universities are institutions in which good governance is also shared governance, governance that is inclusive of all members of the University community through meaningful participation. Good governance encourages individual and collaborative initiatives in defining and directing the mission of the institution. Key characteristics of shared governance are access to information and broad participation in decision-making, with balance between responsibility and accountability.

Members of the Subcommittee on Governance:

Sharon Barker
Tony Brinkley
George Jacobson
Anne Pooler
Devon Storman
Bob White
Carol Wood

Issues Addressed by the Subcommittee on Governance:

The subcommittee on Governance has examined several issues related to governance:

- Establishment of a Governing Council (with broader representation than Faculty Senate)
- Formation of a UM advisory council
- Conflict mediation.
- Creation of an Ombudsperson/office
- Stronger role for Chairs and Directors
- Development of an ethics statement
- Examination of Standards for Accreditation: Commission on Institutions of Higher Education of the New England Association of Schools and Colleges
Relationship to UM Strategic Plan and UMS Strategic Plan.

The University of Maine Strategic Plan does not address governance very directly. The closest key goal to the issue of governance is key goal #5, copied on the next page. Although much of the language is economic, the allocation of resources is fundamental to how decisions are made, what programs grow (or not), and reflects the priorities of an institution.

**STRATEGIC PLAN, 2000-2005**  Governance/Organization

The University will continue its efforts to make its governance and management systems more efficient. It will seek to acquire state-of-the-art technology to enhance its ability to gather and analyze data, benchmark its operations and make sound, data-supported decisions. Strategic planning, budgeting, capital planning, program development and Advancement will all be aligned and integrated.

**Key Goal #5**

Develop the financial resource base necessary to support the University and align budget priorities with strategic actions.

Operational Plan

- Couple the strategic planning and budgeting processes.
- Use the strategic plan to establish priorities in the capital plan.
- Institute a comprehensive peer-review process for all academic programs, linked to the University’s strategic plan and budget.
- Balance funding necessary for successful functioning and growth of existing, high priority programs and funding to establish and grow new initiatives. Pursuit of the University’s strategic directions will require a combination of re-direction and new funds.
- Build an advocate base within the state by educating various constituencies about the importance of the innovative and sustaining roles the University plays in the economic and social well being of Maine and its citizens.
- Achieve a long-term, predictable source of capital funding from the state.
- Attract increased foundation support and philanthropic gifts to address needs such as scholarships, endowed chairs and new facilities.
- Build a shared understanding and vision of University goals and direction and provide collaborative leadership to establish and carry out clear, results-oriented operating policy.

Outcomes

- The University’s budgeting processes will be incentive-based, consistent with the priorities and expectations of the strategic plan.
- The expectation for the level of private giving will be at least $15 million per year.
- Procurement of a 5 percent increase per year for continuing operations for five years as a minimum down payment on rebuilding the University’s financial base will be a top priority. At the end of this period, faculty salaries should equal the same rank nationally as Maine’s per capita income.
- The University will have well-articulated, data based operating and evaluation practices stemming from efficient governance that emphasizes widespread opportunities for consultation and deliberation.
The University of Maine System Strategic Plan Strategic Directions 6, 7, and (to a lesser extent) 8 most directly address the issue of governance. These are copied below. Again, much of the language is economic. Direction 8 is broader but I’ve included it because I think it indicates the System’s invitation to change.

UNIVERSITY OF MAINE SYSTEM
STRATEGIC PLAN
September 2004
“The opportunity to reassess and strengthen Maine’s public higher education system is a rare and important call. This Strategic Plan is an investment in Maine’s future and a commitment to the citizens of this State—a Plan that faces current challenges and offers a vision to ensure that students for generations to come will have broad access to a high quality, affordable education.”
—Joseph W. Westphal, Chancellor
www.maine.edu

UNIVERSITY OF MAINE SYSTEM – STRATEGIC PLAN 1
STRATEGIC PLAN: EXECUTIVE SUMMARY
Strategic Directions and Key Elements
The Strategic Plan features nine strategic directions covering academic quality, administrative structure, cost-effectiveness, and entrepreneurial partnerships. Strategic directions 6, 7, 8, and 9 represent organizational strategies that will help the University System identify opportunities, organize/reorganize the delivery of services, and redistribute resources to enable the first five strategies, and ultimately allow the System, to offer the highest quality education to Maine’s citizens. Those strategic directions and selected key elements include:

6. Establish institutional and individual performance measures to ensure prudent stewardship and public accountability.
   § Set clear goals and objectives for financial and institutional management
   § Renew capital assets to maintain and upgrade facilities
   § Ensure that Academic Program Planning and facilities planning are coordinated and mutually responsive
   § Establish performance-based funding

7. Consolidate certain business and administrative functions across the System to achieve cost-savings and increased efficiencies while maintaining “front-line” customer services at the individual university level.
   § Support and enhance the centralization features and functions of Enterprise Resource Planning (ERP)
   § Coordinate certain business aspects of admissions, student financial aid, bursar, and loan collections processing
   § Improve coordination of human resources management

UNIVERSITY OF MAINE SYSTEM – STRATEGIC PLAN 3
8. Adopt changes in organizational structure that will clarify missions, improve academic and administrative responsiveness, and better serve the University System’s many constituencies.
   § Facilitate a central System administration that, working with the Board of
Trustees, provides System-wide planning, management, coordination, and oversight, and performs certain “back-office” administrative functions and services on behalf of all System universities
§ Support a land- grant/sea- grant research university with State-wide and national responsibilities, including primary responsibility as Maine’s graduate- level, research, and public service outreach institution
§ Develop a comprehensive, multi-campus, urban university serving the southern and central regions of the State, offering undergraduate programs as well as a focused set of graduate, research, and outreach offerings related to the needs of those regions
§ Create a consortium of three liberal arts universities, each with at least one signature academic program, offering undergraduate programs as well as a focused set of graduate offerings related to the needs of the region it serves
§ Continue to support a single-campus, public liberal arts college featuring a strong set of teacher-education programs with focused research and outreach offerings related to its unique role within the University System
§ Administratively connect each of the 11 academic University College Centers with one of the University System’s institutions, providing Distance Education opportunities on-site and through remote-access technologies
§ Support a University System Law School and incorporate its strategic plan with the University System’s Strategic Plan

Remember that these items are taken out of context; read the full text of both Strategic Planning documents for a better understanding of intention.

During our meeting on Nov. 15, we reviewed Standard 3 under Organization and Governance from the Standards for Accreditation: Commission on Institutions of Higher Education. NEASC, 2005. I don’t have it available as an attachment, but will bring extra copies for SPC members to our next meeting on Nov. 21.
INTRODUCTION

Mission

a. To define outreach/service
b. To ascertain the value of engaging in this type of activity.
c. To identify activities within the rubric of service that are part of the University of Maine.
d. To identify the types of information that are needed to better situate and support service within the university context.
e. To identify the sources of that information.
f. To make specific recommendations to support and promote the values, research, and activities related to service that are also aspects of higher education and are appropriate for the University of Maine.

Members of the Subcommittee on Outreach and Service:

Kathleen March, Chair
Sharon Barker (UMaine)
Lavon Bartel (UMaine)
Nancy Boyington (Hutchinson Center)
Margaret Malmberg (Hutchinson Center)
Mary Malone (UMaine)
James Patterson (Hutchinson Center)

Issues Addressed by the Subcommittee on Outreach and Service:

a. Definition: What is outreach/service?

It's more than "offering classes". It means bringing assets at Maine - people, programs, and services - to the people of Maine and beyond. Sometimes this occurs on, sometimes off, campus, with a variety of delivery methods.

Outreach and Service as a concept and practice is not fully understood by campus. This is partially due to communication or organizational reasons.

b. Reasons to do this: Why engage in outreach and service?

Outreach and Service are important to Maine, not only as part of its mission, but also because it is THE most accessible aspect of the university to state residents.

The University recognizes the value of outreach – or service – or engagement and the connection to experiential learning.

c. Data: What outreach/service is there at UMaine?
Nevertheless, there is a much wider range of opportunities for all members of the university community to become involved with communities that are not in the same location as the campus and which are beyond the doors of the classroom or laboratory.

d. and e. Sources of data: How do we locate the information?

f. Specific recommendations follow (1-12)

Recommendations:

GOAL 1

Develop a clearer, better defined and more strongly focused definition of what outreach and service mean in general and in practice. Include the various other terms or concepts used on campus. Among these are: volunteerism, civic engagement, and field experience. This list, however, is not exhaustive. Along with each definition, the role and participants in current and potential configurations of the institution should be identified.

GOAL 2

Link concept and practice of outreach and service to UMaine's mission statement. Disseminate this linkage in public for and to appropriate stakeholders, including all communities, legislators, etc. Include it in public presentations of the value of the institution as a land- and sea-grant university.

GOAL 3

Develop and sustain a climate of civic engagement through visibility, recognition (reward system), and cataloging of outreach and service done by staff, students, and faculty of Maine. Specific methods should be developed and specific individuals charged with carrying out this work of letting the public know about these university activities.

GOAL 4

Promote awareness throughout the state of outreach and service efforts of Maine community and outreach centers, including the Hutchinson Center in Belfast, the Darling Center, the Portland Center, the Norumbega Art Gallery, and, of course, Fogler Library with its statewide responsibility. Ensure the utilization of these centers and sites to their fullest potential by supporting them financially and in public recognition for their achievements.

GOAL 5

Create a central site for achieving the above goals. This may be in the form of a resource center, a service database, a grants expert on staff, a well-maintained web site, some or all of these, etc. It may take the form of a Service-Learning Office, a Center for Civic Engagement, or an Institute for Experiential Learning and Community-Based Curriculum, or a similar entity. It may include,
but not be included under, Black Bear Volunteers or similar student group organizations.

This site should also work to identify or provide snapshots of needs of communities around the state. It should also promote grant writing in the area of outreach and should make connections, where appropriate, to communities beyond the state’s borders.

This site should create (through promotion of research) and disseminate information concerning the link between student success, student recruitment and retention, and active learning such as that which occurs in civic engagement contexts.

GOAL 6

Model the commitment to community engagement through the curriculum. In other words, make Service-Learning or some form of civic engagement a requirement in the general education requirements. There should be an effort to encourage all departments to develop a course that engages students in a meaningful way with local or global communities.

GOAL 7

Enhance and create experiential curricular opportunities. There are many options for this. It can be through development of a SL undergraduate/graduate program, internships, field experiences, and through domestic and international partnerships for students and faculty. It is important to see this as not just for one segment of the university community but for the entire campus. Staff members should also be part of this integration effort.

GOAL 8

Connect in a very visible manner the opportunities opened through the linking of civic engagement, interdisciplinary study, community-based curriculum and creative endeavors, and creative economy in general. Creativity should be seen as coming out of collaborative as compared to competitive efforts. Link the engagement work to best practices in learning and professional training. Also link it to clear examples of how this relates to the creative economy initiative and to the creation of jobs. Do not, however, lose sight of the ethical and creative dimensions as values in their own right.

GOAL 9

Clarify and further integrate Cooperative Extension – with all its success stories – into the Maine profile. Do not, however, “leave it up to someone else” to do the service work. (see mission statement integration above) Illustrate and model how its members are fulfilling the university’s role as “expert”.

GOAL 10

Facilitate the creation of professional and certificate programs as the needs of the state and society in general dictate. Also facilitate the creation of part-time graduate programs and explore
partnering with other institutions and UMS campuses to expand offerings. Outreach capacity of UM will be needed for continuation of 51% funding. Work to have this process be seamless and efficient, able to respond in a timely fashion to identifiable community needs.

GOAL 11

Utilize and make known and support [or expand] technology options for outreach efforts. This connects to distance education in part. Use existing resources (human and otherwise where possible to disseminate knowledge of opportunities for the employment of technology to “reach out” and “reach in”. The latter refers to the inclusion of community expertise to further and collaborate with the goals of higher education.

GOAL 12

Provide ongoing incentives for service & outreach activities by staff members, faculty members, students [cf. existing sources such as Dysart travel funds; PEAF professional development funds]. New incentives may be developed to promote creative thinking in the area of outreach, which will also continue to support new, emerging and evolving programs of study.

Relationship to UMS Strategic Plan.

The following is a series of extracts from the ums strategic plan. The texts inserted in blue capital letters at the end of each strategic direction are a clarification of the relevance to outreach and service. Not all the strategic directions are included – only those considered most relevant and the excerpt that best represents why it is related.

STRATEGIC DIRECTION 1

Strive for quality across the System and support institutions in achieving their potential through enhanced, rigorous academic program planning, program realignment throughout the System, and strengthened student services and support.

The University of Maine System is dedicated to consistent delivery of high-quality education to undergraduate and graduate students throughout the State of Maine. This includes ensuring that our universities have established individual missions and niches leading to excellence in teaching, learning, service, research, scholarship, creative expression, and overall student experience—at levels equal to, or above, those of their Carnegie category peers. It also means ensuring access to a full-range of solid baccalaureate and graduate degrees, as well as selected associate degrees. …

Achieving higher quality will require a careful assessment of resources and needs, as well as appropriate organizational and academic planning that allows each university to serve students at the highest levels of quality possible. Realigning academic programs and centralizing resources will allow the System to operate with greater synergy and improved overall quality. …. A primary implementation strategy will be connecting an Academic Program Planning (APP) process to the budget process in all UMS institutions. … It will require new discipline and a culture shift… Institutions will consider community and State-wide needs as they pursue the development of existing programs as well as the creation of new programs.

Existing and new programs should be assessed in the context of state need. As noted, citizens
look to UMaine as the center of expertise for their concerns. Outreach work and a culture of service to the public in direct ways will heighten and make more visible the overall value of a research institution of higher education. Different disciplines will serve the state in different ways. If there is a need, all the disciplines should be valued and supported in tangible ways. Service is a valid intellectual activity and can be a testing ground for onsite, laboratory or individual research. Quality of programs is directly related to student success and student success is measured by the ability to perform in the disciplines. Outreach, the scholarship of service, and similar foci are all appropriate means for assessing program viability and excellence.

Access means outreach in the sense of delivery of programs to those who need them, and thus to a diverse population or clientele.

**STRATEGIC DIRECTION 2**

*Ensure a high-quality and well-supported faculty throughout the System, with strong faculty development programs to enhance faculty’s ability to contribute to the excellence of academic programs and research, while providing appropriate levels of support for staff.*

Hiring and retaining a diverse, well-qualified, credentialed faculty is a principal way of ensuring quality in higher education. To do this will require the ability to compensate faculty at competitive levels and provide other incentives to encourage their scholarly and creative development. Faculty development, including professional development, support for research, scholarship, and creative expression, and providing opportunities for faculty to interact with other colleagues across the System, are important elements in supporting an engaged faculty. **Faculty who are able to use the technology to reach community members and who are comfortable with alternative forms of knowledge and information delivery will do a better job of outreach.** Faculty members gain this knowledge through incentives of various sorts. The report of the subcommittee mentions the need for incentives. A culture of outreach also easily creates links with other parts of the state and thus other campuses in sharing and transmitting resources. **The whole state benefits.**

**STRATEGIC DIRECTION 3**

*Create a comprehensive, state-of-the-art system-wide distance education program, leveraging current technological strengths, and further coordinating program offerings and development.*

Distance Education is of growing importance to high-quality education, and it can provide a critical competitive advantage, particularly in a rural state like Maine. The UMS must continue to provide Maine students with access to higher education by establishing a strong Distance Education program that covers a broad range of disciplines and courses. UMS faculty need appropriate support so that they can design and deliver quality courses, thus contributing to their professional development and to the expansion of educational opportunities available to Maine citizens. Capitalizing on the expertise and leadership that faculty have exemplified in developing academic programs that are offered through Distance Education, faculty must be involved in every aspect of program development and enhancement utilizing technology.

Outreach is an integral part of the distance education paradigm. Not all outreach is in the form of classes, as noted in the report, but not all distance education strictly in the form of classes nor is it delivered by distance learning. **Cooperative extension is another example of distance education and is a close tie between the university and the people of Maine.**
STRATEGIC DIRECTION 4

Enhance the library resources available to the University of Maine System and the State of Maine by supporting a high-quality, integrated System library consortium built on the foundation of a single, well-supported doctoral/research library at the University of Maine. Continue to develop a State-wide digital library to support all citizens of Maine.

When Fogler library is supported, the public and stakeholders of Maine are supported. Fogler is the portal to information needed by citizens to improve and increase their knowledge and to access information that will result in employment or betterment of their current employment.

STRATEGIC DIRECTION 5

Strengthen and leverage research throughout the State to ensure greater breadth and depth of research. Develop a greater capacity to use research, scholarship, and creative expression to enhance Maine’s economy.

Generating innovative, sponsored research is a critical factor in Maine’s economic development. Top quality graduate programs and research programs will attract resources and businesses to the State, helping to fuel the economy and contribute to growth. The System is committed to strengthening sponsored research throughout the System, particularly at the University of Maine and the University of Southern Maine—both as a way of enhancing the educational experience of faculty and students, and because research and development are such important contributors to economic growth. Additionally, the System will continue to support and enhance the research, scholarship, and creative expression of the faculty, since their work enhances the quality of the universities.

We link outreach to scholarship and application of theoretical investigation. Students at undergraduate and graduate level can be involved in research through applied or field work as is employed in experiential learning and mentored community service.

STRATEGIC DIRECTION 6

Require accountability from all universities by providing appropriate goals and objectives and carefully assessing each institution’s ability to meet its goals. Establish goals, objectives, and performance measures for each institution to ensure prudent stewardship and enhanced public accountability.

All institutions should be held to a high level of accountability for contributing to the overarching goals of the University of Maine System, improving the quality of higher education, and supporting the effective implementation of the Strategic Plan over time. Each university will establish a strategic plan for doing this, including a financial plan that supports its objectives. The System-wide priorities reported in the Strategic Plan are the overarching goals of each campus-based strategic plan. Fulfillment of these goals and accomplishment of campus-based strategic planning priorities will be the basis for review and evaluation of each President.

Goals are as good as the objectives they accomplish. A land and sea grant institution such as UMaine must take into account its community partners or stakeholders. Serving the people of Maine and, in some cases, beyond Maine, is good stewardship.

STRATEGIC DIRECTION 9
Develop a coordinated, collaborative approach to university advancement and advocacy in ways that increase public understanding of the mission, value, and benefits of Maine’s public universities; and enhance the universities’ individual and collective appeal, reputation, financial resources, and public support.

Maine’s public universities cannot adequately fulfill their responsibilities and their potential without broad-based financial investment and political support from their many diverse constituencies. More than ever, those universities must be proactive in serving the needs of Maine and its people.

This goal is the essence of outreach and service to the public. The need to have a coordinated, collaborative structure is stressed in the 12 items of the 0/s subcommittee’s report.
Subcommittee on Research, Scholarship and Creative Activity Report

Mission:

The mission of this subcommittee is to define a strategy specifically in relation to research, scholarship and creative activity by which the University of Maine will maintain, and expand upon, its current status as Maine’s flagship campus and as a major U.S. research university. This must be accomplished within the broader mission of the University of Maine, which is, in essence, to conduct research (to create new knowledge in the form of discoveries and original ideas), to teach (which includes the need to transmit those discoveries and ideas, and to debate them [=scholarship]), and to serve (to extend the results of such research and scholarship for the public good).

Members of the Subcommittee on Research, Scholarship and Creative Activity:

David Townsend (Subcommittee Chair, Marine Sciences)
Mary (Kate) Beard-Tisdale (Spatial Information Science and Engineering)
Kathleen March (Modern Languages and Classics)
Julia McGuire (Undergraduate Student)
Howard Patterson (Chemistry)
Michael L. Peterson (Mechanical Engineering)
Dan Sandweiss (Dean and Associate provost for Graduate Studies).
JulieAnn Scott (Graduate Student)

Meetings:

Four subcommittee meetings: Oct. 19, Oct. 26, Nov. 2 and Nov. 9.

Findings and Key Elements of Our Strategy (still incomplete)

a) The University of Maine must promote and value in a balanced fashion scholarly pursuits across all academic disciplines; furthermore, the University must celebrate and promote unfettered support of the research, scholarship and creative activity of its faculty, for as Vannevar Bush wrote in 1945, “...since much of new knowledge is certain to arouse opposition because of its tendency to challenge current beliefs and practice.”

b) The University of Maine and the State on Maine must recognize that it is because the University of Maine’s faculty engages in research, scholarship and creative activity at the highest levels, it is they who are best to teach;

c) In the case of scientific research, the University of Maine must identify and strike a balance between applied research efforts, of direct importance to Maine’s economy, and basic, curiosity-based research, for which direct financial gains cannot be readily identified. Each must be valued in ways visible to the faculty; Today, we see an overriding emphasis at the University of Maine on research to benefit Maine’s economy, and an under-emphasis on basic research, an observation shared in “the Peterson Report” from two years ago;
d) The University of Maine must recognize that significant increases in the research and capacity for scholarship by its faculty will be limited by the numbers of minds available; incremental increases in research achieved through reduced teaching effort will prove to be counter productive. Simply put, significant increases in research and scholarship will be tied to faculty growth;

e) Future increases in research and scholarship achieved through faculty growth must be balanced by investments in the University’s infrastructure;

f) The University of Maine must capitalize in innovative ways on the potential mentoring capabilities of its talented graduate students, in ways that extend the traditional TA model;

g) The University must find more and better ways to capitalize in innovative ways on its great potential to bring to its undergraduate students the excitement of research, scholarship and creative activity as practiced by the faculty.

**A Strategic Approach to Increasing Research and Scholarly Productivity**

**Step 1:**

At the outset we must pose the question: *Are we satisfied with the current research productivity at the University of Maine?* If our answer is no, then we proceed to Step 2.

**Step 2:**

We need to identify which existing research and scholarly disciplines we want to grow at the University of Maine, and whether we want to initiate new ones. That is, are there areas in which our faculty are already active, but which we want to promote and elevate to the next level? To increase our national and international reputation and visibility? And, likewise, are there areas in which we are not now active, but which we see as important areas in which to become involved?

**Step 3:**

Upon completion of Step 2, we will need to institute a mechanism to increase the overall research output of our faculty.

We can represent research output (or research productivity) as:

\[ Rp = (1-T) N \]

where \( Rp = \) research productivity; \( T = \) teaching as percentage of one’s time; and, \( N = \) number of faculty.

Notice that we can increase Research productivity (Rp) by either reducing T or increasing N. We would argue that increasing N is the much preferred approach, for two reasons: First, increasing the number of faculty will increase the diversity of thoughts and ideas, which are proportional to the number of faculty. Second, a reduction in T will compromise the quality of instruction at the University of Maine, in that we maintain that it is precisely because our faculty are engaged in research and scholarly activities that they are the best to teach. Simply reducing their teaching will not necessarily increase their research activity, nor is there any reason to believe that their ideas will increase in number or quality.
**Step 4:**

Should we take Step 3, and increase the number of faculty at the University of Maine, we must also take the commensurate step of increasing investments in the research infrastructure to accommodate and support the additional researchers. Once this is costed out, we may want to revisit Step 1.

**Relationship to UM Strategic Plan**

**Maine’s Research University**

Maine’s economy is changing, and in many areas Maine is leading the nation in the remarkable but difficult shift from a manufacturing economy to one based on technology, information and service.

Today, more than ever, Maine’s economic vitality is tied to its investment in education and human capital -- ensuring a highly knowledgeable, creative, and flexible workforce and responsible citizens; and to its investment in research and technology development ensuring an adaptable, competitive job market, imaginative solutions to problems and inventive approaches to forecasting and seizing opportunities.

As the state’s center for research and innovation, UMaine must continue to focus its research agenda on areas critical to the state’s economy, providing support for developing new products and processes, skilled personnel, and for attracting federal dollars and creating high-quality job opportunities.

Individually and in partnership with other institutions of higher learning and many connections in the public and private sectors, our faculty and students are advancing or leading the state's research and technological advancements in areas such as composite materials engineering, aquaculture, and information and biotechnologies.

Research also drives and defines the quality of the University’s graduate programs. UMaine must ensure that its graduate opportunities are cutting edge, highly competitive, and inspiring. The enthusiasm of graduate students permeates the campus with an air of excitement unique to research universities and sparks the imagination and motivation of undergraduates, many of whom immediately benefit from the presentation or application of new findings in the classroom.

Like the liberal arts, the research resources of a land-grant university energize and enrich the undergraduate experience. At UMaine, undergraduates have the opportunity to know and often work with internationally renowned faculty in the humanities and professions as well as the hard sciences - on projects that in some way will change or help shape society. This is a student experience exclusive in Maine to its land-grant institution.

Research and service are crucial to our land-grant mission, but our priority is teaching. It is the combination of teaching, research, and service that enriches students’ experiences and increases their opportunities.
Our researchers’ work brings a new dimension and vitality to their classroom teaching and stimulates new learning.

Research

The University’s academic culture will expect, value and reward contributions from all faculty, recognizing that different forms of scholarship and activity are appropriate to different disciplines. UMaine will foster development of interdisciplinary research nodes that create unique centers of world-class excellence. Examples already exist, such as the Laboratory for Advanced Surface Science Technology, the Advanced Engineered Wood Composites Center and the Margaret Chase Smith Center. We expect growth in state and federal support to continue and will strive toward a 10 percent per year increase in sponsored research -- $68 million in seven years.

Key Goal #2
Enhance the research mission to ensure Maine's full contribution to and benefit from a knowledge-based, global economy, while maintaining and enhancing our natural resource-based economy.

Operational Plan

$ Promote further development of UMaine's many research programs in the broad area of information science, coordinated through a University-wide Initiative in Information Science. (For a definition of Information Science and for instructional aspects of this initiative, see Key Goal #1.) Given the recent emergence of information technology and the so-called "knowledge economy", many top universities have responded by creating (variously-named) "schools" of Information Science. A comprehensive, campus-wide approach that integrates and fosters information science in all programs, as far as is known, is unique. Such a holistic, inclusive approach is logical—even required—given to the way that information technology has permeated all aspects of our lives. Such a "comparative advantage" in this exciting area will strategically position the University and the State in a "must do" area of the future—both educationally and technologically.

$ Examine and consider other programs that could be enhanced by greater interdisciplinary coordination and/or reorganization to better align with UMaine's size and resource base. Examples might include biomedical education and research, international programs, policy and social service programs, campus wide connections to K-12 education, and partnerships with public and private entities throughout the State.

$ Develop targeted research areas ("Signature Programs") to increase the University's share of federal research funds and academic visibility, building on areas of strength and strategic directions.

$ Continue to emphasize and develop the legislatively mandated research areas for the State of Maine, including aquaculture and marine technology, advanced technologies for forestry and agriculture, biotechnology, environment technology, information technology and precision manufacturing technology.

$ Consistently articulate and publicize the educational, economic, social and other contributions of a research university.
Cultivate an atmosphere that nurtures and expects inquiry, entrepreneurship and creativity for scholars at all levels and across all disciplines. It is the presence and constant renewal of scholarship and discovery in every classroom and by every faculty member that define the sum and substance of the University and energize the process of learning for our students.

Outcomes

- Total research expenditures will increase at the rate of at least 10 percent per year for the next five years.
- Targeted research and academic areas, such as Information Sciences, will be examined to assess the potential and benefits of organizational coordination and formation of interdisciplinary programs.
- Achieve top echelon status for several programs among high-profile ranking entities such as the National Research Council's Ranking of Doctoral Programs, Carnegie Classification (at the University level), U.S. News & World Report, the Gourmann Report and others. Attain top 50 percent ranking for all University programs and Top Quartile ranking for 10 percent of all University programs.

Relationship to UMS Strategic Plan

STRATEGIC DIRECTION 5

Strengthen and leverage research throughout the State to ensure greater breadth and depth of research. Develop a greater capacity to use research, scholarship, and creative expression to enhance Maine’s economy.

Generating innovative, sponsored research is a critical factor in Maine’s economic development. Top quality graduate programs and research programs will attract resources and businesses to the State, helping to fuel the economy and contribute to growth. The System is committed to strengthening sponsored research throughout the System, particularly at the University of Maine and the University of Southern MaineCboth as a way of enhancing the educational experience of faculty and students, and because research and development are such important contributors to economic growth. Additionally, the System will continue to support and enhance the research, scholarship, and creative expression of the faculty, since their work enhances the quality of the universities.

Specific strategies to achieve this strategic direction include, but are not limited to:

- Request additional Maine Economic Improvement Fund (MEIF) funding from the State to support sponsored research;
- Strengthen sponsored research and coordinate the process for requesting increased funding by forging one voice for advocacy and planning;
- Set greater incentives for faculty research, scholarship, and creative expression, including appropriately adjusting teaching loads;
- Increase graduate fellowships across the System;
- Support faculty in generating grants that will expand and support their research, scholarship, and creative expression; and
Enhance the graduate education experience and build the System=s research and scholarly capacity.
Subcommittee on Undergraduate Education

Mission:
To investigate areas of concern in the undergraduate experience at the University of Maine to enable strategic improvement of that experience.

Members of the Subcommittee on Undergraduate Education:
Chair – Charlie Slavin
Interim Chair- Julia McGuire
Anne Pooler
Pat Burns

Interim Chair- Julia McGuire
Sue Hunter
John Hwalek
Brigham McNaughton

Summary of Status
Because our subcommittee would like to run a focus group survey to gain more of an insight into what the community of students, faculty, staff and alumni feel about certain topics concerning undergraduate education, we have not yet reached any conclusions.

General focus group areas for Student, Faculty, Staff and Alumni:
- General Education
- Work in Major
- Classroom Experience (appropriate pedagogies have different missions, to what extent do they create independence vs. dependence)
- Advising
- Campus Life
- Financial issues
- Out of Classroom experience
- Culturally enriched environment
- Life of Professors and Students outside of Academics
- Interest groups/Learning communities
- What Majors should there be?
- How valued is undergraduate teaching?
- Roles of faculty
- Role of Graduate Students in undergraduate education
- Role of Minors (do multiple minors indicate inadequacy in majors)
- Effect of different kinds of credit hours for different courses (investigate Farmington case)
- Professional majors vs. liberal arts programs (differences/similarities)

Relationship to UM Strategic Plan and UMS Strategic Plan

University of Maine Strategic Plan
Key Goal #1
Strengthen the commitment to providing a first-class, highly relevant undergraduate educational experience in all programs.
Operational Plan
• Expect, endorse, and monitor rigorous, intellectually challenging, inquiry-based activity as the benchmark of all academic programs.
• Create an Honors College to promote and signify academic excellence in the University’s core mission and to facilitate integration of research experiences for all undergraduates.
• Examine current offerings in the broad, dynamic area of information sciences, many with international reputations, and establish a University-wide Initiative in Information Science. Bringing together and expanding the University’s many “pockets of excellence” related to information science will result in a synergy, better positioning the University to compete for resources and students and serve the people of Maine. The University of Maine will, through this initiative, help the state move to the head of the pack when it comes to preparing its citizens for the new information based economy.
• Demonstrate the University’s commitment to constantly renewing its position of leadership among the state’s public institutions and its academic competitiveness with Maine’s outstanding private colleges and the nation’s land-grant universities. Validate this excellence through national rankings.
• Develop and support a comprehensive, faculty-based advising and mentoring system that addresses the full range of student-centered developmental needs.
• Increase the diversity of students and faculty as well as diverse curricular and campus experiences, in accordance with the goals outlined in the University’s current Diversity Action Plan, to provide the learning and social environment essential to preparing graduates who understand and appreciate differences and can excel in a global society.
• Review and intensify marketing and recruitment strategies, and incentives such as internships, to attract more students from other states, as well from Maine.

Clearly, our committee has not reached this level of intricate detail in focus at this point in time. However, there are some strong connections. Our committee has cited a need to address the quality of advising, continuing the concerns of the last strategic plan. Our committee has also had in-depth discussion regarding the intellectual stimulation of undergraduates at the University of Maine, a thread which ties very closely to the first bullet of the last strategic plan. At this point, the connections are tenuous at best but will be more visible as our direction gains focus into its specific areas of recommendation.

*University of Maine System Strategic Plan*

*Strategic Direction #1*

*Strive for quality across the System through rigorous academic program planning, strengthened student services, and program realignment.*

The most direct, or relevant connection between our current dialogue and the University of Maine System Strategic Plan is the issue of financial aid. Our committee feels that financial factors have a strong impact on the lifestyle of our students. Again, the level of specificity that the system plan includes is beyond the stage that our committee has reached. Stronger connections will be realized, or a lack of connection if that is the case as we advance in our research.
Strategic Implementation Plan for Enhancement of Research, Scholarship and Creative Activity

An Integral Part of the UMAINE/UMS and State MSTAC Strategic Plans, Which Collectively Address Broader Academic Initiatives

University Research Council
November 28, 2005
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APPENDIX A

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APPENDIX B

Examples of UMaine Research that Enhance Maine's
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The University Research Council (URC) 2005

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

<table>
<thead>
<tr>
<th>URC Member</th>
<th>Unit</th>
<th>URC Member</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lavon Bartel</td>
<td>Cooperative Extension</td>
<td>John Mahon</td>
<td>Provost, Interim</td>
</tr>
<tr>
<td>Kate Beard-Tisdale</td>
<td>Spatial Information Science and Technology</td>
<td>Shannon Martin</td>
<td>Communication and Journalism</td>
</tr>
<tr>
<td>Amy Blackstone*</td>
<td>Sociology</td>
<td>Paul Mayewski</td>
<td>Climate Change Institute</td>
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<tr>
<td>Bill Bray</td>
<td>Mathematics and Statistics</td>
<td>Karen Merritt</td>
<td>Ph.D. Student in Civil Engineering</td>
</tr>
<tr>
<td>Habib Dagher**</td>
<td>AEWC</td>
<td>Mick Peterson</td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td>Liz Depoy*</td>
<td>School of Social Work</td>
<td>Jonathan Rubin*</td>
<td>Margaret Chase Smith Center</td>
</tr>
<tr>
<td>Susan Erich</td>
<td>Plant Soil &amp; Environmental Sciences</td>
<td>Joyce Rumery*</td>
<td>Fogler Library</td>
</tr>
<tr>
<td>Walter Harris</td>
<td>College of Education and Human Dev.</td>
<td>Douglas Ruthven</td>
<td>Chemical and Biological Engineering</td>
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<tr>
<td>Mike Hastings</td>
<td>Research and Sponsored Programs</td>
<td>Charlie Slavin</td>
<td>Honors College</td>
</tr>
<tr>
<td>Scott E. Johnson*</td>
<td>Earth Sciences</td>
<td>Natalie Steiger</td>
<td>Maine Business School</td>
</tr>
<tr>
<td>Jan Kristo</td>
<td>College of Education and Human Dev.</td>
<td>David Townsend*</td>
<td>School of Marine Sciences</td>
</tr>
<tr>
<td>Bob Lad</td>
<td>LASST</td>
<td>Roy Turner*</td>
<td>Computer Science</td>
</tr>
<tr>
<td>Deirdre Mageean</td>
<td>Assoc Vice President for Research</td>
<td>Jake Ward*</td>
<td>Research and Economic Development</td>
</tr>
</tbody>
</table>

* Also member of URC Research Strategic Plan Subcommittee  ** URC Strategic Plan Subcommittee Chair
Introduction and Objectives

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

The UMS Strategic Direction B calls for “clarifying the missions” of each campus, and states UMaine’s mission as follows:

“Support a land-grant/sea-grant research university with State-wide and national responsibilities, including primary responsibility as Maine’s graduate-level, research, and public service outreach institution”

In a parallel statement, the UMS Plan, Strategic Direction 5 further calls for:

“Strengthening and expand university-based research activity and capacity to enhance Maine’s economy.

- Seek additional State investment in the Maine Economic Improvement Fund (MEIF), with a goal of increasing the annual funding level by $13 million by FY09 to a total of $25 million.
- Increase graduate fellowships across the system
- Increase incentives for faculty research, scholarship, and creative expression

The objective of this implementation document is to realize Maine’s research mission as outlined above in the UMS Strategic Plan. 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 described in the UMS Strategic Plan, it represents the aspirations of UMaine’s faculty to enhance their research mission; therefore this document’s implementation will proceed forward as a 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 heavily 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. They are so effective at this role that they received more than 26 billion dollars from federal funding sources for science and engineering research in 2004. 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, investment in the University of Maine - the State’s only research university - is vital for the future of Maine and its citizens.

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1 For additional information please see Scholarship Measures Committee Report, Dr. Shannon Martin (Chair), Univ of Maine Research Council (2003)
A Shared Strategy for Maine's Future

UMaine faculty have demonstrated that a relatively small State investment in research can return immense benefits to our state and our students, with a direct dollar return on investment of 5 to 1. Since 1998, when the State of Maine made its first targeted investments through the Maine Economic Improvement Fund (MEIF), UMaine has grown its external grants and contracts by 63%, increased its patent portfolio by a factor of 10, and increased spin-off businesses from 2 to 22. 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, UMaine will accelerate its successful invigoration of research activities, while doing significantly more to strengthen research, scholarship, and creative activities across all disciplines on campus.

UMaine's ability to strengthen its research mission while enhancing its teaching and public service missions as called for in the UMS Strategic Plan, 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 39.9% of the UMS budget, down from 67.5% in 1990. Next year marks the first time that UMS tuition income will exceed state appropriations. 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. Therefore the main premise of this implementation plan is the following.

Enhancing UMaine's research mission as called for by the UMS Strategic Plan 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. Investment in research and development is vital to the overall investment in an educated community that can compete and thrive 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 Maine people to create a prosperous and sustainable economic, social, and cultural future for themselves and for their children. As Maine's research university, the University of Maine is committed to making such a future, in all its dimensions, a reality.

The following plan is built around actively raising this new investment and the plan's implementation will depend on how fast the investment will be raised. The new investment will be raised from public sources as well as private giving and foundations. The plan also ensures that the new investment 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 the State and to UMaine's students.

Over the past year, the State of Maine has been faced with significant financial difficulties, including major budget deficits, requirements for significant borrowing and bonding to pay the state's past expenses, downgrading of the State's bond ratings, and most recently Federal base closures. So where will the new public investments come from? The bond houses, in downgrading our State'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 exacerbate 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:

The State of Maine will 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 fifty years created the prestigious Research Triangle in rural, resource-based North Carolina. Likewise, Indiana and Finland 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 workforce, 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 UM, a peer group of Land Grant universities was identified on the basis of state population (less than 1.5 million) and number of undergraduate students (about 10,000). The nine US universities, including UM, who fit these criteria, are listed in Table 1. The table provides information on R&D expenditures collected through a 2002 National Science Foundation (NSF) survey (col. 5), per capita collective R&D expenditures for all universities in the state (col. 6) and for the individual peer universities (col. 7), the NSF’s overall State rankings for university-based R&D (col. 8), and the number of full-time faculty at each university (col. 9). The last column in the table (col. 10) provides the 2002 R&D expenditures per full-time faculty in each institution, calculated using the NSF data and the number of full-time faculty obtained from the Integrated Postsecondary Education Data System (IPEDS).

Table 1: Comparative Land-Grant Universities

<table>
<thead>
<tr>
<th>Peer State</th>
<th>Peer Land Grant University (single campus)</th>
<th>Population</th>
<th>Undergrad students*</th>
<th>R&amp;D expend. in $6b x 1,000</th>
<th>All univ. in the state R&amp;D $/capita*</th>
<th>Peer State rank for only R&amp;D</th>
<th>Peer univ. R&amp;D $/capita</th>
<th>Full-time fac.</th>
<th>R&amp;D $ generated per full-time faculty*</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH</td>
<td>U. of New Hamp.</td>
<td>1,299,500</td>
<td>11,516</td>
<td>$93,222</td>
<td>173</td>
<td>4</td>
<td>$72</td>
<td>917</td>
<td>$101,660</td>
</tr>
<tr>
<td>VT</td>
<td>U. of Vermont</td>
<td>621,394</td>
<td>9,234</td>
<td>88,602</td>
<td>144</td>
<td>15</td>
<td>143</td>
<td>775</td>
<td>114,325</td>
</tr>
<tr>
<td>MT</td>
<td>Montana State U.</td>
<td>926,865</td>
<td>10,750</td>
<td>78,211</td>
<td>129</td>
<td>20</td>
<td>84</td>
<td>735</td>
<td>106,410</td>
</tr>
<tr>
<td>ID</td>
<td>University of Idaho</td>
<td>1,393,262</td>
<td>9,607</td>
<td>76,758</td>
<td>69</td>
<td>44</td>
<td>55</td>
<td>759</td>
<td>101,150</td>
</tr>
<tr>
<td>ND</td>
<td>N. Dakota State U.</td>
<td>634,366</td>
<td>10,148</td>
<td>72,105</td>
<td>167</td>
<td>5</td>
<td>114</td>
<td>803</td>
<td>89,795</td>
</tr>
<tr>
<td>ME</td>
<td>U. of Maine</td>
<td>1,317,253</td>
<td>8,272</td>
<td>62,149</td>
<td>47</td>
<td>50</td>
<td>47</td>
<td>543</td>
<td>114,415</td>
</tr>
<tr>
<td>RI</td>
<td>U. of Rhode Island</td>
<td>1,080,632</td>
<td>11,298</td>
<td>53,347</td>
<td>153</td>
<td>13</td>
<td>49</td>
<td>673</td>
<td>79,267</td>
</tr>
<tr>
<td>WY</td>
<td>U. of Wyoming</td>
<td>506,529</td>
<td>9,385</td>
<td>41,632</td>
<td>82</td>
<td>40</td>
<td>82</td>
<td>907</td>
<td>45,901</td>
</tr>
<tr>
<td>SD</td>
<td>S. Dakota State U.</td>
<td>770,883</td>
<td>9,208</td>
<td>20,000</td>
<td>50</td>
<td>48</td>
<td>26</td>
<td>545</td>
<td>36,697</td>
</tr>
</tbody>
</table>

1 Peer universities with approximately 10,000 undergraduate students in a state of less than 1.5M people.  
2 National Science Foundation. Research and Development Expenditures at Universities and Colleges, S&E, Fiscal Year 2002. NSF 04-330. The data reported includes all Science of Engineering R&D expenditures from all sources, including federal, state and private foundations. The values shown are for the University listed in Column (2). http://www.nsf.gov/statistics/nsf04330/vera.htm.  
3 Using total value of research conducted per capita by all Universities in the State based on NSF Report 04-336, not only the funding for the Univ. in column (2). http://www.nsf.gov/statistics/nsf04330/vera.htm.  

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

1. The State of Maine ranks 50th in the US in overall University-based research per capita (see col. 7 in Table 1). This number represents the sum of all annual S&E research expenditures at all universities in the state divided by the state population, $47/person/year in Maine in 2002.

2. UM ranks first in its peer group of nine institutions in mean research funding generated by full-time faculty members. This number is $114,415/full-time faculty at UM as shown in Table 1, Column 10. This is even more remarkable since UM has the smallest number of full-time faculty in its peer group (543), 41% less than Univ. of New Hampshire’s 917 full-time faculty (col. 9).

These two observations show that UM faculty are working hard and leading the faculty of the eight peer institutions in attracting research funding, while Maine as a whole still ranks 50th in overall university-based research funding.

Therefore, while Maine has begun to invest in research and development since 1988, other states have made larger investments in the same period so that the State of Maine as a whole still ranks 50th in overall University R&D. The Strategic Direction 1 in this plan addresses this situation by recommending that Maine increase its university research investment to $60M a year by 2010. This is consistent with the Maine Science and Technology Advisory Council State R&D plan (issued Nov. 2005).

*Integrated Postsecondary Education Data System (IPEDS) is the core postsecondary education data collection program for the National Center for Education Statistics (NCES) http://nces.ed.gov/ipeds
Vision Statement

The University of Maine will become the leading Land-Grant and Sea-Grant research university in its comparison group within five years. In this context, research is defined as a wide range of intellectual, scholarly and creative activities, which generate new knowledge. Emphasizing its role as Maine’s comprehensive research university, UMaine will build excellence and national and international recognition in its academic programs, research and scholarly achievements, technological and intellectual resources, and public and private financial support is areas particularly relevant to a sustainable economy for Maine.

Demonstrated Benefits to the State of 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 six years since the State invested the first MEIF funds, UMaine has grown its grants and contracts by 63%. Through improvements in 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 of the state’s targeted technology sectors, 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. The FY04 performance measures described below demonstrate UMaine’s successful growth of research and development.

![Graph showing demonstrated benefits to the State of Maine](image-url)
FY 04: $56.7M in External Grants and Contracts Provide 5 to 1 Direct Return on State Investment

UMaine researchers were awarded $56.7M in overall external grants and contracts in FY04. This includes $50.8M Sponsored Programs; $2.7M Industrial Grants; $0.8M through the Development Office, and $2.3M through USDA Hatch funds. This amount constituted a 13 percent increase over the previous year and produced the highest total in UMaine history. Of that total, $40.5M was linked directly to the strategic use of R&D funding to leverage federal and private research grants and contracts, resulting in a 5:1 return on the State’s investment of $8.08M. Research and scholarly activity by UMaine faculty and staff resulted in more than 1,900 publications in FY04. UMaine also experienced a 22 percent increase in R&D contracts with businesses and industries, spurred by UMaine’s improved R&D infrastructure and research capacity. Those contracts resulted in $2.7M in FY04.

FY 04: 614 Research Positions Paid from Grants & Contracts

In FY04, 614 full-time equivalent positions at UMaine were created and/or supported as a result of R&D funds and external grants and contracts. In addition, a total of 125 positions were directly supported by state MEIF funds, bringing the total to 739 equivalent full-time positions supported by R&D funding at UMaine, including full and partially funded faculty positions.

FY 04: 128,000 ft² of New Research Facilities Added at UMaine

UMaine continued to expand and develop state-of-the-art research facilities to support the targeted technologies.

- The Institute for Molecular Biophysics (IMB) is a major new research initiative. Initiated with a National Science Foundation EPSCOR grant and matching State-provided R&D funds, the IMB is a partnership with The Jackson Laboratory and the Maine Medical Center Research Institute. The IMB has the potential to become a major research entity as demonstrated by NSF awarding the group more than $1M for a 4Pi microscope—the first of its kind in the U.S. and only the second in the world.

- In 2004, construction was completed on the new 51,000 square-foot Engineering and Science Research Building. Scientists and students from the Laboratory for Surface Science and Technology (LASSST) and the Department of Electrical and Computer Engineering began moving into the building in July 2004. The building includes a 3,500 square-foot “class 1000” clean room for research and development in the areas of nanotechnology, microfabrication, sensors, and biotechnology.

- The Advanced Manufacturing Center (AMC) was also completed in 2004. The AMC is a 30,000 square-foot facility that includes a host of machining and manufacturing equipment. The AMC staff is dedicated to assisting Maine industry with manufacturing issues leading toward the development of new and innovative products. Also included in this facility is the Hybrid Structures Laboratory, which recently received a $1M grant from the Office of Naval Research.

- The Advanced Engineered Wood Composites Center completed the laboratory expansion that was funded by the June 2003 Jobs for Economic Growth Bond. The 15,000 square-foot addition increased the world-class lab’s size to 48,000 square feet and helped the Center obtain a $6.2M in Army funding awarded in FY05 for development of an Army Center of Excellence in Composite Structures for Force Protection.

- At the Center for Cooperative Aquaculture in Franklin, construction began on a new 24,000 square-foot hatchery building, which was primarily funded by the Economic Development Administration and Maine incubator funding. In addition, construction began on a large portion of the USDA Agriculture Research Service aquaculture center, which is co-located in Franklin. The centers share nearly $3M in infrastructure, including a new state-of-the-art seawater pumping, filtering, and sterilization building; new seawater and freshwater reservoirs; and complete back-up power generation.
• Design work has been completed on the Student Innovation Center, a 5,000-plus square-foot building on campus that will support the creation of innovative businesses by students involved in R&D and the creative economy. In addition, credit and non-credit courses are being developed to encourage entrepreneurship and increased opportunities for graduates to use their education in Maine. Several of the companies started at the Target Technology Incubator have been created by graduate students commercializing their research.

• Purchases of major equipment valued at over $50,000 included 19 pieces of scientific equipment with a total value of $2M. This equipment outfits labs throughout the University.

• Super-computing capabilities received a major boost with the installation of the U.S. Army-funded 256 dual node Apple G5 cluster at the Target Technology Center. Added to the existing Blackbear/Keaneey cluster, it enables UMaine capacity to be on par with any educational institution north of Pittsburgh.

FY 04 Technology Transfer and Commercialization:
UMaine Patent Portfolio up to 50
UMaine continues to expand its technology transfer and commercialization program. The University’s total patent portfolio now contains more than 50 patents, patent applications, and international patents. In FY04, UMaine filed four new patent applications, and six new U.S. Patents were issued. Also in FY 04, UMaine signed license agreements with three Maine companies to commercialize UMaine patents, and UMaine helped start or spin-off four 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 (see display across for detailed process and timeline).

The following pages outline eight strategic recommendations, developed through an extensive survey of faculty, staff, and administrators at UMaine, with follow-up deliberations and discussions among the URC R&D Subcommittee members, and further input from many individuals and groups on campus, including the deans, and 13 open sessions for faculty and staff held in May 2005, two faculty Senate work sessions, and a faculty Union work session in June 2005. Over 600 faculty and staff have been invested, between Dec 04 and June 2005 to help formulate this plan. The names of those who contributed ideas and those who attended meetings are listed in Appendix A.

PROCESS AND TIMELINE
A dynamic, faculty-generated, and continuously improved R&D Strategic Plan:
1. URC Strategic Plan Subcommittee formed (Dec 04)
2. Faculty Survey (Dec. 04)
3. URC Subcommittee synthesis (Dec 04-Jan 05)
4. Work Session Research Directors
5. URC overall Committee presentations (2)
6. Deans presentations (April 05)
7. Meetings with individual Deans (May 05)
8. 13 Campus-wide Work Sessions (May 05):
   a. Chairs
   b. Faculty
9. Three Work Sessions with Faculty Senate (June 05)
10. Two Work Sessions with Faculty Union (June 05)
11. Meeting with UMaine Strategic Planning Committee (June 05)
12. Work Session with winners of UMaine Presidential Research and Creative Achievement Award (June 05)
13. Individual discussions with faculty Senate and Union members
14. Coordinate with Maine Science and Technology Advisory Council (Summer/Fall 05)
15. Work Session with Provost John Miller (June 05). Plan recommended to President.
16. Work Session with President Kennedy (Aug 23 05). Plan recommended to BOV.
17. Work Session with UMaine Board of Visitors (Oct 25 05). Plan unanimously approved.
18. Work Session with Chancellor Westphal (Nov 17 05)
19. Launch external information-providing campaign (Fall 05)
   a. Campaign Committee (UMaine faculty, administrators, business leaders, legislators)
   b. Identify broad strategic focus & emerging areas
   c. Develop campaign strategy
20. Faculty & Faculty Senate briefings (twice every year)
Strategic Recommendations

1. Increase Investment in UMaine Orono R&D, Scholarship and Creative Activity from $16M/year in 2005 to $60M/year in 2010

In order to become a leading research university within five years, a significant increase in research investment is necessary. Within the comparison group, the two universities with the highest NSF Expenditures in 2002, New Hampshire and Vermont, are located in states that have invested twice as much in research as Maine.

A prudent and compelling rationale for increasing research investment should be based on past performance and demonstration of the ability to accelerate achievement of outcome goals. The University of Maine's measures of performance indicate an accelerated growth in research that warrants additional investments to allow it to further benefit the State's ability to attract the best faculty and students, jumpstart the creative economy through vibrant Arts and Humanities programs, new industry, 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 the State dramatically increase its investments from $16M in 2005 to $80M by 2010. The proposed increase is consistent with the Maine Science and Technology Action Plan issued in Nov 05 (www.mainenovation.com/studies_reports/default.asp). Maine's per capita investment in R&D remains the lowest in the U.S. Continued investments at the present rate will not change Maine’s standing and will inhibit the State's economy from improving in comparison to other states.

Between 1993 and 1998, prior to MEIF investments in university research, R&D performed by Maine's academic institutions remained relatively constant (see adjoining Figure3). In contrast, as the MEIF investments were made in 1998, Maine's growth in academic R&D outpaced the reference groups between 1998 and 2002 (in percent growth but not in absolute dollars). During this period academic R&D in Maine increased 96 percent compared to 41 percent in the U.S., 34 percent in New England, and 39 percent among the EPSCoR4 states.

In terms of academic R&D per worker, in 2002, Maine's academic institutions combined performed $101 worth of R&D per each worker in the state, compared to $251 for the U.S., $371 for New England states, and $201 for EPSCoR states.5

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3As of this writing, estimated at $12M MEIF and $4M bond.
4$30M State R&D and $30M bond.
5Maine Innovation Index, Maine Department of Economic and Community Development (2005).
6Maine Innovation Index, Maine Department of Economic and Community Development (2005).
7EPSCoR focuses on those states that have historically received lesser amounts of federal R&D funding and have demonstrated a commitment to develop their research bases and to improve the quality of science and engineering research conducted at their universities and colleges. The program currently operates in 23 states: Alabama, Alaska, Arkansas, Delaware, Hawaii, Idaho, Kansas, Kentucky, Louisiana, Maine, Mississippi, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, South Carolina, South Dakota, Tennessee, Vermont, West Virginia, and Wyoming, as well as the Commonwealth of Puerto Rico and the U.S. Virgin Islands. http://www.ornl.gov/epscorstart.cfm.
8Maine Innovation Index, Maine Department of Economic and Community Development (2005).
The University is poised to partner with the State, and to increase private and foundations fund-raising as described in the bold new initiatives that follow. It is recommended herein that 80% of all new State research funds allocated for this plan be invested within the legislated target technology sectors, while the other 20% is set aside to address other research, scholarship and creative achievement activities necessary to create a vibrant well-rounded research university, e.g., areas impacting Maine’s economy, social environment, culture and quality of life.

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. For example, the University of Wisconsin-Madison Psychology Department is a research leader in the US. The Department’s 30 faculty are awarded approximately $30M/year in external research funding (nearly 50% of UMaine’s total research funding in 2004), or $1M/faculty/year. The program was built by focusing research activities on brain imaging, hiring magnet faculty, investing in the program over a sustained period, and developing an inter-disciplinary research approach. 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?

The Strategic Research Investment Program illustrated in Figure 1 will allow UMaine to focus as well as invest in individual UMaine faculty research broadly across all disciplines. New research funds will be concentrated into Six Strategic Focus Areas (50% of new funds), while funds will be invested to create a feeder system of New and Emerging Focus Areas (15% of new funds), and to support Faculty Growth (10% of new funds). The remaining 25% of the funds will be used to carry out other initiatives described in this plan. An inclusive process to allocate funding will be used allowing individual faculty, departments, centers, and colleges to submit proposals. The Strategic Research Investment Program will allow individual faculty or groups of faculty to participate under three categories:

1. Faculty Research Growth ($10k - 50k/year). Invest 10% of new base research funding to individual faculty or smaller groups of faculty to support research and teaming efforts. Some of these individual or teaming efforts will develop into Emerging Focus Areas. It is recognized that in some creative efforts, the model for continued growth may not support clustering or inter-disciplinary activities. In such cases, individual or small groups of faculty with outstanding performance in their first 5 years will be eligible to re-apply for a new 5-year round of funding.

2. New and Emerging Focus Areas ($100k - $300k/year). Invest 15% of new base research funding to create a feeder system of integrated research clusters which can develop the capability to become Strategic Focus Areas within 5 years.

3. Strategic Focus Areas ($1.5M - $3.5M/year). Invest 50% of new base research funding to promote growth in six selected areas. Programs in this category are expected to become world leaders in their fields within 5 years, become largely self-sufficient, and move "out" of the pyramid so that new areas can move in. Following the initial 5 years, the successful programs will be sustained with $300X-500X/year to cover basic operating expenses and new staff salaries.

Figure 1. Strategic Research Investment Program

5th Year Snapshot with $25.5M Investment in Strategic Direction 2 of $60M Annual Investment

Remaining $60M - $25.5M = $34.5M investment supports Strategic Directions 3 through 8
Eligible Disciplines. All disciplines at UMaine are eligible for new funding. 80% of the new funding will be invested within the State-mandated MEIF areas, and 20% of the new funding will be set aside for competition in other areas that impact Maine’s economy, social environment, culture, and quality of life.

Sustained Funding. Since all funds will not be available at the beginning of the plan, initial investments will be primarily in Strategic Focus Areas, and as more funds are generated, the rest of the pyramid will be filled. Funding in each category will be sustained for 5 years. Accountability will be stressed and a major program review will take place at the end of 5 years. Eligibility for additional funding beyond the first 5 years will depend on success in meeting the goals set out in the proposal, as well as on promise for continued growth. Following the initial 5 years, the Strategic Focus Area programs which have met their 5-year goals will be eligible for Program Sustainability funding of $300k-500k/year to cover basic operating expenses including staff salaries. Thus after the first 5 years, the savings realized from “graduated” programs, as well as potential growth in State research investments, will be used to fund new proposals. This will allow new faculty to enter into and move through and out of the pyramid.

Re-Applying after 5 Years of Funding. It is generally anticipated that Strategic Focus Areas will become largely self-sustaining after 5 years, so that new Strategic Focus Areas may be developed. Similarly, it is anticipated that successful New and Emerging Focus Areas would be ready to submit proposals that would allow them to be considered for Strategic Focus Areas after 5 years. In the same manner, successful individual PIs may be ready to submit proposals to create New and Emerging Focus Areas after the first 5 years of funding. It is recognized that in some creative efforts, the model for continued growth may not support clustering or inter-disciplinary activities. In such cases, individual faculty with outstanding performance in their first 5 years will be eligible to re-apply for a new 5-year round of funding under the Growth of Individual PIs category. Similarly, faculty who have successfully completed a 5-year round under the New and Emerging Focus Area or under a Strategic Focus Area may re-apply under any category. All else being equal, preference will be given to new applicants or groups who have not received any funding in the past.

Selection Process and Eligible Funding. The Vice President for Research office will organize and oversee the Strategic Research Investment Program selection process. Eligible funding requests depend on the specific needs of the researcher(s), and can include one or more of the following: attracting new or magnet faculty, post-doctoral fellows, research staff, doctoral students, MS and undergraduate students, summer salary, travel funds, materials and supplies, publication costs, patent filing costs, commercialization costs, new equipment, physical facilities improvement, external proposal matching funds, etc. Criteria for selection are shown in the Figure 2.

- Relevance to Maine’s economy and needs
- Promise for future success
- Technical viability
- Traditional strength
- A demonstrated research culture
- Enhancement of academic scholarship
- Outstanding leadership
- National needs and opportunites
- Past performance
- Demonstrated need

Figure 2. Criteria for Selection - Strategic Research Investment Program
3. Enhance Human Resources, Physical Facilities, and Administrative Procedures

3.1 Enhance Human Resources: Faculty, Soft-Money Research Staff, Graduate Students, and Support Staff

3.1.1. Faculty Investment Initiative: Add 10 outstanding magnet faculty/year, including exceptionally promising young hires, who have research excellence in Strategic Focus Areas or New and Emerging Areas. These faculty will achieve new national and international prominence for their units. Use new research monies to make some of these hires. In addition to hiring new magnet faculty, increase the support for existing faculty as described in Strategic Direction 2 and illustrated in Figure 1.

3.1.2. Increase the number of graduating doctoral students to 60 by 2010 (60% in Strategic Focus Areas and 20% in New and Emerging Areas). Internally supplement 2-year grants to allow doctoral student hires, and increase recruitment in new ways, such as delivery of doctoral programs for working professionals throughout the state. Earmark 10% of returned indirect to graduate programs via the VPR office for this activity.

3.1.3. Increase the number of research faculty, postdoctorates, and senior research staff, (80% in focus areas).

3.1.4. Hire professional research grant programs officers: Hire > two grant officers who will help faculty identify and write larger research grants (> $1M, particularly interdisciplinary research grants).

3.1.5. Hire senior professional foundation/grant officers: Hire > two senior professional foundation/grant officers with a demonstrated track record in attracting investments in Research, scholarship and creative activities.

3.1.6. Integrate research culture into the undergraduate curriculum and provide faculty with resources and recognition for this contribution, including support for Honors College undergraduate thesis research.

3.2 Enhance Physical Facilities: Library, major equipment, facilities, and IT support

3.2.1. Increase Library support. Improvements of our library facilities are necessary so that we can retrieve the latest scholarship in all areas of research ongoing at UMaine and expand into new areas of scholarship.

3.2.2. Create a competitive Major Equipment and Facilities Fund with state bonds (80% in focus areas). Solicitations for major equipment and facilities acquisition or upgrade projects will be issued by the Vice President for Research office, using the Strategic Research Investment Program model (see Strategic Direction 1).

3.2.3. Enhance computational research facilities and IT support

3.2.4. Streamline administrative procedures to improve efficiency.

4. Reward Excellence in Research, Scholarship and Creative Activities

4.1 Return of indirect (F&A): Return of indirect costs recognizes sponsored research achievements, provides an incentive for continued research productivity, and permits investment in continued research growth. Create a fixed $ baseline of indirect costs, using FY06 as a base year, above which all indirect costs are returned, using the following formula: 10% of indirect costs to faculty who generate it (allow that to be held over fiscal years ends), 25% to facilities, Library and administration, 8.3% each to the Departments, Centers and the Deans, and retain the remaining 40% to the VPR for investment. Dedicate 10% of those VPR funds to enhance scholarly and creative activities in areas not represented by the focus areas, including travel funds, teaching release, and other basic research support to these academic departments and programs.

4.2 Reward faculty with stipends and professorships: Reward faculty members that contribute to excellence in research, scholarship and creative activities with stipends and endowed professorships, and considering criteria for research excellence established by the VPR Office, and the faculty member’s Departmental Peer Committee, Center, and College.

4.3 Incentive award for grants, creative, and scholarly activities: One goal of this strategic plan is to increase research and scholarly activity at UMaine resulting in funded projects. As such, reward successful Principal Investigators with additional compensation determined annually, funded using return of indirect, and calculated using a percentage of externally generated indirect costs recovered by UMaine through the faculty’s grants.

4.4 Increase teaching support through more competitive TA stipends, postdoctoral fellows, and course release that can support research and teach classes.

4.5 Develop a formalized program, including resources and personnel, to increase visibility of faculty research and creative activities accomplished (see 8.5 as well).

*Magnet faculty are expected to engage in teaching, research, and public service and program development through team building. Use new state R&D funds to hire some of these new faculty.  
*2005 Coalition Report on Graduate Research, Scholarship and Education, UMaine. Dr. Scott Johnson Committee Chair.
5. Increase Research Commercialization and Technology-Transfer

5.1 Hire at least 2 new patent/commercialization/technology transfer positions
5.2 Provide incentives for faculty to work with industry and the state-funded Maine Technology Institute by recognizing such activities as an integral part of the tenure/promotion criteria
5.3 Create a Commercialization Competitive Fund for proof of concept
5.4 Create a Research Corporation to streamline administrative procedures, and create a reward structure

6. Enhance Communication with External Constituencies

6.1 Invite funding officers to UMaine
6.2 Create distinguished lecturer series (50% of funding in focus areas)
6.3 Increase travel funds for faculty (50% of funding in focus areas)

7. Institutionalize Training, Mentoring, Retention and Support for Researchers

7.1 Create a formalized research mentoring and retention program for faculty, including an internal voluntary training and peer-review program for new proposals, as well as for resubmitting rejected proposals. Also, when a proposal has been declined for funding, provide travel funding for visits to the funding agencies for advice on resubmission of the rejected proposals (see 6.4). Also, provide summer funds for preparation of grant proposals to external agencies.
7.2 Enhance internal communications among researchers
7.3 Encourage active dialogue on funding opportunities among the faculty in the research centers AND those with college connections. Advise that there may be start-up funds or other resources relevant to them working together depending upon the specifics of the work and the faculty involved
7.4 Increase access to childcare on campus. On a broader scope, work towards adopting policies such as those consistent with the AAUP May 2001 Statement of Principles on Family Responsibilities and Academic Work http://www.aaup.org/statements/REPORTS/re01fam.htm.

8. Strengthen Research, Scholarship and Creative Activities in Areas Impacting Maine’s Economy, Social Environment, Culture, and Quality of Life

Research, scholarship and creative activities in these areas are an integral part of all 7 strategic directions outlined earlier in this plan. Strategic Direction 8 strongly reinforces this fact. UMaine will increasingly promote research that develops a better understanding of what constitutes excellence and essential areas of inquiry within those fields, and how best to generate additional resources to support faculty conducting research in those fields (see Appendix B). For example, research, scholarship and creative activities needed to support a sustainable Creative Economy in Maine will occur in wide-ranging disciplines throughout the University. It is this plan’s clear intention to support and encourage individual faculty, departments, colleges and centers across all disciplines to participate in research, scholarship and creative activities (see Strategic Direction 2). It is well known that external research funding is more difficult to obtain in some fields than it is in others. As such, UMaine will increase financial support for faculty conducting research, scholarship and creative activities in these fields by:

8.1 Setting aside 20% of all new funding under Strategic Direction 2 to support faculty in non-MEIE areas.
8.2 Using increased Return of Indirect to the VPR office (Item 4.1) to increase the size and number of competitive research funds in fields not represented by the focus areas.
8.3 Increasing faculty support to obtain funding from Foundations and other funding outlets such as NEA, NEH and SSRC (Strategic Directions 1, 2, 3, 4, 5, 6, 7)
8.4 Obtaining State funding and bonding to support these objectives (Strategic Directions 1 and 2)
8.5 Improving incentives and rewards to faculty who excel in fields other than those represented by the focus areas (Strategic Direction 4)
5-Year Projections

A detailed research investment plan outlining both the proposed state investment and the return on investment over the next 5 years has been developed. The investment plan is detailed for each of the 8 strategic plan recommendations described earlier. 80% of the State investment will be in the State-legislated areas while the other 20% will be set aside to strength research, scholarship and creative activities in other areas. The projections depict a combined growth of state R&D and Bond funding to $60M in 2010 and assumes that the growth will be invested in Focus Areas, New and Emerging Areas, and Growth of Faculty, covering all disciplines on campus (20% set aside for non-MEIF areas). By 2010, the impact of the investment will include:

- Growth of UMaine research grants and contracts to $88M/year ($118 M total including state funds)
- Increased support for research, scholarship and creative activities across all disciplines on campus, including non-MEIF areas. 20% of all new funds, that is $6M/year by 2010 will be set-aside for non-MEIF areas.
- Growth of UMaine jobs funded by Research to 1,055
- Growth of the UMaine patent applications to 12/year and the doubling of the UMaine patent portfolio to 100 within 5 years
- Growth of new business startups to 6/year; and the total of new startups created will be 25
- Personnel growth over the 5 years will include the hiring of:
  - 50 new magnet faculty positions
  - Double research faculty positions funded at 50% of their salaries through State funding growth
  - Double post-doc positions
  - Double technicians and research staff positions
  - 100 new Doctoral students: 20/year, 50% State-funded positions available to match 1-1 Ph.D. salaries on grants
  - 2 new senior foundations officers hired to invigorate major foundation awards
  - 2 new senior grants officers to assist in assembling major interdisciplinary external grants (min > $1M grant)

- Investment in Library, facilities and major equipment of $128M, 10% of which will support library and IT ($13M)
- Redistribution of indirect costs increase over the amount recovered in the FY 04 base year will result in annual indirect costs reinvestments of $3.5M in 2010 back to faculty, Departments, Centers, Deans, VPR, and the facilities (assumes 11.46% mean indirect recovery rate). The VPR recovered indirect becomes $1.4M annually in 2010 will include: salary stipends for outstanding faculty, faculty promotion resulting in national recognition and awards, and teaching support including granting TAs or course release competitively to selected faculty.
Appendix A - List of UMaine Faculty, Staff and Administrators who Contributed to this Report, or Attended Open Forums

The following question was asked of faculty and administrators at UMaine: “In order to increase research activity on Campus, what are your four best ideas - two with new resources, & two without new resources?” The results were synthesized by the URC Strategic Plan Subcommittee into a draft plan. Over 600 faculty hours have been invested between Dec 04 and June 2005 to help formulate this plan. Input was obtained from Research Directors, Deans, the University Research Council, 13 campus-wide open faculty work sessions, two work sessions organized by the faculty Senate, a work session organized by the faculty Union, individual meetings and discussions with faculty Senate and Union members, and other research-intensive faculty who reviewed or commented on the document, including the following individuals:

Jim Acheson - Prof. of Anthropology & Marine Sciences
Andrei Aiyokhin - Asst. Prof., Biological Sciences
Francois Amar, Assoc. Prof., Chemistry
Aria Amirbahman - Assoc. Prof., Civil and Environmental Engineering
Paul Anderson - Director, Sea Grant
Steven Barkan - Chair, Dept. of Sociology
Dan Belknap - Chair, Dept. of Earth Sciences
Lauren Bartel - Dean & Director of Cooperative Extension
David Batzki - Professor and Chair, Department of Physics and Astronomy
Kate Beard-Tisdale - Chair, Spatial Information
Michael Blidou - Director, Pulp and Paper Process Development Center
Catherine Billings - Assist. Director for Communications & Development, College of NSFA
Amy Blackstone - Assist. Prof. of Sociology
Joline Blais - Asst. Prof., New Media
Doug Bausfield - Prof. Chemical and Biological Engineering
Michael Boyle - Assoc. Prof. of Mechanical Engineering
Tony Brinkley - Assoc. Chair, English Dept.
Thomas Brann - Prof. of Forest Resources
Bill Bray - Chair Mathematics Dept.
Richard Brucher - Assoc. Prof., English Dept.
Al Bushway - Prof., Food Science and Nutrition
Rod Bushway - Prof. and Chair, Food Science and Nutrition, Lab Director of SECRL
Vincent Caccese - Assoc. Prof. of Mechanical Engineering
Mary Camir - Prof., Food Science and Nutrition
Joe Carr - Director of Public Affairs
Mary Cathcart - State Senator (former), MCS Policy Center
Beth Clark - Assist. Prof. of Nursing
Robert Cobb - Dean College of Education
Alan Cobo-Lewis - Assoc. Prof. of Psychology
Ted Coladalli - Prof. of Education
Barbara Cole - Chair, Prof. of Chemistry
Timothy Cole - Chair, Assoc. Prof. of Political Science
Laura Cowan - Assoc. Prof. of English
Dorothy Croall - Prof., Biochemistry
Chris Cronan - Prof. of Biological Sciences
William Davids - Assoc. Prof. Civil Engineering Dept.
Habib Dagher - Director, AEWC Center & Prof. Civil Engineering Dept.
Eugene Del Vecchio - Prof. and Chair, Modern Languages and Classics
Elizabeth DePoy - Prof. of Social Work, Center of Community Inclusion

Note that this is NOT a list of faculty who endorse the report; it is a list of those who participated in work sessions or provided input.
Darrell Donahue - Assoc. Prof. of Chemical & Biological Engineering
Frank Drummond - Prof., Biological Sciences
Michael Eckardt - Vice President for Research
Merrill Elias - Prof., Psychology
Susan Eich - Chair, Plant Soil and Environmental Sciences
Suzanne Esler - Assoc. Prof. of Higher Education Leadership
Jim Fastook - Professor, Computer Science/Quaternary
Ivan Fernandez - Professor of Plant, Soil and Environmental Sciences
Raymond Fort - Prof. of Chemistry
Thane Fremouw - Research Assist. Professor, Psychology
Brian Frederick - Assoc Prof., Chemistry, LAAST
Amy Fried - Assoc. Prof., Political Science
Douglas Gardner - Prof. of Wood Science, Forest Management, AEWC Center
Stephen Gilson - Prof. of Social Work, BASW Coordinator
Don Grant - Prof. and Chair, Mechanical Engineering
Max Egenhofer - Director, NCGIA
Kim Goff - Engrg Grants Officer
Barry Goodell - Prof. Wood Science, Forest Management, AEWC Center
Eleanor Groden - Assoc. Prof., Biological Sciences
Jeff Hecker - Prof. and Chair, Psychology
James Horan - Professor of Public Administration
Michael Howard - Professor of Philosophy
Adriaan Van Heiningen - Ober Chair and Prof., Chemical and Biological Engineering
Nancy Hall - Chair, Communication Sciences and Disorders
William A. Halteman - Assoc. Prof. of Mathematics
Walter Harris - Director, Center for Research and Evaluation
Michael Hastings - Director, Research and Sponsored Programs
Marie Hayes - Assoc. Prof. of Psychology
C. T. Hess - Prof., Physics and Astronomy
Jeff Hecker - Prof. and Chair, Psychology
Richard Hollinger - Head, Special Collections, Fogler Library
James Horan - Prof. of Public Administration
Stephen Hornsby - Director, Canadian American Center
Michael Howard - Prof. of Philosophy
Dana Humphrey - Prof. and Chair, Civil Engineering
Keith Hutchison - Professor, Biochemistry, Microbiology and Molecular Biology
Dan Innis - Dean, College of Business Public Policy and Health
George Jacobson - Prof. of Botany & Quaternary Studies
Jody Jellison - Prof., Biological Sciences, Asst. Dir. MAFES
Scott Johnson - Assoc. Prof., Earth Sciences
Peter Jumars - Prof., School of Marine Sciences
Lenard Kaye - Director, Center on Aging, Prof. of Social Work
Renee Kelly - Business & Economic Development Liaison, Office of Research and Economic Development
Roger King - Prof. and Chair, Philosophy Dept.
Renate Klein - Assoc. Prof., Human Development and Family Studies
Barbara Knowles - Co-Director, Institute of Molecular Biophysics
David Kotecki - Assoc. Prof., Electrical and Computer Engineering
Jan Kristo - Prof. - College of Education and Human Development
Robert Lad - Director, LAAST
Jim Linehan - Prof. and Chair, Art
Roberto Lopez-Anido - Assoc. Prof. of Civil Engineering & Environmental Engineering, AEWC Center
Margaret Lukens - Assoc. Prof. and Chair, English Dept.
Deirdre Mageean - Assoc. VP for Research and Dean of the Graduate School
John Mahon - Interim VP for Academic Affairs and Provost, Prof. of Management
Kathleen March - Prof. of Spanish, Modern Languages & Classics
Shannon Martin - Assoc. Prof., Communications and Journalism
Craig Mason - Assoc. Prof., College of Education and Human Development, CCI
Larry Matthews - Dean of Engineering
Larry Mayer - Prof., School of Marine Sciences
Paul Mayeski - Director, Climate Change Institute
Karen Merritt - Ph.D. Candidate, Civil Engineering
Jean MacRae - Assist. Prof., Civil Engineering
Susan McKay - Prof. and Chair, Physics and Astronomy
James McClanahan - Assoc. Prof., Physics and Astronomy
Charles Moody - Assoc. Prof. of Biochemistry, Microbiology & Molecular Biology
James Moreira - Director, Maine Folk Life Center, Assist. Prof. of Anthropology
Donald B. Mountcastle - Assoc. Prof. of Physics
David Neumann - Asst. Prof., Chemical and Biological Engineering
Laurie Oshier - Assist. Prof. of Plant Soil & Environmental Science
Howard Patterson - Prof. of Chemistry
Hemant Pendse - Chair, Chemical and Biological Engineering
Eric Peterson - Assoc. Prof., Communication & Journalism
Michael Peterson - Prof. of Mechanical Engineering
Steve Reiling - Director, Maine Agriculture Center
Robert Rice - Professor, Forest Management, Wood Science
Liam Riordan - Assoc. Prof., History
Paul Roscoe - Prof. and Chair, Anthropology Dept.
Alan Rosenwasser - Prof. of Psychology
Jonathan Rubin - Interim Director of Margaret Chase Smith Policy Center
Joyce Rumery - Interim Director, Fogler Library
Douglas Ruthven - Prof. and former Chair, Chemical and Biological Engineering
Christa Schwitzer - Prof. of Biological Sciences
Bruce Segel - Assoc. Prof., Electrical and Computer Engineering
Stephen Shaler - Assoc. Director AEWC, Forest Management, Wood Science
Ann Schonberger - Director, Women in the Curriculum, Women Studies
Scott See - Chair and Librarian Prof. of History
John Singer - Chair, Dept. of Biochemistry, Microbiology and Molecular Biology
Charles Slavin - Dean, Honors College
Natalie Steiger - Asst. Prof., Maine Business School
Martin Stokes - Chair, Professor of Animal & Veterinary Sciences
Tom Taylor - Professor and Chair, Public Administration
Andrew Thomas - Professor, School of Marine Science
John Thompson - Prof. of Physics & Astronomy
David Townsend - Director, School of Marine Sciences
Shih-fen Tsai - Asst. Prof., College of Education and Human Development
Elise Turner - Chair, Computer Science
Roy Turner - Assoc. Prof. of Computer Science
Senthil Vel - Assistant Prof. of Mechanical Engineering
Janet Waldron - Vice President for Administration and Finance
Jake Ward - Exec. Direc., Research and Economic Development
Adrienne White - Assoc. Prof., Food Science and Nutrition
Robert White - Assistant Provost and Dean, Division of Lifelong Learning
Bruce Wiersma - Dean, College of Natural Resources, Forestry and Agriculture
David Wihry - Chair, Assoc. Prof. of Economics
Lucille Zeph - Director, Center for Community Inclusion
Appendix B. Examples of UMaine Research that Enhance Maine's Creative Economy, Social Environment, Culture, and Quality of Life

In addition to sciences and engineering research, UMaine continues to lead in conducting research that enhances Maine’s creative economy, social environment, culture, and quality of life. Examples include:

- The Margaret Chase Smith Center for Public Policy is dedicated to improving and promoting the quality of public dialogue about state, regional, and national policy issues. The Center has received a Congressional award to fund the Maine Rural Substance Abuse Partnership. Substance abuse is considered one of the most critical problems facing rural populations in Maine and nationally.
- The Cohen Center in the School of Business cultivates in-depth understanding of international business, foreign competition and global awareness, helping position Maine in the global economy.
- The Center for Community Inclusion & Disabilities Studies is creating opportunities for Maine people with disabilities through research and policy analysis.
- The Center on Aging specializes in aging education, research and community service. It serves the state by maximizing the quality of life of Maine’s older citizens and their families.
- The History Department, working with the Canadian-American Center, developed the Maine Atlas which will soon be sold throughout the United States.
- The Canadian-American Center is one of the leading institutes for the study of Canada. It promotes cross-border research, which benefits Maine’s culture and economy.
- The Political Science Department’s faculty have recently completed a book on the impact of term limits in Maine.
- The Sociology Department is researching the extent, sources, and consequences of domestic violence in Maine and beyond.
- The UMaine Folklore Center is developing concepts for Maine’s Creative Economy, including support for the National Folk Festival.
- The Research Collaborative on Violence Against Women generates high quality research that contributes to work for peace and justice in Maine’s communities.
- The Psychology Department conducts research in anxiety disorders, infant sleep disorders, stereotyping and prejudice, and creativity, just to name a few. The role of stress in stimulating and sustaining binge eating is one focus of research which could contribute to better psychological treatments for binge eaters.
- The Psychology Department has worked with a local Maine company to secure a phase 2 Small Business Innovation Research grant from NIH to develop and commercialize software for rapid testing of language development in young children. This project brings University research to pre-K educational and medical applications, providing improved tools for identifying and evaluating children at risk for developmental disability.
- The Anthropology Department is researching the Northeastern Borderlands, especially Maine, and its unique historical interface with Québec and the Maritime Provinces of Canada.
- The National Center for Student Aspirations provides research and analysis, and interventions to help Maine schools assess and respond to the perceptions and needs of all students, and improve overall educational environments.
- The School of Social Work is conducting research on Native American children and families, poverty, public child welfare programs, community mental health, as well as disability and diversity.
- World-renowned poets and scholars involved in the creation and study of poetry were at the University of Maine in summer 2004 for one of the largest conferences devoted to the genre. "Poetries of the 1940s, American and International" drew participants from nine countries and the U.S.
- UMaine Spanish students from Modern Languages and Classics are tutoring Spanish-speaking migrant workers Down East. The campus service-learning initiative was funded by the Northeast Regional Campus Compact. A 2005-06 VISTA/AmeriCorps volunteer will link the Hispanic migrant population, poverty in Central America and service-learning projects at UMaine.
- The University of Maine System Libraries have brought online a newly developed, searchable database for public use. The Gateway to Digital Collections provides online access to thousands of selected digitized materials—full text, image, sound, video, and finding aids.
Graduate Research, Scholarship and Education at the University of Maine: Meeting the Challenges of the University of Maine System Strategic Plan

This report was produced by: The 2005 University of Maine Coalition on the Graduate Environment
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Graduate Research, Scholarship and Education at the University of Maine: Meeting the Challenges of the University of Maine System Strategic Plan

This report was produced by:
The 2005 University of Maine Coalition on the Graduate Environment

which includes representatives from the following groups:
The University of Maine Faculty Senate
The University of Maine Graduate Board
The University of Maine Research Council
The University of Maine Association of Graduate Students

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Graduate Research, Scholarship and Education at the University of Maine: Meeting the Challenges of the University of Maine System Strategic Plan

Executive Summary

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. To compete in this economy, states must invest in a continuous flow of creative discovery and the production of highly skilled and educated workers. One of the most crucial and strategic decisions made by competitive states is to invest in their research universities. These universities are engines of economic progress, fueling creativity and innovation, and providing the human capital that underlies prosperity.

The 2004 University of Maine System Strategic Plan rightly identifies the University of Maine as the State's only research university, highlighting the vital and unique role played by the University in the State's future, and emphasizing the critical nature of graduate research and education in its mission. The University's graduate mission clearly differentiates it from the other campuses in the System, and is a key factor in its national reputation. Graduate students at the University of Maine assist faculty with cutting edge research, produce data that lead to millions of dollars in successful grant proposals, generate new knowledge and creative discoveries, and contribute significantly to the teaching of undergraduate students. From a strategic viewpoint, graduate students provide a relatively inexpensive and efficient way for the State to maximize the effectiveness of its research university.

The University of Maine is one of only 151 universities in the country classified by the Carnegie Foundation for the Advancement of Teaching as Doctoral Research Extensive I. This is the highest classification possible, designating institutions that graduate an average of no fewer than 50 doctoral students per year across at least 15 programs over a 3-year period, and that attract more than 40 million dollars of external funding per year. This prestigious status makes the University of Maine the only institution in the State that has the faculty and program recognition required to attract the very best graduate students across a broad range of disciplines. One of the State's top priorities should be to ensure that we compete effectively for these students.

However, many years of budget cuts to the University have made this task increasingly difficult. Our institutionally supported recruiting packages are uncompetitive, and our library resources and research infrastructure have suffered. In addition, faculty time for graduate advising has eroded due to increases in the number of undergraduate credit hours served in order to increase tuition-generated revenues. These factors make it impossible in many instances to recruit top quality graduate students, or to maintain strong graduate programs. In addition, these factors send a strongly negative signal to potential new faculty as well as potential collaborators in business and industry. The reason for this is simple: the health of a research university's graduate programs is an important indicator of the overall health of the institution.

This report makes urgent, key recommendations that are required to keep the University's graduate programs strong and competitive. The University of Maine is arguably the State's most valuable public asset, and it must play a fundamental role in shaping Maine's future. We currently attract 92% of all federal research dollars for academic research in the State ($57 million in FY04), we have a number of graduate programs and faculty that are internationally recognized as world class, our graduate student enrollment is 2300 and growing, and we have produced every single Doctoral graduate in the University of Maine System. If Maine is to compete in the innovation-driven economy and provide an improved quality of life for its citizens, funding to the University of Maine and its graduate programs must be a priority. We are in no small measure responsible for the State's future, and we call on the State to invest in our research and graduate programs accordingly.
Graduate Research, Scholarship and Education at the University of Maine: Meeting the Challenges of the University of Maine System Strategic Plan

“Graduate education prepares the scientists and engineers needed by industry, government, and universities to conduct the nation’s research and development; educates the scholars in the humanities, social sciences, and the arts who preserve and enlarge our understanding of human thought and the human condition; and develops the scholars in all disciplines who become the faculties of the nation’s colleges and universities.”


“Generating innovative, sponsored research is a critical factor in Maine’s economic development. Top quality graduate programs and research programs will attract resources and businesses to the State, helping to fuel the economy and contribute to growth.”

— University of Maine System Strategic Plan, 2004

Introduction

The nation’s research universities are engines of economic progress, fueling creativity and innovation, and providing the human capital that underlies intellectual and material prosperity. Research universities are important to industry, commerce and government, because those groups are dependent on the ideas, solutions and highly skilled labor force that the universities produce. 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 broad set of academic programs and high quality faculty, research universities provide some of the finest undergraduate liberal arts education in the nation, adding richness to the human experience. One of the key indicators of the quality and strength of a research university is the degree to which it emphasizes graduate research, scholarship and education. This report focuses on the University of Maine’s graduate environment and makes key recommendations for building strength and impact in these programs. In particular, this report focuses on meeting the challenges inherent in the 2004 System Strategic Plan.

System Strategic Plan and Graduate Research, Scholarship and Education

The 2004 University of Maine System Strategic Plan rightly identifies the University of Maine as the State’s only research university and challenges it to excel in this regard. The System Plan highlights the vital and singular role played by the University of Maine in the State’s future, and emphasizes the critical nature of graduate research and education in its mission. We are enthusiastic about this recognition of the University’s unique role in the State, and we see it as a catalyst for a renewed effort to realize the University’s great potential for contributing to the State’s economic, technological, scientific, educational and healthcare needs.

The University of Maine offers graduate degrees in 65 Master’s programs (including the professional programs) and 25 Doctoral programs. These programs offer real and important benefits to the people and State of Maine by supporting an innovative and creative economy, educating Maine’s highly skilled labor force, and developing new ways to understand and use Maine’s natural resources and human capital. Some of these programs are already world class, but in order to increase quality and effectiveness across the board, and meet the challenges laid out in the System Plan, the perception and financing of graduate research and education at the University must undergo crucial changes. These changes will not be easy, and they will cost money, but the University of Maine is arguably the State’s most valuable public asset and these changes will position the University to play a fundamental role in shaping Maine’s future. This report outlines some of the most important required changes and makes recommendations that will maximize the contribution of
the University's graduate programs to the prosperity and cultural development of Maine and its citizens.

"Research also drives and defines the quality of the University's graduate programs. UMaine must ensure that its graduate opportunities are cutting edge, highly competitive, and inspiring. The enthusiasm of graduate students permeates the campus with an air of excitement unique to research universities and sparks the imagination and motivation of undergraduates, many of whom immediately benefit from the presentation or application of new findings in the classroom."

— University of Maine Strategic Plan, 2000-2005

Some Facts About the University of Maine

The University of Maine is one of only 151 universities in the country that hold the highest classification of the Carnegie Foundation as Doctoral Research Extensive I. This prestigious status designates institutions that graduate an average of no fewer than 30 doctoral students per year across at least 15 programs over a 3-year period, and that attract more than 40 million dollars of external funding per year. One of the defining features of Doctoral Research Extensive universities is strong support for graduate programs, and particularly Doctoral programs. Graduate students typically comprise greater than 25% of the total student population at the best public Doctoral Extensive universities, whereas they comprise approximately 20% at the University of Maine. Similarly, Doctoral student enrollment at the University of Maine is approximately 20% of the total graduate student enrollment. To improve relative to its national peer cohort, the University needs to increase its graduate enrollment as a percentage of total enrollment, particularly at the Doctoral level.

Graduate students should, and in many cases do, play vital roles in the research and teaching missions of the University. They assist faculty with cutting edge research, produce data that lead to millions of dollars in successful grant proposals, generate new knowledge and creative discoveries, and contribute significantly to the teaching of laboratory and service courses across the campus. From a strategic viewpoint, graduate students provide a relatively inexpensive and efficient way for the University to maximize its competitiveness with other research universities, effectiveness at educating Maine's citizens, and ability to build strength in Maine's economy.

Despite the vital roles played by graduate students while at the University, and their successes after they graduate, there is a significant lack of financial and infrastructural support for graduate research and education at the University. One ominous sign of neglect in this regard is that we have graduated fewer than 30 doctoral students per year for the past 6 years, and are on the verge of losing our Carnegie classification of Doctoral Research Extensive I. Loss of our Carnegie status would suggest to funding organizations, candidates for faculty positions, existing productive faculty, and prospective graduate students, that the University of Maine no longer aspires to compete in the national community of research universities. The number of Doctoral students at the University is on the increase owing to specific measures taken over the past few years, but it is essential to ensure that this trend continues.

From its inception, the University of Maine has been characterized by a climate and financial priorities typical of an institution focused primarily on its undergraduate mission. The University's graduate mission clearly differentiates it from the other campuses in the System, and is a key factor in its national reputation. In addition, graduate research and education are profoundly important to the University's undergraduate mission, allowing the University to attract high quality faculty that provide research opportunities for undergraduate students and cutting-edge knowledge in the courses they offer. Despite all the benefits of the graduate mission at the University of Maine, it has received relatively little attention and financial priority.

We strongly recommend sweeping changes that capitalize on our unique position as the State's Flagship University, and that elevate our graduate mission to a level commensurate with our Carnegie status. We attract 92% of all federal research dollars for academic research in the State ($57 million in FY04), have a number of graduate programs and faculty that are internationally recognized as world class, and we have produced every single Doctoral graduate in the University of Maine System. The University of Maine is the only institution in the State that has the faculty and program recognition required to attract the very best graduate students across a broad range of disciplines. One of our top priorities should be to ensure that we compete effectively for these students.

Benchmark Goal

As part of its transformation to becoming a stronger research university, the University of Maine will increase its emphasis on high-quality graduate research, scholarship and education. By 2010 the graduate student population at the University of Maine will increase to 25% of the total student enrollment, and the number of doctoral students will increase to 25% of the total graduate student enrollment. This level of increase is consistent with the University's Carnegie classification of Doctoral Research Extensive I, and is essential if we are to meet the challenges laid out in the 2004 University of Maine System Strategic Plan.

Target Audience and the Report Focus

Our target audience for this report is the senior administration of the University of Maine (President and Vice- Presidents), the System-level administration (Chancellor, Vice-Chancellor and Board of Trustees), the Board of
Informing the Report

In the fall semester of 2004 a broad coalition of University of Maine faculty and graduate students assembled with the intention of delivering this report in the spring semester of 2005, coincident with the University's internal strategic planning process. In preparing this report, we have worked closely with the University Research Council Strategic Plan Implementation Committee, which has also clearly recognized the need to build strength in our graduate programs. We also worked closely with the Stipend Committee of the University of Maine Association of Graduate Students.

Data and information for this report were collected from three primary sources, as follows.

1) In order to identify the key topics of concern for the report, the following question was sent to approximately 70 faculty members representing all graduate programs at the University of Maine:

In order to improve the graduate environment, graduate education, and graduate research/scholarly activities on campus what are your 2 best ideas that could be implemented with new resources and your 2 best ideas without new resources?

Responses were broadly grouped into themes (Appendix A), and a series of meetings were held to discuss the responses and deliver a set of recommendations.

2) To evaluate the State-level support for graduate research and education at the University of Maine, we have examined a number of documents produced or sanctioned by the State Government over the past 5 years that address the issues of graduate research and education and the vital role it plays in shaping the future of Maine. These include: (a) the 2003 Report of the Maine Economic Growth Council, which is administered by the Maine Development Foundation; (b) the 2004 Maine Innovation Index Report of the Maine Department of Economic and Community Development; and (c) the 2001 Maine Science and Technology Action Plan of the Maine Sciences and Technology Foundation. We have also examined a wide range of reports and surveys generated by the Association of American Universities, National Research Council, Carnegie Foundation for the Advancement of Teaching, other research universities, federal government, and non-government organizations.

3) To evaluate the University-level support for graduate research and education at the University of Maine, we have examined the following five documents: (a) the 2004 University of Maine System Strategic Plan; (b) the 2000-2005 University Maine Strategic Plan; (c) a Review of the Graduate Programs at the University of Maine, provided by The Peterson's Academic Services Group, 2004; (d) the 1988 University of Maine Report of the Presidential Commission on Graduate Education; and (e) the 2002 University of Maine Report of the Provost's Commission on Graduate Education. The two University of Maine reports contain some excellent recommendations, very few of which were ever fulfilled.
Strategic Issues and Recommendations

Below we present nine strategic issues and associated recommendations. Although each of these strategic issues represents a crucial component of becoming a strong public research university, we believe that Strategic Issues 1, 2 and 3 are of the highest priority. Apart from ranking the first three issues as highest priority, there is no rank ordering implied by the numerical ordering below. In light of the System Strategic Plan and the renewed emphasis placed on the University of Maine as the State’s only research university, we hope that our recommendations will be acted on.

Strategic Issue 1 - Highest Priority
Institutionally funded recruiting packages offered by the University of Maine are not competitive with our national peer institutions, and therefore do not allow us to compete for the best available graduate students.

"In 2000, about 7.9 percent of Maine residents age 25 and over had either a Master’s degree, professional degree, or PhD... This is...considerably lower than the New England-wide rate of 12.3 percent... To compete in the "knowledge economy," Maine must come closer to being on par with New England. Currently, Maine has the lowest percentage of graduate degree holders of any of the six New England states. Due to the importance of this issue and Maine's relative standing, the Growth Council has awarded this performance measure a Red Flag this year. Graduate degree attainment is particularly important to many high-tech and professional areas of the economy, and is fundamental to business innovation."


Preamble
Research universities seek to employ high quality graduate students as teaching assistants and research assistants to: (1) educate the highly skilled workforce of tomorrow, (2) stay at the cutting edge of research, (3) remain competitive with other institutions, and (4) maximize the quality and efficiency of undergraduate education. Graduate assistants are employees and collaborators, not customers. By assisting faculty and conducting research for their own dissertations and theses, graduate assistants help attract millions of dollars in extramural funding to the University each year. They also play an important role in the generation of new knowledge and creative discoveries in fields where external funding is typically difficult to obtain. Under the supervision of experienced professors, they contribute significantly to the teaching mission of the university, and commonly receive some of the highest evaluations from undergraduates whom they teach. From a strategic viewpoint, high quality graduate assistants provide a relatively inexpensive and efficient way for the State to maximize the effectiveness of its efforts to education Maine residents and build strength in its economy. However, the recruiting packages we offer are simply not competitive, and the sad reality is that we often end up recruiting second-tier students who were passed over by more competitive schools. There are important differences between first-tier and second-tier graduate students, and these differences manifest themselves in overall academic performance. At the same time, we lose the very best Maine residents to other states, partly because they receive better offers, but also partly because they (or their parents) know that Maine's graduate programs are a relatively low priority for the State. This brain drain at the advanced degree level is troubling.

"Key Goal #3
"Strengthen graduate education as a vital component of the University's land-grant mission, fundamental to research and invigorating undergraduate education... Improve the University's ability to compete for the best graduate students nationally and internationally by providing competitive stipends, benefits and nationally recognized programs and researchers."

— University of Maine Strategic Plan, 2000-2005

Current support package
Our current support package for institutionally funded graduate assistants includes a yearly stipend of $9,010, well below the single-person poverty line in Maine, and a 50% subsidy on student health insurance. This level of support is extremely low by both national and New England standards. According to a 2004 survey of large U.S. research institutions conducted by the Chronicle of Higher Education, in the field of biology the University of Maine reported the lowest annual stipend of all of the institutions included in the survey. Even more telling is how our minimum stipend level of $9,010 compares to those in other New England Land Grant universities. These are only minimum stipends for incoming Master's students; some of these institutions have higher minimums for Doctoral students.
It is impossible for us to compete with other New England universities for high quality graduate students, particularly given that we offer only a 50% subsidy on health insurance for graduate assistants, the State does not extend subsidized child care to graduate students (although it does for undergraduate students), our graduate student housing is unattractive, and the cost of living in Orono is not significantly different than the cost of living in other New England university towns.

"The National Science Foundation funds approximately 45% of non-life-science basic research at U.S. academic institutions. Annual stipends for NSF's fellowship and trainee programs have increased from $18,000 in 2001 to a projected $30,000 in 2005."

— Office of Management and Budget, The Executive Office of the President

Current number of teaching assistantships
The University of Maine suffers from both a shortage and uneven distribution of teaching assistants in relation to the size and function of its graduate and undergraduate programs. Some extremely productive and nationally recognized research departments have few or no institutionally funded teaching assistants. On the other hand, some departments that do relatively little nationally recognized research have a large number of institutionally funded teaching assistants to service introductory-level undergraduate courses. A recent analysis of teaching assistant distribution by the Graduate School has shown that significant reallocation of assistants would in most or all instances lead either to decreased offerings of undergraduate courses or increased faculty teaching loads. Owing to a major push to increase the number of undergraduate credit hours served over the past few years to increase revenue generated by tuition dollars, the existing assistantships are generally consumed in entry-level courses. This pro forma action by cash-strapped universities typically leaves assistants with no upper-level teaching experience, and provides no assistants for professors in their core curriculum courses. This situation is extremely unfair for Doctoral students who need the upper-level teaching experience to be competitive in the academic job market, and it hinders research and scholarly productivity as professors are left with increasingly limited time for these activities.

Current number of research assistantships
The University of Maine Graduate School oversees 2 programs for institutionally funded research assistantships: the Provost's Fellowship and the University Graduate Research Award. Both of these are small programs that provide one year of funding on a competitive basis for a total of approximately 10 students each per year. Whereas the Provost's Fellowship is more competitive at $15,000 per award, the University Graduate Research Award pays a non-competitive stipend of $9,010 per award. Institutionally funded (but better paying) fellowships and assistantships are essential for maintaining momentum in graduate programs, recruiting high quality graduate students, and maximizing completion rates for Doctoral dissertations. However, at 20 awards per year they do not even come close to meeting the needs on campus.

"To get the best students, we have to spend money. Good students want many things from their universities. They want good faculty, high quality facilities, engaging student activities and recreation, winning intercollegiate sports programs, high quality living space, extensive service oriented libraries and computer support, and most of all; they want to be with other good students. None of this comes cheap."


Recommendation 1
Establish and maintain a competitive financial package for recruiting and retaining high quality graduate students in today's market. Although we cannot compete with NSF stipends, the institutionally funded University of Maine package for fiscal year 2006 should include a minimum stipend of $13,400 per year for Master's students and $16,000 per year for Doctoral students. Stipend salaries must be incremented yearly as are faculty salaries in order to maintain competitiveness through time. The package
should also provide fully subsidized health services for graduate assistants, and affordable coverage for their spouses, domestic partners and dependents. The current policy in Maine's Department of Health and Human Services of not allowing subsidized child care for graduate students at the University of Maine should be reversed.

Primary beneficiary(ies): All graduate programs.

**Recommendation 2**

Increase the total number of institutionally funded graduate teaching and research assistants across the campus. This is essential if the University wishes to continue with (or even reduce) current undergraduate teaching loads while simultaneously becoming a more competitive research university.

Primary beneficiary(ies): All graduate programs.

**Recommendation 3**

Establish a rational and sustainable administrative policy for supporting graduate programs at a level consistent with our Carnegie status. Quality of graduate programs is essential at the State's premier Doctoral/research institution.

Primary beneficiary(ies): All graduate programs.

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**Strategic Issue 2 - Highest Priority**

The University of Maine has an enormous capacity for increased Doctoral-level research activities that remains perpetually underutilized owing to a lack of bridging and opportunity funds for Doctoral student support.

"Ph.D. education differs from master’s and professional education, as well as from undergraduate education. The Ph.D. is a research degree, signifying that the recipient has acquired the capacity to make independent contributions to knowledge through original research and scholarship."


"Relatively speaking, when it comes to Ph.D.s in the workforce, Maine has a significantly smaller pool to draw upon than other states nationwide, particularly in fields such as computer science and engineering. This shortage of Ph.D. scientists and engineers imposes a potential restraint on Maine’s knowledge-based economic growth."

— Maine 2004 Innovation Index

"Efforts to increase university-led R&D require a concomitant expansion in science and engineering graduate programs. Two statistics illustrate this striking interdependence. Maine ranks last among the 50 states in producing science and engineering Ph.D.s and last among the states in conducting university research and development. The state’s status in both of these measures is not coincidental. To move forward, expanded graduate programs must match investments in R&D."

— Maine 2001 Science and Technology Action Plan

**Preamble**

It is a well-known fact that full-time Doctoral students perform much of the cutting edge research at research universities in collaboration with their dissertation advisors. At universities with strategic graduate-student funding policies, ambitious faculty in Doctoral granting departments often pursue numerous projects simultaneously with assistance from graduate students who receive support partly from grants and partly from institutionally-funded fellowships or research assistantships. The result is an extremely efficient and cost-effective multiplier of annual productivity as measured by patents, funded grant proposals and published journal articles.

**Underutilized Capacity**

At the University of Maine we are unable to meet our capacity for Doctoral-student-driven research. Although not the only reason, we argue that a central reason for this unhealthy trend is the disparity between the duration of specific research funding and the residence time of a Doctoral student. A focused, funded, full-time and well-advised Doctoral student can finish a degree in 4-5 years. However, most granting agencies provide project funding for 2-3 years. Therefore, a Doctoral student cannot be guaranteed 4-5 years of funding, and this gap can break the chain of recruiting either because the potential student finds a better offer, or the faculty member feels uncomfortable gambling on the future availability of additional funding for the student. High-quality Doctoral students clearly enhance a research group’s capacity to secure additional funding and conduct additional research. The University of Maine currently returns approximately $6.60 in economic activity in the State for every $1.00 delivered by the State. We conclude that investing in high quality Doctoral students will strengthen this very favorable ratio of return.

"We recommend increasing to capacity the number of graduate students – particularly doctoral students – in these (selected) programs and programs in the basic sciences that support them. We think that increasing enrollment in other programs at this point would have a serious impact on quality and would distract the University from its goal of raising its profile among research universities.”

— Review of the Graduate Programs at the University of Maine, Peterson's Academic Services Group, 2004

**Recommendation 1**

Fill to capacity the number of full-time Doctoral students in those departments that grant Doctoral degrees by providing institutionally funded awards for those faculty who are able to secure at least 2 years of support from external sources. These bridging awards should be offered for 2 years at a competitive level, and should bring the total award to at
least 4 years. It is essential that our full-time Doctoral students complete their dissertations while the work is still at the cutting edge. To facilitate this, an additional dissertation-year award should be available on a competitive basis in instances where dissertation completion is demonstrably imminent. Primary beneficiary(ies): All Doctoral programs.

Recommendation 2
Establish a targeted Maine Doctoral Fellowship Program for competitive Mainers who want to pursue Doctoral degrees at the University of Maine. These students are very likely to stay in Maine after graduation, and so they represent an excellent investment in Maine's future. At present, most competitive Mainers who can do so apparently go out of State for their Doctoral studies. Primary beneficiary(ies): All Doctoral programs.

Recommendation 3
The University of Maine should periodically evaluate the quality of its Doctoral programs through internal or external review. Marginal programs should be given the opportunity to improve, and failing improvement they should be terminated. Quality of Doctoral programs is essential at the State's premier doctoral/research institution. Primary beneficiary(ies): The entire University.

Strategic Issue 3 – Highest Priority
The University's ability to sustain first-rate graduate research and education depends on the development and maintenance of the very best academic programs, which in turn depends upon hiring and retaining the very best faculty.

“The vitality and creativity of bright, young students working in a research lab can invigorate a research program and launch new lines of inquiry. The presence of a strong cadre of graduate students is often one of the most effective recruiting tools for attracting high-quality faculty.”


“At first glance, graduate programs (at UM) appeared to be either very strong or not strong at all, with nothing in between... When we turn to the comparative cohort, however, even the University’s strongest programs require improvement. In almost every discipline, UMaine’s programs have the lowest productivity and research expenditure in the cohort.”

— Review of the Graduate Programs at the University of Maine, Peterson’s Academic Services Group, 2004

Preamble
One of the most important improvements we can make to our graduate environment is to continually increase the quality of our faculty and provide them with rational benefits for becoming engaged in graduate advising. The following recommendations are fundamental and high priority for any research university.

Recommendation 1
The University's Strategic Plan and Vision Statement should make it abundantly clear to any reader that the University of Maine is ambitious and competitive in a manner consistent with its Carnegie Doctoral Research Extensive status. The University's graduate and undergraduate missions should be promoted with equal strength. Primary beneficiary(ies): All graduate programs.

Recommendation 2
Departmental promotion and tenure guidelines should place an appropriate emphasis on graduate research, scholarship and education consistent with our Carnegie Doctoral Research Extensive status. Where departments do not have strong graduate programs of their own, the guidelines should address participation in interdisciplinary graduate study. Departments should have clearly written criteria for appointment and reappointment to graduate faculty, and these criteria should seek to promote and maintain the quality of the department's graduate program. Primary beneficiary(ies): All graduate programs.

Recommendation 3
Faculty recruiting and retention packages should include nationally competitive salaries and startup packages. The University should implement a rational policy that recognizes and rewards strong faculty performance and participation in graduate research, scholarship and education. Primary beneficiary(ies): All graduate programs.
Strategic Issue 4

Some departments at the University of Maine are not large enough to cover the breadth of their disciplines and attain critical mass in focus areas. For many of them, fostering cross-departmental and cross-college ties is a promising way to achieve research depth and a critical mass of graduate students, particularly Doctoral students.

"The benefits of graduate education extend well beyond science and technology. Graduate education in the humanities, social sciences, and the arts produces the teachers and scholars who bring the intellectual history of human thought and creative expression to their students, expanding their capacity for critical thinking by applying the lessons of the past to current problems and future challenges. In the classroom and beyond, teaching and scholarship in the humanities, social sciences, and the arts inform the public discourse essential to the functioning of a democracy."


Preamble

In an era when interdisciplinarity is the key to progress in many fields, establishing innovative interdisciplinary and multidisciplinary Doctoral programs could significantly increase the visibility and uniqueness of the University's graduate offerings. Where no formal program exists, but the University has strength across several departments and colleges, the Graduate School can provide the infrastructure to coordinate and formalize rigorous core curricula, and then develop and disseminate these unique programs through national and international publicity and recruiting efforts. Interdisciplinary centers and programs, in collaboration with an improved graduate culture of cross-disciplinary study, can help to position our graduate students for a future in which problems and the skills needed to solve them often fall outside, or across, disciplinary boundaries. Looking at interdisciplinary and multidisciplinary solutions has been made increasingly important by the recently released Draft Standards for Accreditation in New England, which state the following about graduate degree programs:

"Institutions offering graduate degrees have an adequate staff of full-time faculty in areas appropriate to the degree offered. Faculty responsible for graduate programs are sufficient by credentials, number, and time commitment for the successful accomplishment of program objectives and program improvement. The scholarly expectations of faculty exceed those expected for faculty working at the undergraduate level. Research-oriented graduate programs have a preponderance of active research scholars on their faculties. Professionally oriented programs include faculty who are experienced professionals making scholarly contributions to the development of the field."

Such requirements may prohibit some departments at the University of Maine from developing (or maintaining) their own graduate programs; therefore, inter- and multidisciplinary programs are an attractive alternative for members of such departments interested in graduate research and education.

Recommendation

Create and institutionalize interdisciplinary Doctoral programs that will position the University of Maine as a premier institution in innovation in contemporary areas of interdisciplinary study and inquiry. Affiliated faculty to the programs, and ensure that they receive graduate assistantships. Credit both the interdisciplinary program and the home department for affiliated faculty to promote genuine faculty participation. Create and institutionalize a small but rigorous core curriculum for interdisciplinary Doctoral programs to educate students in the foundation areas of history and philosophy of knowledge, and research design and ethics, to form the basis of interdisciplinary inquiry.

Primary beneficiary(ies): Faculty, particularly those in relatively small programs, who want to participate in graduate research and education.

Strategic Issue 5

There is a long-standing perception that the crucial nature of graduate research and education is not fully understood by the broader community outside the University of Maine. This hinders the university from reaching its potential to contribute to the State's economic, social and cultural prosperity.

"They (graduate students) are the ones who do the research. They connect you to the rest of the world and become the scientists and professors of the future."

— Joseph Westphal, Chancellor of the University of Maine System, Bangor Daily News, January 24, 2005

Preamble

Two important roles played by all public state Research Universities are to: (1) serve the State's citizens and government agencies, and (2) help individuals to achieve a better quality of life. The University of Maine is an active, visible, and collaborative member of Maine society. The many and varied roles played by its graduate programs in the State's economic and social development cannot be overstated. Yet, our past strategies for transmitting this vital message to the citizens of Maine, and to their Legislative Representatives, have clearly been ineffective. In strengthening graduate research, education and scholarship for the public good, we need to keep our graduate students at the center of all activities. The perspectives and contributions of graduate students are essential to public relations, and their energy and vision
for the future transmit a powerful and welcome message to State Legislators. In fact, they may well be the most effective advocates that we have.

**Recommendation 1**
Initiate a highly prestigious Maine Legislative Fellowship Program to fund outstanding graduate students across the various colleges to communicate with the Maine Legislature about the value to the State of graduate research and education. Yearly stipends and benefits for the awards should equal or exceed those of equally prestigious fellowships in our peer cohort. The fellowships could be split between 3 Doctoral students receiving 2 years of funding each, and two Master’s students receiving one year of funding each. These fellows would serve as ambassadors for the University of Maine, communicating the vitality of our programs and our vision of the future to our elected representatives and their constituents.

Primary beneficiary(ies): All graduate programs.

**Recommendation 2**
Publicize the accomplishments and contributions of graduate students using the various web environments, marketing tools and publishing media available at the University of Maine.

Primary beneficiary(ies): All graduate programs.

**Strategic Issue 6**
Serving more than 2300 graduate students at the University of Maine, the Graduate School should be a highly visible point of pride for the University. Instead, it is effectively invisible in the basement of a building that is inaccessible to individuals with mobility related disabilities.

**Preamble**
As noted in the 2002 Provost’s Commission of Graduate Education: “A symbolic representation of the priority that the University places on graduate education to potential students, faculty, staff and visitors is the location of the Graduate School in the basement of Winslow Hall – a building inaccessible to persons with mobility related disabilities. Given the comprehensive responsibilities of the Graduate School and the fact that approximately 20% of the UMaine student population is comprised of graduate students, it has a proportionally smaller budget than other support-oriented offices such as the Office of Student Records, Enrollment Management, Undergraduate Admissions Office, and the Office of International Programs. While many offices serving students theoretically serve both graduate and undergraduate students, graduate students and faculty consistently encounter an environment and procedures aimed primarily toward the needs of traditional aged undergraduate students. In an era in which technology plays a critical role in information and marketing, the Graduate School receives no direct support from the campus webmaster for its web pages, although several other institutional offices do. This lack of significant financial and symbolic support hinders UMaine’s ability to compete for and recruit the best graduate students both at the national and international level. Indeed, it is the quality of the students that drives the quality of graduate programs and associated research, teaching and public service.”

**Recommendation 1**
The Graduate School should be moved to a different building that better reflects its vital function in the mission of the University of Maine. However, the Dean’s office should remain in Alumni Hall to maintain daily connection with the Provost and Vice President for Research. As with the University of Maine Honors College, the option of having the Graduate School located in a building dedicated to graduate student housing should be explored.

Primary beneficiary(ies): All graduate programs.

**Recommendation 2**
The University should upgrade its marketing efforts to include the graduate programs as equally important to undergraduate programs in all that it does. Track our graduate students after they leave, highlighting those who stay in the State and make important contributions to the enterprises and citizens of Maine. The Graduate School should maintain an exciting and forward-looking website that
attracts the attention of high quality graduate students (and faculty). A Development Officer should be employed by the Graduate School to manage these efforts.

Primary beneficiary(ies): All graduate programs.

Strategic Issue 7
High quality graduate research and education can only be achieved if the University has high quality infrastructure and resources. Key elements of this include the following.

- Fogler Library, which is the State's only research library, must be a world-class repository of knowledge.
- Acquisition and upgrading of analytical instrumentation and cyber infrastructure must keep pace with national developments if our graduate students are to develop the skills and expertise to make them competitive in the new, high-technology job market.

"Investment Priorities for Strategic Direction 4:
Fogler Library and Digital Library Funding: $1.5 million
As the only research library for the State of Maine, consistent and substantial investments in Fogler Library are vital to the entire State. Funding is necessary to restore and increase the journal collection at Fogler Library to support its role as the sole research library for the State of Maine."
— University of Maine System Strategic Plan, 2004

Preamble
In an intensely competitive market for high quality graduate students, the University's facilities and infrastructure must be world class. We cannot be competitive if our facilities and infrastructure lag behind what is available in the larger marketplace. Providing rapid and complete access to the world's primary knowledge sources, and delivering enhanced capabilities in information technology to better prepare our graduate students and help in their progress toward the degree, should be a high priority.

Recommendation 1
Provide the 1.5 million dollars recommended in the System Strategic Plan to restore and increase the journal collection at Fogler Library, to support its role as the sole research library for the State of Maine, and to develop and maintain a State-wide digital library that will guarantee access to all Mainers.
Primary beneficiary(ies): All graduate programs.

Recommendation 2
Ensure that expensive analytical equipment is maintained and upgraded as needed, and implement Gigabit ethernet in all buildings within a reasonable time frame.
Primary beneficiary(ies): All graduate programs.

Strategic Issue 8
On-campus housing for graduate students is a key indicator of the low priority set for graduate research and education at the University of Maine. While the university has excellent undergraduate housing options, including new structures with suite accommodations, graduate student housing is lamentable.

"In addition to its external benefits, graduate education benefits the institutions in which it is carried out. University graduate programs are inextricably intermingled with the teaching and research missions of the institution. These interconnections enrich both the education of graduate students and the university's research and education programs. Graduate students, closer in age and cultural experience to undergraduate students than faculty members, may be able to find the crucial connections that will make subjects come alive and spark a lifelong interest in a particular discipline."

Preamble
Many of our graduate students are adults and come from different cultures. They need different living arrangements than most undergraduate students, including full kitchen facilities, an activity center and 12-month accommodation contracts. Currently, graduate student housing is so unattractive that only 29 students live on campus. This is only 1.2% of the total graduate student population as compared, for example, to 6% at the University of Connecticut and 7% at the University of New Hampshire. This dearth of acceptable university housing presents a fundamental impediment to creating an intellectual community for those graduate students who come to the University.

Cultural and Ethnic Diversity
Graduate students contribute very significantly to cultural and ethnic diversity at the University of Maine. Even though they account for only 20% of the total student population, graduate students account for 50% of the total international student population. The University of Maine could significantly enhance its cultural and ethnic diversity by recruiting more international graduate students, and better accommodation for these students may play a crucial role in successful recruiting efforts.

Recommendation
Conduct a feasibility study for providing a dedicated building or buildings for graduate student housing at the University of Maine. In particular, examine the impact this might have on attracting international students and increasing the cultural and ethnic diversity of the campus. New accommodations will confirm that the University's graduate students are an integral and important part of the academic community, will provide a focus for graduate student life, and will enhance the University's recruiting power.
Primary beneficiary(ies): All graduate programs.
Strategic Issue 9
The University of Maine System Strategic Plan calls for the smaller campuses to initiate selected graduate programs in areas in which the University of Maine has significant experience and expertise.

"By restructuring the System and better defining each institution's mission and niche, it will be easier for students to make choices about the type of institution that will best meet their needs. Furthermore, with enhanced collaboration between and among institutions, students will have access to greater academic offerings, including expanded graduate programs and expanded options for Distance Education."
— University of Maine System Strategic Plan, 2004

Preamble
A formal process is required to meet the statewide needs for graduate and professional education, while at the same time ensuring that these degrees meet minimum quality standards. The University of Maine should collaborate, where appropriate, with other System campuses in meeting these needs. As the recognized Doctoral/Research Campus for the University of Maine System, the University of Maine has a vested interest in the quality and credibility of graduate programs throughout the System. This is especially true for graduate programs already offered at the University of Maine owing to the possibility that its degrees might be confused with degrees from other System campuses.

Recommendation 1
Where the need is clear, cross-campus collaboration should be formalized for the purpose of offering selected Master's degrees statewide. Where it is involved in such collaborations, the University of Maine should manage the graduate programs to ensure quality and credibility.
Primary beneficiary(ies): Affected Master's programs.

Recommendation 2
Where the need for such collaborations is clear, targeted funding should be provided to support their development. Staffing needs for the targeted degree programs should be assessed prior to permitting degrees to be granted.
Primary beneficiary(ies): Affected Master's programs.
Appendix A
Survey: Improving Graduate Research, Education and Scholarship at the University of Maine

The 2005 University of Maine Coalition on the Graduate Environment
01/15/2005

The Question
In order to improve the graduate environment, graduate education, and graduate research/scholarly activities on campus what are your 2 best ideas that could be implemented with new resources and your 2 best ideas without new resources?

Survey Respondents
Aria Amirbahman – Civil and Environmental Engineering
Carolyn Ball – Public Administration
Dan Belknap – Earth Sciences
Emmanuel Boss – Marine Sciences
Richard Borgman – Business
David Bradley – Mathematics
Susan Brawley – Marine Sciences
Dorothy Breen – Education
Bill DeSisto – Chemical Engineering
Liz DePoy – Interdisciplinary Disability Studies and Social Work
Dusty Dowse – Biological Sciences
Sue Estler – Education
Ben Friedlander – English
Todd Gabe – Resource Economics and Policy
Marie Hayes – Psychology
Keith Hutchinson – Biochemistry, Microbiology, and Molecular Biology
George Jacobson – Biological Sciences
Scott Johnson – Earth Sciences
Nory Jones – Business
Richard Judd – History
Peter Koons – Earth Sciences
Jim McClaymer – Physics and Astronomy
Susan McKay – Physics and Astronomy
Stom Ohno – Plant, Soil and Environmental Sciences
Eric Peterson – Communication and Journalism
Michael Peterson – Mechanical Engineering
Paul Rawson – Marine Sciences
Alan Rosenwasser – Psychology
Doug Ruthven – Chemical Engineering
Dan Sandweiss – Anthropology
Ann Schonberger – Mathematics and Women’s Studies Program
Phillip Silver – Music
Roy Turner – Computer Science
Judy Perkins Walker – Communication Sciences and Disorders
Charles Wallace – Animal and Veterinary Science
Alan White – Forestry
Carol Wood – Nursing

Note: All survey responses are included in this document with only minor editing where appropriate. All reference to specific departments has been modified so as not to name departments. Multiple responses with the same idea are included multiple times, indicating the relative number of advocates for the idea. Some ideas were obtained verbally from the respondents. Responses were grouped into the following eight categories.

1. Increase Support for Graduate Stipends and Benefits to a Competitive Level
   - Increase TA and RA stipends. The numbers are now reflective of late 70s thinking. NSF and NIH RA numbers are three times what we offer. We have students with RAs on grants working next to students with TAs or University RAs and it is VERY BAD for morale.
   - Substantially increase the number of University Graduate Research Assistantships and Teaching Assistantships available, and distribute them equitably across campus, in proportion to the number of PhD students in each program; and bring Teaching Assistantship salaries up to nationally competitive standards.
   - Tie grad stipend increases to at least faculty salary increases, if not more.
   - Increase stipends and travel money. NIH standard stipend is now approx $22K. NSF is even higher. We are not going to be able to attract the best students into the sciences without reaching that level somehow. It should be a standard number every time a faculty member includes a stipend on a grant.
   - Increase pay for assistantships. Reallocation resources if necessary.
   - Raise graduate TA stipends. This is important if we are to remain competitive in recruiting top students. We have one of the top MA-only programs in the country in our Department, but we are finding it harder to compete for the best students because they receive much better TA offers from other schools.
   - Increase teaching assistant stipends to nationally competitive levels.
   - Expand and increase the stipends for University Graduate Research Assistantships and Provost fellowship.
   - Increase stipends.
   - Increase number of graduate assistantships.
   - If there is no new money, use money from grant IDC to increase stipends, and/or reorganize administration and use savings to increase stipends.
   - Raise stipends (morale is very low because of the low stipends) for TAs.
   - Raise stipends for graduate assistantships…we’re simply not competitive.
• Improve stipends (i.e., equivalent to national average) and benefits packages for grad students (e.g., health care for 1/4 time, dental and child care facilities).
• Pay most all health benefits, even for families.
• Increase number of positions for TAs.
• Support more first year students through assistantship to help raise the population.
• Increase the number of TAships and RAships available through central funding. Increase the cash value of these assistantships.
• We are limited in our ability to attract as many students as our faculty could accommodate because of money, which we use to: a) increase stipends so as to be competitive with other schools and b) increase the number of stipends.
• More money for grad assistantships is probably on everyone’s list.
• If we were to have more resources, I would like to see them first used to give graduate students more support in the form of grants, traineeships, scholarships, assistantships, etc.
• More funding for graduate assistants to facilitate research in all colleges.
• Increase TAships, Stipends and benefits. We need to increase the level of graduate stipends and the number of institutional TAs and RAs. Up till now, I have recruited mostly MS and not PhD students because I cannot give prospective students any assurance of funding beyond the typical 2 to 3 years of funding available from my research grants. UMaine currently has few institutional RA/TA opportunities to help with BOTH recruiting and rewarding/retaining high quality students. And the typical salary level for graduate assistants at UMaine is abysmal.
• One thing is to increase stipends, but some programs have no support at all for Grad Students. There are a lot of programs on this campus that have little grant research and get very little or no TA support. Thus my recommendation is more grad student support—more graduate assistantships that are not grant dependent for such programs, more scholarships that can be used to attract very good students. The Provost Fellowships are a good model for this. Why not a fundraising campaign for scholarships and assistantships? People like to give for such things.
• More TAs, with TAs assigned to researchers rather than to classes in order to offload teaching administration from the researcher.
• Increase the TA stipend to $14,000.
• Increase the number of centrally funded RAs
• Increase the stipends of centrally funded RAs

2. Workload and Faculty Incentives
• Reduce teaching loads. Though we aspire to a status equivalent with large research universities, we assign faculty teaching loads consistent with regional comprehensives. Research takes time and good teaching takes time. The higher the teaching load the more it impinges on the ability to focus on research. Our loads are 3 and 3 and sometimes more. Serious public research institutions typically max at 2 and 2 or 2 and 1. Systematically reducing teaching loads would require a corresponding increase in the number of faculty or teaching assistants to take up the slack.
• If a chunk of grant overhead were returned directly to the Principal Investigator each year, or if the University of Maine pooled some of the IDC money and gave, say, $5,000 per year, per PhD student, to the primary advisor to “grease the wheels”, active researchers could maintain active PhD programs.
• Give departments and faculty incentives to save or even generate new income in certain areas by returning these savings/income to use in priority areas. Right now, every time I’ve seen savings implemented at the department level, the savings just disappear into the central administration’s budget, so there is little incentive to generate additional savings/income. With appropriate incentives, we could unleash the vast creative power of the many individual faculty on this campus. This power is currently untapped as far as budgetary issues go, with most decisions being centrally made by a few, with token faculty input.
• Provide access to research assistantships for faculty. The faculty research fund does not fund research assistants who can be immensely helpful in moving a research project along especially in the areas outside the sciences that have less access to external funding.
• Review the incentives for graduate level teaching and advising. In places where numbers become the criteria in evaluations and other decision making e.g. class sizes, advising loads, and budgeting the incentive is to favor undergraduate priorities.
• Reduce teaching load across campus for active researchers—with reduction as an incentive.
• Make a major push to ensure that research proposal submitted include support for RAs. Sometimes the choice appears to be one of summer salary for the faculty member vs. support for an RA. Obviously, we need to provide some other career advantages to those who do a great job of supporting grad students over the years. Along those lines, we could have a policy of returning a modest amount of indirect to a PI who is successful specifically in raising external funding for an RA.
• The best way to improve is to offer more to the people we want to attract—if it can’t be money, let them eat status.
• Provide release time and resource support for faculty who are productive grant proposal writers.
• Implement a realistic faculty workload formula that rewards those who work hard to support graduate students. Any cost to the university should be offset by a rational adjustment to the base funding of the university. In the absence of a rational plan, extra costs could be offset by increasing tuition, increasing class size, or other creative solutions.
3. Academic Resources, Technology and Infrastructure

- Improve campus infrastructure to provide better resources for students (e.g., improving library resources, interdisciplinary doc programs, greater allotment of money for travel funds to conferences).
- Improve library resources for research. The cutbacks have been particularly hard on journals in social sciences and arts & humanities.
- We should provide more training for faculty in mentoring graduate students. Some of this is being done, but the student-advisor connection is one of the most crucial pieces of successful graduate education.
- Increased support for the library. It cannot be said often enough that the library is one of the biggest roadblocks for increasing the quality of graduate education and research.
- Increase funding of library through re-allocation of indirect costs. I've changed my view on this and feel that there should be no return-on-indirect to the department and probably dean level. It becomes too small a piece of cash to do much with. Better to pool and use for more costly items, for example to improve library resources, particularly access to journals.
- Provide better physical office/computer space for graduate students.
- Add faculty lines in stepped increments over five years, with the aim of establishing new Ph.D. programs in the humanities and social sciences.
- Improved technologies in terms of distance education, collaborative technologies (like the Access grid) to nurture and facilitate communication and collaboration in the classroom and in research activities.
- Digitizing Fogler materials and making them accessible on-line.
- Library situation as discuss in the Senate is another big issue, which also requires investment.
- Re-start access to ScienceDirect.

We really need to invest in the library—it forms the cornerstone of a strong graduate program in any discipline. At present, my students and post-docs continue to use accounts at other institutions or pester their friends at other institutions for many of the articles they need. While I recognize that we can get articles from other institutions, working through interlibrary loan is not an efficient use of time, particularly for class projects. It is not just an issue of efficiency, however. Declining library resources hurt our image and ability to recruit new graduate students.

- Readily available conference rooms that are Internet-enabled, AccessGrid-capable, or otherwise configured for collaboration with distant colleagues.
- Gigabit ethernet in all buildings within a reasonable time frame.
- Improve our promotion and tenure process to support and retain people who are strong and productive. The second recommendation flows from the first, and that is to restructure the support and processes for seeking and managing extramural resources for grad education and scholarship. Of course, we need a strong faculty cohort to engage in fund raising, and improving the promotion and tenure process would be critical for that to happen.

4. Creative and Social Graduate Environment

- Create a space on campus where interesting things happen for graduate students (e.g., a foreign film festival with films each week that the graduate students select)—these could be open to the public as a revenue stream, but grad students should be able to have a major part of the event.
- Greater attention to increasing diversity and to improving the campus climate with regards to diversity, especially for women, students of color, lesbian, gay, bisexual and transgender students.
- Create a Humanities Center to promote research and conversation across the disciplines; the center would invite speakers, host conferences, promote research, and provide support for specific projects in the form of grants, release time and office space.
- Have a seminar series sponsored by the graduate students to bring prominent scholars/educators to campus.
- Establish residential housing in a building set aside exclusively for graduate students, and provide graduate students with a student center/lounge in a central location (Memorial Union?).
- Interdisciplinary seminar series with presentations by graduate students and/or presentations about issues related to graduate research.
- Graduate students need a physical place to meet and work together. Our department has no such space. That presents a problem, especially for our commuting students, people who work in schools and travel here to attend class or meet with faculty. They need a lounge type space, and worktables to meet in small groups.
- Perhaps a grad school sponsored symposium that would change in topic each year.
- Campus-wide effort to draw students into research forums (e.g. interdisciplinary colloquia series).
- Improved communication and collaboration among faculty and grad students for more interdisciplinary endeavors including research.
- One problem that our program suffers from greatly is the lack of a seminar series, where we could invite folks from other institutions to present their research. This way, the students also get to network with faculty from other universities. Perhaps a solution would be to have the administration (Grad School in particular) allocate funds to the programs that offer a PhD degree to start seminar series.
- I enjoy the graduate exposition in the spring—perhaps a continuing graduate "research cafe" or other forum could further highlight the achievements of some of our most talented grads.
- My students did reflect that a grad dorm put up by UMaine would be too expensive for grad students to want to live there.
• Provide temporary housing for prospective graduate students and for new students while they are searching for places to live in August.

• We need to provide a better, more attractive living situation for our grad students. Estabrooke, although a glorious old building that if renovated would be lovely, is not lovely to live in now. Why can’t the university dedicate perhaps a hall of a nice building, or better yet some suites, to Grad students? (In the long term we do need to spend money and develop a nice graduate dedicated facility.)

• Improve on-campus housing options for graduate students.

5. Visibility, Profile, Recognition, Synergy and Marketing

• Establish new, high-visibility interdepartmental programs along the lines of the genomics initiative. I am voting with my feet; I have been working in the trenches on an undergraduate neuroscience program that will start with a minor this year, moving to a major in two, and then, hopefully, to a graduate program. This is just one example. We are looking for extramural funding, positions, and a high profile.

• A high priority UM and UMS goal should be to retain Carnegie Extensive Doctoral ranking. Productive PhD programs should get priority in hiring for new and replacement positions. I think a rather big effect occurs when critical size is reached and maintained. This investment should provide more funds for grad student support as well as increased grant productivity.

• Start a Legislative Fellow program that provides $30,000 fellowships to 5 talented graduate students each year. The program would favor Doctoral students over Masters students. They earn their pay by spending 20 hours per week visiting Legislators in Augusta or in their own districts, or touring them around the campus. Student contact with Legislators is an effective mechanism for enhancing their awareness and commitment to graduate education.

• Hold an annual competition with named cash prizes for best Masters and Doctoral theses in the major areas. Give the prizes prestigious names—e.g. The Robert Kennedy Outstanding Dissertation Prize in Natural Sciences. The selection process would both encourage submission and identify candidates for regional and national awards that apparently exist.

• Give more prestigious titles to existing RAs and TAs, both centrally and unit funded—e.g. The Byrd Teaching Fellowship in Earth Sciences.

• Try to recognize the importance of the graduate students by the University awarding prizes for outstanding teaching and research; much like we do in the College of Engineering except we only have one award.

• Increase visibility of UMaine compared to USM with state government to obtain grants. Send reps to talk to agencies, particularly their Research Divisions, about UMaine's abilities to enter into cooperative agreements. USM has an office in Augusta. UMaine does not.

• Publicize accomplishments of grad students more on the UMaine website etc.

• An annual publication highlighting graduate student research, writing, etc.

• Recognize graduate students for their scholarly work. Appoint them (grad students) to key boards/committees.

• Research or performance rewards, even on a monthly basis.

• If the Grad School were to be elevated to a higher visibility (both physically and figuratively), that would be helpful.

• Showcase our alumni from the graduate programs to boost morale, and involve them in helping raise funds for existing and future graduate students in the same specific programs they graduated from.

• Get a good home for the Grad School. While the Grad School can function out of a basement, it does very little to present the image we want to present to potential students and faculty. Let’s put the offices of the Grad School in an attractive location that will actually aid in attracting students, including students with handicaps that now cannot even go to our Grad School offices.

• Establish formal ties with national and international labs for graduate internships for graduate students—this will establish national ties for student, help with his/her training.

• Increase grant productivity: A truly great university has a large % of active, successful researchers. UM should work to increase this by starting a mentoring program: A successful proposal writer teams up with a less successful or new proposal writer. Each is to be awarded $500 when a proposal is submitted within the year (or next available cycle). The idea is that by tying a small amount of money to the program it will keep the very busy mentor involved more than good intentions alone. I suggest a pilot program of 10 to 20 mentors (max cost $20 K, not all would complete program, the extra indirect should easily fund the program).

• Look for success stories with ex-grad students who have become integrated into Maine's economic system and then follow that up with a mechanism for communicating that to folks outside the university.

• Track graduate students once they have left the university, collate the data, and make it available for study (as well as for fundraising efforts).

• Improved communication and collaboration with outside stakeholders such as Maine businesses, the state legislature and governor's office, non-profits, etc. to work synergically on research projects that will help the state and other outside stakeholders while simultaneously contributing to faculty research and the university mission.

• Bring to campus more research branches of federal agencies (NOAA, FDA, USGS etc) that will help fund students and increase the critical mass of researchers. It is a shame that the NOAA lab is off campus at the industrial complex...

• We need more funds and a strategy to help market the Grad School, and also individual programs (e.g., funding
so programs can update or develop new brochures, marketing CDs, websites, and so on). Partially we are marketing to the state of course, and that can be helpful if our image improves.

- Have a person in each college that is specifically charged with graduate recruitment. That person would be able to assist departments to better “sell” their graduate programs. This might only need to be a graduate assistant (PhD level) position. But more distributive work at the college level to help to recruit graduate students.

6. Bridging, Opportunity and Student Research Funds

- Have funds set aside, at the discretion of the graduate director, to send people for travel to DC (or other places) to discuss their proposals with project/program officers. In our college, the chair already does this to a limited extent, but I feel this would help other colleges, a broader approach.

- Travel money would include both travel for students and some support for bringing in guest speakers.

- University support for prospective grad student visits.

- Provide funding during the final year of a student’s program to attend and make a scholarly presentation or performance at an appropriate conference or meeting.

- Encourage increase in external funding for students, either through training grants or as line on research grants. If I haven’t thought of much of the way of “carrots” to do this, without cost. Perhaps at least some recognition in the calculations of teaching and research loads. One “stick” could be to limit length of support on teaching assistantships or UM research assistantships, thus forcing faculty who want graduate students to be more proactive in finding outside support.

- Increase the funding levels for travel to research and to conferences, and distribute this equitably across the University’s graduate programs.

- Set aside a percentage of indirect from external funding to provide a pool of bridging money for PhD students. This money should go preferentially to individuals and programs that contribute to the pool.

- Support graduate student for travel to meetings and to give papers at meetings.

- Provide bridging funds for students transitioning out of high profile programs like GK-12 and IGERTs.

- More money for grad students to go to conferences. There is some now, but it is scarce.

- Additional resources put into a plan for graduate education and research along the lines of the current MAPI plan. I know that the state provides some support in the form of MEIF funds, but the MAPI program seems much more broadly supportive of our university.

- Increase funding to assist in scholarly activities of students from more travel funds to conferences to research funds.

- More frequent meetings to dispense money available for grad student conf. travel. Right now there are only 2 dates I think and sometimes grad students get papers accepted and the deadline for applying for money has passed.

- Greater assistance in creating collaboration on grants to create an environment competitive with USM.

- Make funds available for traveling to Washington to meet with program managers and prospective program managers.

7. Curricular Issues

- There is a genuine dearth of graduate courses, at least in the areas I am familiar with. I think this is now the result of a simple conundrum. Faculty get far less credit for teaching a small grad course with 7 students than they do for a large undergraduate course. Despite “area requirements”, it is far too easy under the current system for a grad student to end up with piles of credits for “problems” and “directed reading” courses rather than grunt and groan formal graduate lecture courses. Parenthetically, there are few, if any, laboratory courses at the grad level. I suggest a restructuring of the requirements such that formal courses are required in full measure.

- All graduate students who will do a thesis, either a master’s thesis or doctorate, need to be advised to take appropriate research methods courses in order to be sufficiently prepared to conduct a research project and write their theses. Currently, our master’s thesis students sometimes don’t take any research methods courses.

- Funding for interdisciplinary research methods course for IPhDs.

- University wide “seminar” where selected students will give a presentation on their work.

- Provide tuition credit money for grad students to take courses outside their departments if their department requirements take up all the tuition credits they get with their assistantships. We have trouble with this in our graduate concentration. There are people who want to take the concentration, but their programs are so structured that they can’t afford the extra tuition, even though they are willing to spend the extra time to enhance their credentials.

- Create Ph.D. level course numbering 700-level. USM has this and we do not.

- Create and provide support for a core set of research courses for grad students so that they will be prepared to collaborate with faculty and/or conduct their own funded scholarship.

8. Administrative Leadership and Cultural Shift

- The President should make clear to the University community that graduate education, especially at the Doctoral level, is the primary dedicated function of this campus within the UM System, and announce a specific plan for strengthening these activities.

- Educate University administrators and support services to be equally mindful of the graduate mission and graduate
students in all they do. If successful, on line and printed materials would speak as loudly to grad students as undergraduates, student services and activities would engage and address needs of graduate students as clearly as undergraduates; student records communications would not assume all students are undergraduates and classes are all lectures (grad classes more likely to be small seminars—every semester we have to scramble to find more appropriate spaces than those assigned.)

- Prohibit the university from setting up any new unit that offers grad degrees or continuing to have such a unit if the University (Graduate School) doesn't offer that unit credible numbers of TAs to support graduate training/education. It is patently unfair to some of our best graduate students to have areas of the university in which only 1-2 TAs exist. This puts these students at a marked disadvantage in the job market when they leave UMaine and are competing with peers from other institutions who have done university TAs.

- Annually audit print and online publications for the degree to which they fully include the graduate mission on a par with the undergraduate (perhaps Marketing staff with AGB reps).

- It's important to emphasize the need to foster an environment where we can recruit and retain PhD students. Many departments offer only MS degrees, or they have a token number of PhD students. Our department with 11 faculty has graduated only 2 PhD's in the last 8 years, even though we have graduated many MS students. As a result, much of the work coming out of our department is not published in the top journals. We can become a strong research university only when we have a critical mass of PhD students.

- PhD offering programs should be given extra advantage by the administration when it comes to hiring new faculty. New faculty hires should not be solely based on the departmental teaching load or undergraduate enrollment. Lack of faculty active in research is what really hurts our department now. Among other things, this limits the number of advanced courses in a given field.

- Electronic "green sheet"—or even a local FastLane-like system for grant preparation and administration.

- More support from ORSP for post-award grant management. Make access to post-award budgets easy (e.g., Web-based) and comprehensible (i.e., not accountant-ese).

- Establish a competitive process for assigning RAs that treats all units fairly (doesn't eliminate those where it is impossible to raise RAships via grants but also permits units with grant-funded RAs to get bridge RAs when critically needed).

- We should continue to look at the effectiveness of services that we provide to graduate students and see how we can make those services more supportive and user friendly: health care, housing, childcare, etc.

- The Graduate School should work closely with the undergraduate component of the university to minimize any potential duplication of efforts.

- Implement a policy of more equitable distribution of Awards, Grants, and Assistantships, based on the number of graduate students in each program.

- Rationalize the fee structure. The distinction between fees for thesis credits and course credits seems artificial. It might be better to agree on a fee for the entire program (M.S. or PhD). This would be pro-rated for the normal duration of the program and charged at the prorated rate each term with a modest continuation fee for time beyond the agreed norm.

- Review thesis format requirements. These seem unnecessarily restrictive. For example, in some theses that deal with several distinct (but related) topics it makes more sense to compile the references at the end of each chapter rather than in one block at the end of the thesis, but this option seems not to be allowed.

- Respond quickly to faculty inquiries to ensure smooth processing of department-related requests and paperwork.

- Consider requiring an external examiner (external to the University) for PhD theses. This provides a useful quality control and is especially useful for smaller PhD programs where no one other than the supervisor may have the necessary depth of expertise to review the thesis in a meaningful way.

- Have greater accountability at all levels of graduate education. That would result in more acknowledgement when things are done well, and a greater chance for improvement when things are not done as well as they should be.

- Look into streamlining paperwork and administrative procedures in the Graduate School. Try to reduce paperwork for graduate students, and reevaluate whether the program of study governs what should really be the purview of the student's committee.

- I would like to see some of our current strong leadership simply stay in place. Specifically, I would like to see the Dean of the Graduate School remain in her current position, and the two positions of interim president and provost remain with those who serve in those capacities at the present time. We have had a lot of administrative turnover, and I believe the University's mission would be best served by encouraging the three administrators mentioned above to be candidates for the positions in which they currently serve so well.
A Proposal to Establish

a

Graduate School of Biomedical Sciences

Participating Institutions:

The University of Maine
The Jackson Laboratory
Maine Medical Center Research Institute
Mount Desert Island Biological Laboratory
The University of Southern Maine
The University of New England College of Osteopathic Medicine
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Overview: The Graduate School of Biomedical Sciences (GSBS) will serve as the organizational framework within the state of Maine for the development of interdisciplinary research and doctoral-level education in the biomedical area, including genomics, biophysics, bioengineering and nanotechnology, molecular and cell biology, neuroscience, and the molecular mechanisms of disease. The GSBS will contribute to learning and discovery on the “emerging frontier” of the biological, physical, clinical, and behavioral sciences, preparing new faculty, training scientists, and furthering Maine’s biotechnology and biomedical infrastructure. The institutional participants in the Graduate School of Biomedical Sciences will be The University of Maine (UM), The Jackson Laboratory (TJL), the Maine Medical Center Research Institute (MMCRI), the Mount Desert Island Biological Laboratory (MDIBL), the University of Southern Maine (USM) and the University of New England College of Osteopathic Medicine (UNE.COM). Eastern Maine Healthcare’s Maine Institute for Human Genetics and Health (EMH/MeIHGH) has also expressed interest in joining the GSBS partnership.

Context

Present State: For many years graduate education related to experimental biomedical sciences in Maine involved individual faculty in several different departments at The University of Maine as well as an ad hoc relationship between The Jackson Laboratory (in Bar Harbor) and individual departments in the biological sciences at UM. In the latter case, students who expressed interest in working with a scientist at TJL would be directed to apply to one of the Ph.D. programs at UM. Though successful in providing a doctoral education for interested students and access to graduate students for interested faculty on an individual basis there was no formal curriculum in place and little or no visibility to attract the best students into the program either from within the State or from across the county.

Significant changes in graduate education in the biomedical sciences began to take place across the State, starting in the mid- to late-1990’s. These changes were driven by an expansion of research opportunities throughout the state and the parallel interest of scientists associated with that growth to be involved in training graduate students. They were made possible by the development of the necessary network infrastructure. TJL, already the world leader in mammalian genetics, expanded its research facilities and staff, particularly in the areas of genomics, cancer, and bioinformatics. Similar expansion took place at the Maine Medical Center Research Institute (MMCRI) with the formation of the Center for Molecular Medicine and, later, the Center for Regenerative Medicine. The Mount Desert Island Biological Laboratory (MDIBL) moved from being a summer research institute with an influx of leading scientists from around the country and the world to a year-round institution, hiring staff working in the areas of stem cell biology, toxicology and bioinformatics. At UM, new faculty were hired working in the biomedically-related areas of development, disease and genomics in the departments of Biochemistry, Microbiology and Molecular Biology (BMMB) and in Biological Sciences (BioSci). The University of Southern Maine (USM) also expanded its research capacity, particularly in the Applied Medical Sciences program. This increased research with the influx of new scientists and new research directions became a driving force for the expansion of opportunities for graduate education, particularly at the Ph.D. level.

What began in 1996 as an effort between UM and TJL to develop a graduate program in
Mammalian Genetics quickly expanded into the formation of the Statewide Cooperative Ph.D. in Molecular Genetics and Cell Biology. In the end, the Statewide Ph.D. program was built on existing Ph.D. programs at UM, principally the Ph.D. in Biochemistry and Molecular Biology in BMMB. The program was successful at the faculty level in that it greatly increased the number of faculty from the other institutions who had appointments to the UM Graduate Faculty, giving them access to Ph.D. level graduate students. It also increased the number of students located at the non-UM institutions, expanding from a single Ph.D. student at TJL in 1999 to a current number of 23 students distributed between TJL, MMCRI and USM. The program also served as the basis for obtaining support from the Maine Science and Technology Foundation to build the videoconferencing infrastructure needed to link UM, TJL, MMCRI, MDIBL and USM. With this system, students can have access to graduate level courses, faculty from any of the institutions can teach in graduate level courses and both can participate in graduate student committee meetings regardless of where they are physically located. Nevertheless, the Statewide Ph.D. program has not fully lived up to its potential. Because it lacks an administrative structure and financial support for students, the Statewide Ph.D. program still operates on an ad hoc basis.

This means that there is no coordinated student recruitment, and since the program provides no financial support for students, recruitment can only occur on an institution-by-institution basis. It also means there is no consistent presentation of courses via videoconferencing that can be directed toward a curriculum.

Driven largely by the changes in biomedical sciences, particularly in the area of genomics, funding was sought through the National Science Foundation Integrative Graduate Education and Research Traineeship program (NSF-IGERT) to establish and support a new Ph.D. program in Functional Genomics. The program runs under the Interdisciplinary Ph.D. program at UM and involves faculty from the biological, physical and computational sciences. Participating faculty come from eight different departments or programs at UM plus TJL and MMCRI. The NSF-IGERT grant was awarded in December 2002 (Knowles-PI, Hutchison-co-PI) with funding from NSF expected to continue for at least three more years. The training grant covers student tuition, stipends, fees and travel money as well as administrative and recruiting support. As a consequence, the Functional Genomics Ph.D. program is growing more rapidly than the State-wide Ph.D. program. The Interdisciplinary Ph.D. Program in Functional Genomics therefore serves as the model for the GSBS. However, as a federally-supported training program, it is expected that funding for Functional Genomics will transfer to State and local sources. Further, Functional Genomics is only one of four tracks in the proposed GSBS.

Need
The need for the GSBS exists on many levels. As noted above, growth of biomedical research efforts within the State has been significant over the past 10-15 years, making it one of the largest, if not the largest growth industry in Maine. The economic impact of biomedical research, both as an industry in its own right and as a potential draw for attracting to or creating new companies in the State has clearly been recognized at all levels of the State government and within the business community. The increased biomedical research activity pushes the need for the GSBS from two directions. First, graduate students and graduate education are part of the engine that drives basic research. Second, the ability of the State to attract new industries in the
biomedical/biotechnology arena will depend upon having the necessary educated work force and the scientific infrastructure for basic research. For the biomedical and biotechnology industries that means a critical mass of scientists with Ph.D. level degrees and a challenging intellectual environment. Indeed, the importance of the GSBS to the economic development of the State is part of the specific set of steps laid forward by the governor in his 2005 state-of-the-State address.

Establishment of the GSBS is important for another reason. As a small state with relatively small academic institutions, when compared to the major academic research centers of the country, it is often difficult to compete for the necessary grants to fund both research and graduate training. By pooling the academic and research strengths of UM, USM and UNECOM with the significant resources of the biomedical research centers of TJL, MMCRI and MDIBL, the GSBS will collectively form a graduate education and research entity that can rival the larger programs in the country. The success in obtaining a highly competitive NSF-IGERT training grant by forming a collaboration between UM, TJL and MMCRI is just once example of the strength achievable when institutions work together across the state.

Together the Statewide Ph.D. program and the Functional Genomics program have grown to involve over 70 faculty members and research scientists with a total amount of extramural funding in excess of $175 million per year. Total doctoral student enrollment in the two programs has surpassed 30 students. In order for the partnership among these institutions to continue this rapid expansion of graduate programs, it is necessary to create an organizational structure that can support the unique financial, technological, and administrative needs of an inter-institutional program among entities that are dispersed throughout the State. Creation of the Graduate School of Biomedical Sciences is consistent with the UMS and the UM Strategic Plans to increase doctoral research capacity at the University of Maine.(see Appendix V)

Present Capabilities - Areas of Strength
The GSBS will form with four initial areas of concentration. These concentrations were chosen because they represent nationally recognized areas of research excellence in the partner institutions and because they represent areas of research well supported by federal funding agencies. The four are Functional Genomics, Molecular and Cellular Biology, Neuroscience and Biomedical Engineering.

Functional Genomics
Functional Genomics is an existing degree program established under the Interdisciplinary Ph.D. program of UM. It will move under the GSBS umbrella once the School is established. The program was established for several reasons, one of which is the increased need in genomics for Ph.D. students with interdisciplinary training. Functional Genomics draws on the world-wide recognition of TJL as the major research center for mammalian genetics and genomics including a large group of investigators working in the area of bioinformatics and computational biology. It combines that expertise with similarly recognized research efforts at MMCRI in vascular biology and stem cell biology and with internationally recognized faculty at UM working in the physical and computational sciences, especially in the areas of nano-engineering, sensor development and information systems.
Molecular and Cellular Biology
Molecular and Cellular biology now sit at the core of all of the biological and biomedical sciences and all of the participating institutions have faculty and active research programs that can contribute to this area of emphasis. The importance of molecular and cellular biology as an area of concentration can be seen by the fact that nearly all the students working under the Statewide Ph.D. program are working on the Ph.D. in Biochemistry and Molecular Biology degree of the department of Biochemistry, Microbiology and Molecular Biology at UM.

Neuroscience
Neuroscience is one of the major research areas in the biomedical sciences. It is also an area that draws on a wide variety of disciplines. At TJL there is a well-funded group of scientists working in this area. UNECOM has identified work in this area as part of its strategic plan and has faculty actively working in pain, pain-management, memory and addiction. The ion channel work at MDIBL also interfaces with neuroscience as does the toxicology work at both MDIBL and USM. At UM, most of the historic NIH funding to the campus has been to the Psychology department, both in the basic and clinical research areas. This provides one obvious example of a direct link of activity in the GSBS to the clinical sciences and translational medicine.

Biomedical Engineering
The future of biomedical research will inevitably depend on developing new technologies to address both old and new research problems. UM has an internationally recognized group of faculty working in the area of nano-engineering and sensor development. The latter group has already spun out several small companies. This group is working with scientists from the biomedical areas at TJL and MMCRI as well as at UM, principally through the Institute for Molecular Biophysics. However, there are also faculty at other institutions, such as those at UNECOM working in the neurosciences who clearly can contribute to and benefit from working with this group. Therefore, building this program into the GSBS will expand the areas of contact to include all the participating institutions.

The Graduate School for Biomedical Sciences Structure---Administration
The GSBS will be led by a Director, who will oversee all administrative aspects of the School’s operation. The Director will report to the University of Maine’s Dean and Associate Provost for Graduate Studies and will be advised by a Steering Committee comprised of one representative from each of the participating institutions. Given the breadth of the program in scope, in size and geographically, the Director will have specific administrative assistant support in addition to support provided by the UM Graduate School (see below). The GSBS will establish multi-institutional faculty committees to oversee curricular and programmatic planning, to make graduate admissions decisions and to oversee students during their first year in the program. For the sake of administrative efficiency, the GSBS will rely on general admissions and student records support from the University of Maine’s Graduate School office, just as all other UM graduate programs do.

Recruitment and Admission
Recruitment is critical to the success of the program in competing for the best, most highly
sought students, and the proposed budget contains funds for this purpose. Recruitment depends upon not only on providing a high quality program but also visibility. Visibility is achieved through a number of mechanisms including use of: 1) a dedicated website with links from and to each of the participating institutions and to the UM Graduate School; 2) use of registries associated with professional societies, 3) posters and other material both mailed to colleagues and distributed at professional meetings, 4) recruiting from students attending research programs affiliated with the participating institutions and 5) direct contact with colleagues. For example, TJL and MDIBL each have NSF Research Experience for Undergraduate program (REU)-funded, internationally recognized summer programs for undergraduates that have existed for over 75 years, and MMCRI has a more recent summer research program. All three of these programs have served to attract students into one of the existing Ph.D. tracks associated with the State-wide Cooperative Ph.D. program. UM has a long standing NSF-funded REU program in the physical sciences and engineering which has helped attract students into the Functional Genomics program. The experience of the Functional Genomics program is that one of the most effective recruitment tools is direct, personal contact. For example, faculty are provided with both an information slide to be shown at the conclusion of any seminar or talk presented and brochures to be distributed to students met on seminar visits and meetings. It is also expected that when any of the participating institutions sends representatives to professional meetings and recruitment fairs, recruitment material for the GSBS will be given priority exposure. UM, TJL and MMCRI currently follow this practice with regard to the Functional Genomics program.

Admission Procedures. Prospective students will apply directly to the GSBS through the University of Maine Graduate School. The Admissions Committee will review these applications, prioritize them before February 15 and contact prospective candidates by telephone to arrange all-expenses-paid, on-site interviews for the top candidates. Prior to their arrival, candidates will be asked to select specific faculty with whom they wish to interview. During their visit, students will tour the research centers and facilities and participate in small group discussion sessions with faculty and with students. Social activities will present opportunities for informal interactions with faculty and current students. To the extent a candidate’s schedule will allow, s/he will also be shown the coast of Maine and the surrounding environment, which even in winter is an unmatched recruiting tool. Offers of admission will be made by March 15. Students admitted to the program will usually receive stipends and tuition support from GSBS for two years, with the expectation that the major advisor will raise external support for subsequent years. We expect to admit between 10 and 15 students each year, depending on the amount of State funding from the racino scholarship fund.

Admissions Requirements. We will seek and admit students of the highest quality. Expected standards for admission will include: 1) three strong letters of recommendation from qualified individuals in science or engineering; 2) a G.P.A. of 3.5 or greater; and 3) GRE scores equal to or greater than 1200 for the Verbal plus Quantitative section and 4.5 or greater on the Analytical section. Special consideration will be given to students with prior research experience. Exceptional letters of recommendation and significant prior research experience can compensate for weaknesses in G.P.A. or GRE scores.
Curriculum and Degrees
At the time of its formation the GSBS will offer a Ph.D. degree in Biomedical Sciences with concentrations on any of three subject areas: Molecular and Cellular Biology, Neuroscience, or Biomedical Engineering. A fourth subject area, Functional Genomics already exists as a degree program under the UM Interdisciplinary Ph.D. program and is currently funded by an NSF training grant. All students in the School must meet all UM Graduate School requirements for completing a Ph.D. degree including minimum number of total credit hours, minimum number of credit hours per semester for full time status, maximum time limit to formation of a thesis committee, and maximum time limit to passing of qualifying exam. In addition, all students matriculating into the program will take 2 core courses: bioethics/scientific conduct; and biostatistics and bioinformatics. In addition students will take a course curriculum specific to their area of concentration (see Appendix III). Ultimately, all courses required by students in the GSBS will be available at all campuses or institutions using both existing and/or expanded videoconferencing facilities. The links already exist and course or lectures have been run between all the institutions except UNECOM.

It is expected that as the GSBS grows and matures, individual areas of concentration may become specific degree programs under the aegis of the GSBS. Such changes will occur at the recommendation of the Steering Committee and Director and will occur via normal UMS procedures involving a submission of an Intent to Plan to the Board of Trustees and, upon approval, a full degree proposal. It is also expected that over time additional areas of concentration will be added under the Ph.D. in Biomedical Sciences. Proposing and preparing new degree areas of concentration will be the responsibility of the Director and Steering Committee.

Rotations: Research is the critical component of any GSBS student’s graduate training. It is critical that a student achieve the best possible match with his or her mentor. Therefore, all students will perform three laboratory rotations, each of one half to one semester duration. To increase the exposure of the students to the research options, rotations should involve at least two institutions (rotations in the Functional Genomics program also require that rotations be in at least two different disciplines). All rotations should be completed by the end of the student’s first calendar year and no later than the end of their third semester, at which time they must have established an agreement with at least one faculty member to serve as their mentor (the Functional Genomics program requires two mentors for each student). An exception to this rule will be applied to students recruited by and supported by an individual faculty member or institution who nevertheless wish to obtain a degree in Biomedical Sciences. Such students would not be required to do a rotation in another laboratory.

Faculty
Faculty of the GSBS will be drawn from the participating institutions and will meet the UM requirements for membership in the Graduate Faculty (see Appendix I). As noted in the UM Graduate School Constitution this means that faculty in the GSBS are expected to be “engaged (1) in extending the limits of current human knowledge, (2) in interpreting and reinterpreting the past and present experience of humankind, and (3) in creating in these and other ways an
intellectual climate in which both graduate and undergraduate scholarship may flourish.” With rare exceptions it is expected that faculty members of the GSBS will be admitted as Full members of the UM Graduate Faculty. As Full members, they may serve on University of Maine GSBS doctoral committees, either as the chair or as a committee member.

The strength of the GSBS will depend not only on the quality of students admitted to the program but on the strength and caliber of the faculty participating in the program. Admissions requirements for graduate faculty will follow the model established for the existing Ph.D. in Functional Genomics program. That is, faculty will be expected to show evidence of an active research program through publication and grant support, both of which are standard metrics for the quality of a faculty member’s research effort. Current and/or recent funding is particularly important in that the program provides no support for the actual costs of the research performed by the students. In addition, the program will normally only support students for the first 2 years of their graduate career. Therefore, faculty participating in the program must have funds available through other means to provide the necessary support.

Membership in GSBS faculty will be evaluated every five years, concurrent with the renewal cycle for membership in the UM Graduate Faculty. Renewal will depend not only upon a faculty member’s research activity but on evidence of active participation in the activities of the GSBS, through teaching, mentoring and participation on graduate committees. The above criteria serve as the School-specific requirements for admission to the GSBS graduate faculty. However, each participating institution may, if it so desires, set additional criteria for allowing its faculty to participate in the GSBS.

Appendix II contains a list of faculty from the participating institutions who currently have Graduate Faculty appointments at UM. It also includes UM faculty with research interests directly related to the mission of the GSBS and/or who are currently members of the Functional Genomics faculty. The list is not meant to be exclusive but rather to indicate the breadth of faculty upon which the GSBS is being built.

Facilities
Each institution has all the necessary research and support facilities to provide the appropriate research environment for students in the GSBS (see Appendix V). In addition, UM, TJL, MMCRI, MDIBL and USM are all equipped for course presentation and committee meetings using an ATM broadband-based videoconferencing system using MPEG2 compression technology. This allows for full presence of up to four sites as well as broadcast from a single site to many. As backup each site also has the capacity to use H.323-based videoconferencing systems for course presentation and committee meetings. This lower-end technology provide videoconferencing links to sites elsewhere in the country and the world. For example, faculty and students associated with the Institute for Molecular Biology regularly “meet” with colleagues in Europe to discuss research and graduate training issues.
Benefits and Costs

Budget

The budget for the GSBS has three components. State legislation has provided the GSBS with up to $1M in direct support of the students. It is expected that this level of funding would support approximately 30 students. This is based on an estimated cost per student of approximately $30,000 per year. To be competitive nationally or even regionally it will be necessary to offer students NIH-standard stipends of $23,000 per year, with the remainder of the money being used to cover cost of tuition, insurance and fees. State bond money of $1M has been approved by the voters and will be used to renovate space in Camden Hall for the GSBS office, as well as the needed communications infrastructure, especially videoconferencing facilities. No support has been provided by the State for administration of the GSBS a component considered critical to the success of the School. A proposed start-up budget for the current academic year is given in Appendix IV. Also given are budgets for year 2 and year 3 and beyond. The primary administrative costs are support for a Director and an administrative assistant and support for recruitment of students, including travel costs to bring the best potential students to Maine for interviews.

It should be noted that one of the activities of the Director and Steering Committee will be to seek additional support for the GSBS, such as through submission of application for training grants. The Functional Genomics component of GSBS is currently supported by such a grant and a renewal application will be submitted in 2 years.

Implementation

Approval by the UMS Board of Trustees of Proposal to authorize the establishment of the Graduate School for Biomedical Sciences
Develop and sign Memorandi of Agreement with participating institutions
Develop GSBS graduate student recruitment materials. Create a website for the GSBS with admissions and programmatic information, faculty research, and links to partner institutions.
Develop the constitution and by-laws for the Graduate School of Biomedical Sciences.
Finalize the core curriculum and curricula for the initial concentrations in Cellular and Molecular Biology; Biomedical Engineering, Neuroscience, and Function
Implement an administrative budget which will reasonably support the ongoing operations of the GSBS. (See Appendix IV for proposed budget for years 1-3+.)
Arrange for interviews with prospective students for the GSBS program and finalize offers of admission to GSBS applicants matriculating in the Fall 2006.
APPENDIX I
UM Graduate School Constitution criteria for admission to Graduate Faculty
ARTICLE III -- The Graduate Faculty.

Section 1.  Purpose.  The Graduate Faculty should be engaged (1) in extending the limits of current human knowledge, (2) in interpreting and reinterpreting the past and present experience of humankind, and (3) in creating in these and other ways an intellectual climate in which both graduate and undergraduate scholarship may flourish.

Section 2.  Jurisdiction.  The Graduate Faculty shall have jurisdiction over:

Admissions to the Graduate School.

Designation of courses carrying graduate credit.

Establishment of requirements for advanced degrees.

All students who pursue graduate study.

Recommendations to the President for presentation to the Trustees of all students who have completed degree requirements.

All matters pertaining to graduate study which are not otherwise delegated and which are within general University policy.

This jurisdiction may be delegated to the Graduate Board, but it may also be exercised directly at any meeting of the Graduate Faculty.

Section 3.  Membership.  The Graduate Faculty governs the process which determines eligibility for membership.

Categories of membership.

Full Graduate Faculty.  Full members of the Graduate Faculty must hold formal faculty appointments at the University of Maine or must be a full member of an established, multi-institutional graduate faculty group.  Full members of the Graduate Faculty who possess doctoral degrees may serve on University of Maine master's and doctoral committees, either as the chair or as a committee member.  A Full member of the Graduate Faculty possessing a master's degree may not chair a doctoral committee, but on the recommendation of the unit graduate committee and with the permission of the Graduate School, may serve as a member of a doctoral committee, if the individual possesses a specific area of expertise essential to the makeup of the committee.  Full members of the Graduate Faculty may also advise graduate students in non-thesis programs.

Although it is expected that Full members of the Graduate Faculty shall possess the highest level of achievement in scholarship, graduate teaching, and public service, each institutional unit shall set the specific criteria for appointment of its faculty.
Associate Graduate Faculty. Members of the Associate Graduate Faculty are individuals at the University of Maine, who do not meet all the criteria for appointment as Full Graduate Faculty but who have significant qualifications for graduate instruction. Associate members of the Graduate Faculty possess all the privileges of Full Graduate Faculty members with the exception of chairing student committees, although Associate members may serve as co-chairs of committees. Associate members of the Graduate Faculty who do not hold doctoral degrees may serve on doctoral committees only on the recommendation of the unit graduate committee and with permission the Graduate School.

External Graduate Faculty. Members of the External Graduate Faculty are individuals who do not hold appointments at the University of Maine. External members of the Graduate Faculty possess all the privileges of Full Graduate Faculty members with the exception of chairing student committees, although External members may serve as co-chairs of committees. External members of the Graduate Faculty who do not hold doctoral degrees may serve on doctoral committees only with permission of the Graduate School.

Individuals who qualify for External Graduate Faculty status but who were previously appointed as Associate Graduate Faculty shall be automatically reappointed as External Graduate Faculty for the duration of their current appointments. Thereafter, such individuals shall be eligible for reappointment as External Graduate Faculty. Associate Graduate Faculty who qualify for Full Graduate Faculty status as full members of an established graduate faculty group shall be automatically reappointed as Full Graduate Faculty for the duration of their current appointments. Thereafter, such individuals shall be eligible for reappointment as Full Graduate Faculty.

Graduate Instructors. Graduate instructors must have earned at least a master's degree. Graduate instructors may teach graduate-level (500 and 600) courses but may not advise graduate students or serve on graduate student committees.

Ex officio members. The CAO of the Graduate School may appoint appropriate persons holding administrative positions as ex officio Graduate Faculty members. The Graduate School’s administrative leadership and all department chairpersons and graduate coordinators shall be ex officio members unless holding a different category of graduate faculty appointment. Individuals appointed as ex officio members normally do not serve on graduate committees.

Appointment and reappointment.

In keeping with the University of Maine's mission as a land-grant and sea grant institution, individuals considered for appointment to the Graduate Faculty shall demonstrate substantial achievement in each of the areas of scholarship, graduate teaching, and public service.

Appointment. Faculty may be appointed to any of the five categories of membership. Recommendation for membership on the Graduate Faculty is subject to the approval of the appropriate institutional unit committee, unit head, dean(s) (if appropriate) and the Graduate School.
New University of Maine faculty members may be granted an initial appointment to the Graduate Faculty at the time of hire. For all other appointments, each institutional unit shall develop a peer review process similar to that employed for decisions of promotion and tenure. Criteria used in this process should take into account the level of responsibility expected of Graduate Faculty in different categories of membership and will include specific expectations related to scholarship, graduate teaching, and service. For appointment as a Full member of the Graduate Faculty, achievement in scholarship must include peer-reviewed publications, presentations at professional meetings, or other creative work appropriate for Graduate Faculty members in each individual institutional unit. These criteria shall be reviewed by the appropriate college dean (or by the CAO of the Graduate School for multi-college, interdisciplinary graduate faculty groups) and by the Executive Committee of the Graduate Board. Graduate Faculty appointment criteria may undergo periodic re-examination by departments and graduate programs. Any resulting changes shall again be reviewed by the appropriate authorities listed above.

Reappointment. The normal term of membership for all categories of Graduate Faculty shall be for five years and shall be renewable. Individuals who do not possess all of the qualifications normally expected for reappointment as Full or Associate Graduate Faculty members may continue serving for the duration of current committee appointments.

Reappointment to the Graduate Faculty is contingent upon meeting the appointment criteria of the faculty member's institutional unit and the following conditions:

demonstrated record of service on graduate student committees, including attendance at scheduled committee meetings;

success in advising graduate students (for example, completion rates of advisees); and

record of compliance with established University of Maine and/or departmental policies.

In reappointing individuals to the Graduate Faculty, each institutional unit should review the performance in the above three areas. Documentation related to the Graduate Faculty member’s performance in these areas should be submitted with reappointment materials upon request from the Graduate School.

Appeals process. Individuals who are denied appointment to the Graduate Faculty may appeal the decision at each successive level (see Section 3 - Appointment) up to the Graduate School. If the Graduate School denies the appeal, the matter shall be referred to the next meeting of the Executive Committee of the Graduate Board with an explanation of the referral. The Executive Committee may then approve a referred application, with an affirmative vote of a majority of those present required.

Section 4. Institutional unit graduate committee. Each institutional unit of the University offering a program leading to an advanced degree shall have a unit graduate committee. That
committee shall be the executive committee of the Graduate Faculty of the institutional unit. The department chairperson shall be an *ex-officio* member of this committee. The size of the committee, the method of selecting members, and the general range of its functions shall be determined by the Graduate Faculty of the institutional unit.

In those cases involving interdisciplinary graduate programs, an interdisciplinary graduate committee, approved by the Graduate Board, shall be responsible for the initiation of the appointment of any additional faculty members to the Graduate Faculty.

Section 5. **Graduate student committee membership.** Only Full, Associate, and External members of the Graduate Faculty may ordinarily chair or serve on graduate student committees in accordance with the responsibilities established in Section 3 under membership, but on the recommendation of the unit graduate committee and with the permission of the Graduate School, *ex-officio* Graduate Faculty may serve as committee members.

Sections 6. **Meetings of the Graduate Faculty.** A meeting of the Graduate Faculty may be called at any time by the Graduate School, by the Graduate Board, or by petition of twenty-five or more members of the Graduate Faculty.

Items of legislative or general policy nature must be on the agenda, and explanatory material must have been distributed to the Graduate Faculty at least one week prior to the time of the meeting at which the action is to be taken. Other items may be presented from the floor at a meeting of the Graduate Faculty, but final action may not be taken at the same meeting.

A quorum shall consist of at least 25% of the Faculty listed in the most recent Graduate Catalog.

Section 7. **Secretary of the Graduate Faculty.** The Graduate Board shall elect a secretary who shall serve a one-year term. The election may be by open or secret ballot, and a majority of the votes cast shall be necessary for election. The Secretary shall prepare minutes of the meetings of the Board and of the Graduate Faculty, and these shall be made generally available to the Graduate Faculty.
APPENDIX II:
List of Graduate Faculty for the GSBS (Note: this list is not exclusive. All faculty listed have UM Graduate Faculty membership). Faculty marked with FG are members of the Functional Genomics Ph.D. program.

<table>
<thead>
<tr>
<th>NAME</th>
<th>Institution</th>
<th>Dept</th>
</tr>
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<tbody>
<tr>
<td>Croall, Dorothy</td>
<td>UM</td>
<td>Biochem/Micro/MolBiol</td>
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<td>Gundersen, Robert</td>
<td>UM</td>
<td>Biochem/Micro/MolBiol</td>
</tr>
<tr>
<td>Hutchison, Keith</td>
<td>UM</td>
<td>FG Biochem/Micro/MolBiol</td>
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<td>Kim, Carol</td>
<td>UM</td>
<td>FG Biochem/Micro/MolBiol</td>
</tr>
<tr>
<td>King, Gary</td>
<td>UM</td>
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<td>FG LASST / Chemistry</td>
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Ackerman, Susan  JAX  FG
Barak, Yaacov  JAX  FG
Blake, Judith A.  JAX  FG
Bult, Carol J.  JAX  FG
Burgess, Robert  JAX  FG
Cox, Gregory A.  JAX  FG
Eicher, Eva  JAX  FG
Frankel, Wayne  JAX  FG
Graber, Joel  JAX  FG
Gridley, Thomas  JAX  FG
Handel, Mary Anne  JAX  FG
John, Simon  JAX  FG
Knowles, Barbara B.  JAX  FG
Li, Shaoguang  JAX
Naggert, Jurgen  JAX  FG
Peters, Luanne L.  JAX  FG
Ringwald, Martin  JAX  FG
Roopenian, Derry C.  JAX  FG
Serreze, David V.  JAX
Shopland, Lindsay S.  JAX  FG
Shultz, Leonard D.  JAX
Sundberg, John P.  JAX
Rosen, Clifford  JAX  St Joseph Hospital
Ault, Kenneth A.  MMCRI  FG  Ctr. Molecular Med.
Friesel, Robert E.  MMCRI  FG  Ctr. Molecular Med.
Liaw, Lucy  MMCRI  FG  Ctr. Molecular Med.
Lindner, Volkhard  MMCRI  FG  Ctr. Molecular Med.
Oxburgh, Leif  MMCRI  FG  Ctr. Regenerative Med
Spicer, Douglas  MMCRI  Ctr. Molecular Med.
Vary, Calvin P.H  MMCRI  Ctr. Molecular Med.
Verdi, Joseph M.  MMCRI  FG  Ctr. Regenerative Med
Wojchowski, Don  MMCRI  FG  Ctr. Regenerative Med
Yoon, Jeong K.  MMCRI  Ctr. Regenerative Med
Barnes, David  MDIBL
Coffman, James  MDIBL
Forrest, John  MDIBL
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<td>Bilsky, Edward</td>
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<td>UNECOM</td>
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Core courses-draft descriptions

Biocomputing: a course in bioinformatics and biostatistics (3 credits). The foundation of this course already exists as the Computational Methods in Genomics course (see below). Material to be covered in the course includes database structure, construction, and analysis, including spatial statistics; introduction to scripting languages and computer programming; mathematical modeling of biological processes; statistical models of complex traits. Specific examples will be used but with guidance given to application of the models to alternative fields of study. Course will use a team-based problem solving strategy.

Bioethics and Scientific Conduct (1 credit). A readings and discussion course based on a current experimental course “Graduate Readings in Philosophy: Responsible Conduct in Research”. Material to be covered in the course includes ethical concepts and resolution of ethical conflicts including those involved in scientific conduct; plagiarism; use of animal and human subjects; access to and limits in the use of both public and private databases; interfacing with society. In addition to readings students will be provided with current federal guidelines the deal with these subject areas as guidance for appropriate scientific conduct.

Proposed curricula for degree areas

The following proposed curricula for each area of concentration are in addition to the core curriculum given above.

Courses listed as GSB5XX are in the process of receiving approval from the Graduate Board. They have been taught under Special Topics designators during their development. All the GSB courses are team taught involving faculty from UM, TJL and MMCRI.

Courses marked with “[VC]” are courses that have already been offered at two or more sites using the existing videoconferencing links.

Functional Genomics:

Each student must take the following four core courses:

GBS5XX - Functional Genomics[VC] (currently BMB550 - Special Topics) Topics to be covered: 1) The genome (how DNA sequencing projects are used to determine genome structure, sequence annotation, comparative genomics and gene discovery); 2) The transcriptome (EST databases, microarrays, spatial temporal data on gene expression); 3) Multiplex Proteomic and Genomic Approaches (ESI and MALDI Ultrahigh Resolution Biological Mass Spectrometry, why understanding the transcriptome is not enough); 4) Metabolome (development of high-throughput ways to determine the physiological capacity of an organism and the underlying basis of metabolic diseases); 5) The Phenome Project (understanding how genetic variation in inbred mice can be used to find genes that influence phenotype); 6) Bioinformatics and Systems Biology (database issues relating to large datasets, and heterogeneous data types, computer language semantics).

GBS5XX - Computational Methods in Genomics[VC] (currently BMB550 - Special Topics) Topics to be covered: 1) Sequences and Bioinformatics (algorithms for sequence alignment; sequence comparison and database search; data management, visualization, and informatics
tools); 2) Microarray Analysis (classifying gene expression data, identifying genes, modeling of gene expression data); 3) Genetic and Biochemical Networks (gene/protein/metabolic pathways; investigating relationships between components; knockout effects); 4) Physiological Models (statistical models of complex phenotypes; mathematical models of molecular interactions).

GBS5XX - Microscale Bioengineering[VC] (currently CHE598 - Special Topics) Introductory microfluidics (issues surrounding scale-down of fluid paths, devices, cellular systems); 2) Cell and tissue engineering (requirements and advances in generating high-density cultures, facilitating cell association and creation of artificial tissues); 3) Artificial growth matrices (materials and surface chemistries for promoting cell growth, attachment, and development); 4) Cellular and molecular biosensors (concepts involved in using biomolecules, cells and organisms as molecular detectors); 5) Nanoscale analytical methods (introduction to new techniques that allow chemical analysis to be carried out on the sub-nanoliter scale); 6) Introductory materials and microfabrication

GBS5XX - Interdisciplinary Training – Grant Writing This required course is only open to graduate students in their 2nd or 3rd year in this program and is intended to enhance a student’s ability to critically evaluate the literature in areas related to their thesis research using a format of proposal preparation, oral presentation and peer review. A second intent is to focus students on hypothesis-driven research in their focal areas.

In addition, each student must attend the following two short courses held at TJL. Students begin the Functional Genomics program in July and take the first course upon their arrival. They take the second course during the summer following their first academic year.

Annual Short Course in Medical and Experimental Mammalian Genetics. This course draws on the top scientists in genetics/genomics worldwide for its faculty and provides a comprehensive immersion in the latest developments in mammalian genetics and genomics. Most aspects of human and medical genetics are covered including cytogenetics, biochemical and molecular genetics, developmental genetics, population genetics, linkage analysis, analysis of complex traits, and basics of clinical genetics.

Experimental Genetics of the Laboratory Mouse in Cancer Research This is a graduate-level genetics course for predoctoral and postdoctoral students as well as established investigators entering the field of mouse genetics. The course focuses on the mouse as an experimental tool in genetics, development and cancer research. Focus areas will include: Genetics of the Laboratory Mouse; Tools for Genetic Analysis; Developmental Genetics and Cancer; Genetic Models in Cancer Research; and Ethical Considerations in the Dissemination and Use of Information from Genetic Studies. The intensive 11-day course has a mix of formal lectures, discussion groups, demonstrations and tutorials.

Additional courses will be as required by the student’s thesis committee.

As given above, the rotation requirement for students in the Functional Genomics program is greater than that needed for the core GSBS program because each student must have two Ph.D. mentors from two different disciplines.
Students in the Functional Genomics program are also required to meet monthly for research presentations and general programmatic discussion.

Minimum Total Credits = 30 (including thesis research credits)

Molecular and Cellular Biology
Each student must meet the following requirements:
A course in molecular genetics/molecular biology (3 cr). Suggested course or equivalent from another institution:
BMB400 - Molecular Genetics[VC]. The structure of DNA and of genes, and the mechanisms of gene regulation, particularly as they pertain to cell growth and differentiation. Includes a discussion of the experimental techniques used in the genetic manipulation of organisms.
Or
BMB550 Special Topics – Advanced Molecular Genetics[VC] A literature-based course covering the most recent literature and developments in molecular genetics and genomics. Introductory lectures provide the basis for in depth discussion of assigned research article from the primary literature. Coverage includes all aspects of gene and genome structure and function. Note: this course will have to be re-developed as it was last offered in 1999.

A course in cell biology (3 cr). Suggested course or equivalent from another institution:
GBS5XX - Special Topics in Cell Biology[VC] - (currently offered as BMB550 - Special Topics) A comprehensive 2 semester course. The first semester will focus on experimental techniques in cell biology and basics of cell structure and function. The second semester addresses cellular biology in the context of receptor signaling, cell-cell interactions, and tissue function.
Or
BIO480 - Cell Biology. Examines the fundamental cellular, sub-cellular and molecular characteristics of cells with emphasis on structure and function of organelle systems common to eukaryotic cells.

A course in signal transduction (3 cr). Suggested course or equivalent from another institution:
GBS5XX - Special Topics in Cell Biology[VC] - (currently offered as BMB550 - Special Topics) A comprehensive 2 semester course. The first semester will focus on experimental techniques in cell biology and basics of cell structure and function. The second semester addresses cellular biology in the context of receptor signaling, cell-cell interactions, and tissue function.
Or
BMB525 - Cellular Signal Transduction Mechanisms[VC]. Signal transduction mechanisms used by cells to perceive extracellular messages and to produce proper responses in regulating growth, development and metabolism.

A seminar course each semester.

It is also recommended that students take a course in development such as:
BIO 438 - Morphogenesis and Differentiation. Analysis of interacting systems in development. Study of regulation of morphogenesis and differentiation at the organ, tissue and cellular levels, with emphasis on experimental approach towards problems in development.

It is also recommended that the student take a course in Neuroscience (currently under development)

Additional courses will be as required by the student’s thesis committee.
Minimum Total Credits = 30 (including thesis research credits)

Neuroscience
Requirements:

The program will require a minimum of 60 hours selected from the following courses, or from substitutions approved by the student’s program advisory committee.

Statistics, Research Methods, and Philosophy of Science - At least two of the following:

PSY 540 Advanced Statistics and Research Methods I
PSY 541 Advanced Statistics and Research Methods II
PSY 611 Scientific Inquiry in Psychology
MAT 531 Mathematical Statistics I
MAT 532 Mathematical Statistics II

Cellular and Molecular Neuroscience – At least two of the following:

BIO 474 Neurobiology
BIO 574 Neurophysiology
BIO 587 Advanced Neuroscience

Behavioral Neuroscience – At least two of the following:

PSY 465 Hormones, Brain and Behavior
PSY 466 Cognitive Neuroscience
PSY 551 Advanced Physiological Psychology

Developmental Neuroscience – At least one of the following:

PSY 520 Biological Bases of Infant Development
BIO 504 Advanced Developmental Biology

Graduate and Thesis Research – Students will normally register for 3 hours per semester from among the following:

PSY 692 Directed Research
PSY 699 Graduate Thesis
BIO 587 Graduate Research in Biology II
BIO 588 Graduate Research in Biology II
BIO 699 Graduate Thesis

Other Relevant Courses:

BIO 462 Principles of Genetics
BIO 456 Evolution
BIO 479 Endocrinology
BIO 480 Cell Biology
BIO 588 Advanced Cellular Biology

PSY 556 Advanced Perception
PSY 567 Advanced Cognitive Psychology

BMB 400 Molecular Genetics
BMB 460 Advanced Biochemistry
BMB 510 Laboratory in Molecular Biology
BMB 525 Proteins and Enzymes
BMB 530 Cellular Signal Transduction Mechanisms

CHY 531 Structure and Mechanism in Biological Chemistry
CHY 551 Topics in Advanced Organic Chemistry

Biomedical Engineering
Six Courses, required of all students

(6-8 credits) Physiology (Human and cell) existing/in development
(3 credits) Biomechanics new course
(3 credits) Bioinstrumentation new course
(3 credits) Biological materials new course
(3 credits) Bio-Imaging and Spectroscopy in development

Other required components
(1 credit/yr) Biomedical Engineering Seminar
(3 credits) Residency/Internship (1-2 semesters at a medical research institution)
(9 credits) PhD Thesis

Tracks
Within the concentration there are four “tracks” from which students can choose. Each track will provide students with an opportunity to develop a focus area in which there is active research on campus and at the GSBS affiliated institutions. Students will be required to take at least two additional, graduate courses that are specific to their research track.

1. Hard and soft tissue science and engineering
2. Biomedical microdevices and microinstruments
3. High resolution bio imaging
4. Bioinformatics

Total required credits $\approx 40$ (including thesis; not including prerequisites)
**APPENDIX IV**

Budget

Year 1 (2005-2006)

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<td>Operating Expenses</td>
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1 includes travel, printing, postage for communication between partner institutions, initial printing costs for recruitment materials, basic office equipment.

Notes: We reduced the budget from original projections for this startup year in several ways: 1) the 2 months of summer salary for the Interim Director will be July and August, the next fiscal year; 2) the Graduate School has hired a secretary with funds from the University of Maine Graduate School’s NSF AGEP and the University’s cost-share for this grant; that person can provide some clerical support through June during the GSBS startup.

Revenue: Each of the 6 partner institutions must provide $10,000 in this preparatory year.

Year 2 (full operation, 15 students)

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<td>Recruitment Expenses (subtotal)</td>
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<td><strong>TOTAL BUDGET:</strong></td>
<td>$160,000</td>
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Revenue: We will use all tuition revenue to offset the costs of operating GSBS. We estimate that the GSBS will enroll 15 students in the first year. These students will take approximately 18 credit hours each per year at an in-state tuition rate of $274/credit hour, for total annual revenue of $73,980. Each student will also be assessed a $1000 technology fee to help cover telecommunications costs involved in running a multi-institutional operation, providing additional
Revenue of $15,000. The combined income from tuition and fees ($88,980) leaves $71,020 to be covered by the partners, or $11,836 per partner. Note that two years support for 30 students at the current rate of $30,000/student for stipend, tuition, fees, and health insurance will use $900,000 of the potential $1,000,000 racino allotment. If the allotment reaches that maximum, the additional $100,000 would be used to support more students (possibly those past the second whose advisors fail to receive adequate funding) and/or to help cover inflationary increases in stipends, tuition, health insurance, and fees. If there is additional tuition income, it would be used to offset the requested contribution from partners.

Year 3 and forward (full operation, 30 students)

Stipend/Summer Salary for Part-Time Director: $35,000 (with fringe benefits)

Coordinator of Academic Support Services for Biomedical Sciences $55,000
Support Services (subtotal) $55,000 (with fringe benefits)

Mailing/Printing - $5,000
Videoconferencing/Networking - $15,000
Director Travel - $12,500
Annual Symposium - $7,500
Operating Expenses (subtotal): $40,000

Advertisement - $10,000
Recruit Travel - $20,000
Recruitment Expenses (subtotal): $30,000

TOTAL BUDGET: $160,000

Revenue: We will use all tuition revenue to offset the costs of operating GSBS. We estimate that the GSBS will enroll 30 students after the first year. These students will take approximately 18 credit hours each per year at an in-state tuition rate of $274/credit hour, for total annual revenue of $147,960. Each student will also be assessed a $1000 technology fee to help cover telecommunications costs involved in running a multi-institutional operation, providing additional revenue of $30,000. Each partner will continue to be assessed $10,000/year. Along with $17,960 left from the tuition and fee revenue, that leaves $77,960 to cover unexpected expenses, inflationary increases in budget lines, and one to two students whose advisors temporarily fail to secure adequate funding past the two years of GSBS base support. Note that two years support for 30 students at the current rate of $30,000/student for stipend, tuition, fees, and health insurance will use $900,000 of the potential $1,000,000 racino allotment. If the allotment reaches that maximum, the additional $100,000 would be used to support more students (possibly those past the second whose advisors fail to receive adequate funding) and/or to help cover inflationary increases in stipends, tuition, health insurance, and fees. If there is additional tuition income, it would be used to offset the requested contribution from partners.
APPENDIX V – Facilities

THE UNIVERSITY OF MAINE

The University of Maine is the state’s land grant university and sea grant college. Its mission is to be the state’s center of learning, discovery and service to the public. UM is comprised of 158 buildings on 660 acres overlooking the Stillwater River. Since 1968 it has served as the flagship university within the state’s University of Maine System. Within the System, UM has the responsibility for providing high quality undergraduate and graduate education programs, public service outreach, and basic and applied research.

Computer Resources: UNET. The University of Maine System Network for Education and Technology Services designs and employs technologies and services for students, faculty, staff, and the people of Maine in support of the educational, research and public service mission of the University of Maine System. It serves to advance the use of computing, communication, and instructional technologies in the State of Maine. Education Services offers statewide instructional, library, marketing, faculty and student support services. UNET provides computing, administrative systems and distance learning technology support, including interactive television, two-way video conferencing, telephone conferencing, Internet and videotape instruction. UNet also provides wide area/local area network installation, development, management and troubleshooting, Internet connectivity and services. UNET provides the Internet 2 link for the University of Maine and for The Jackson Laboratory.

Computer Resources: Information Technologies: Information Technologies provides audiovisual systems, computer repair, faculty development, networking, telecommunications, and video services. IT assists with setting up, installing, and running Novell, AppleShare, Windows NT, and UNIX networks and accessing the campus-wide network and the World Wide Web.

Department of Spatial Information Science and Engineering places emphasis on the acquisition, modeling, and use of spatial information. Courses in advanced software engineering, database management, spatial database design, visualization of spatial data quality, as well as information systems law are offered in addition to geodesy, remote sensing, photogrammetry, and surveying engineering. The National Center for Geographic Information and Analysis (NCGIA) is a research consortium comprising the University of California-Santa Barbara, the State University of New York at Buffalo, and the University of Maine. The core group of NCGIA researchers at the University of Maine are faculty members of the Department of Spatial Information Science and Engineering. Research and graduate education at NCGIA-Maine focus on GIS software engineering and the design of information systems.

The Intelligent Systems Facility is located in the Electrical and Computer Engineering (ECE) Intelligent Systems Laboratory (ISL). The Intelligent Systems Laboratory is equipped with a state-of-the-art computing facility including 12 high performance PC Pentium, Silicon Graphic parallel processors, Digital Alpha Workstation, scanners, color printers and other peripherals. The computing facility in the ECE department is internally connected through a 100Mb local
area network and externally through the Internet. In addition to the hardware, ISL is also equipped with a variety of analysis and modeling tools. These include Matlab with neural network, fuzzy logic, and signal processing toolboxes, Chromas, Phred, MathCad, GenSym G2 Intelligent Real-Time automation software, NeuralWare software, Khoros Image Processing software and a variety of in-house designed intelligent software.

Zebrafish Facility: The Aquatic Habitats for Accelerated Bioresearch (AHAB) system (Aquatic Habitats, Apopka, FL) is composed of five-foot wide, four-level, stainless steel racks. Any combination of three tank sizes (9, 2.75, and 1 liter) can be supported on any of the four levels. Water delivery lines bring sterile water to each tank through its own valve. The fish tanks have self-cleaning bottoms and the effluent system features a see-through design. The filter system requires minimal maintenance, and maintains high water quality. Some of the advantages of the system include dramatically reduced disease and mortality, low maintenance, and efficient utilization of space. The site for the zebrafish facility is in a 16 x 20 foot room. At maximum capacity, this small room may house 12 recirculating racks of tanks for genetics and developmental work, and one flow-through rack of tanks for disease and toxicology research. Each of these racks can hold up to 60 tanks with 50 fish per tank for a total of 39,000 fish at maximum capacity. A full-time technician is assigned to day-to-day management of the fish facility. Undergraduates and graduate students are involved in all levels of maintenance, rearing, and research with the zebrafish. The University has two veterinarians on the staff as faculty members. It also has a large aquaculture research laboratory and associated facilities for monitoring the health of the animals.

Mass Spectrometer: A newly renovated modern room houses our state-of-the-art 7T ESI FT-ICR mass spectrometer and a new MALDI FT-ICR ion source. The Chemistry Department is also equipped with numerous modern instruments such as the HPLC and the GC-MS (HP MSD 5970) that will be utilized in this project. In addition, there is a quadrupole MS (HP MSD 5973) and a high-resolution sector (Autospec Ultima, Micromass, UK) mass spectrometer equipped with GC systems.

Imaging Core Facilities: Still in development, the Imaging Core Facility will be a state-of-the-art laboratory of spatial imaging of biological systems and biomaterials. This facility will be a user facility that provides imaging capabilities to support researchers working on genome expression using microchip technology, DNA and chromatin structure, protein/enzyme interactions, protein adsorption, biomacromolecules, cell surface antigens, intracellular interactions, cell morphology and motility, synaptic release and signal transduction processes, membranes, viruses and other microbes. Initially the equipment for this core will remain in their current locations at the University of Maine. In approximately two years, all of the equipment (except for the confocal microscope) will be brought together into a single laboratory to be located in the space assigned to the Laboratory for Surface Science and Technology in a new (~$20 million) research building to be built as an addition to Barrows Hall. This building is in the final stages of architectural design and construction is expected to begin within one year. The following equipment is already available at the University and will be incorporated into the Imaging Core Facility: A Renishaw Raman System 1000 equipped with a CCD array detector, and a Leica DM/LM microscope with confocal capabilities and an automated mapping stage, a
Leica SP confocal microscope equipped with Kr-Ar, green He-Ne, and red He-Ne lasers, scanning monochromator detectors, and a variety of objective lenses, are available. Image analysis is carried out using Leica proprietary software, Scion Image (PC), or NIH Image (Mac).

Library Services: The Raymond H. Fogler Library at the University of Maine is the largest research library in Maine, with collections and services supporting the faculty, students, and staff of the University as well as residents of the State of Maine. The collections include approximately 950,000 volumes, 6,700 periodical subscriptions, 1.5 million microforms, 2.1 million United States Federal, Maine State, and Canadian federal and provincial government publications, and a rapidly growing number of electronic resources. Fogler Library’s branch at the Ira C. Darling Marine Center in Walpole houses a specialized collection focused on marine studies of more than 12,000 books, journals, and reprints. The Library also has a large number of information resources in a variety of electronic formats. Fogler Library has used technology to change the environment for both the patrons and the staff and has made many resources and services available 24 hours a day. The Mariner Gateway is a vehicle for locating and accessing local and remote databases. It includes electronic resources created by individual UMS libraries, as well as other free and fee-based resources. Web site resources are linked to a topical directory that may be customized by each library to address the particular campus mission. CD-ROM collections licensed by individual campus libraries are accessible through Mariner.

Laboratory for Surface Science and Technology (LASST) is an interdisciplinary research unit within the University of Maine comprised of faculty, staff, post-docs, graduate students and undergraduates from the Departments of Chemistry, Physics & Astronomy, Chemical Engineering and Electrical & Computer Engineering. LASST engages in research, public service, and educational activities providing a focus for training students and carrying out research in high technology areas related to surfaces, interfaces, and thin film materials. Research of advanced materials spans the spectrum from basic science to applied technology in areas related to microelectronics, sensors, composites, paper, and other industries both within and outside the State of Maine.

Over the last two decades, LASST has developed a well-equipped facility for the synthesis, analysis and characterization, and processing of surfaces, interfaces, thin films, and electronic devices. Several instruments are state-of-the-art research apparatus with unique capabilities; others allow more routine investigation using modern but well-established techniques. The major facilities available at LASST include: Thin Film Deposition, Diffraction Analysis, Electron Spectroscopies, Optical Spectroscopies, Surface Microscopy (Scanning/Tunnelling (STM), Atomic), and Nanomechanics.

The University of Maine DNA Sequencing Facility is equipped with three DNA sequencers: one ABI model 373A Stretch DNA Sequencer with the XL upgrade, one ABI model 377 Sequencer with the XL upgrade and one ABI 3730 Capillary DNA Sequencer. The turnaround time per sample is usually 2-3 days, depending upon the services performed. In addition, the Facility is equipped with a Model 2100 Agilent Bioanalyzer and a Stratagene MX 4000 Real Time PCR machine.
Genetic Resources: The Jackson Laboratory’s primary genetic resource is the over 2,800 strains and stocks of mice maintained in its resource colonies or as cryopreserved embryos. The Genetic Resources Program includes a Repository that contains strains of mice with spontaneous, chemically induced, and genetically engineered mutations; inbred, recombinant inbred, congenic, and consomic (chromosome substitution) strains; strains of mice carrying chromosome aberrations; and strains of special interest for particular disease-related research.

*The Phenotypic Deviant Search* isolates and identifies spontaneous mutations in the genetically defined mouse strains at The Jackson Laboratory. Two large-scale mutagenesis and phenotyping programs generate new mouse models for neurological phenotypes and heart, lung, blood, and sleep disorders.

*Laboratory Animal Health Services* comprises three basic units that work cooperatively to advance and protect the health, welfare, and genetic quality of animals at The Jackson Laboratory. The Jackson Laboratory is fully accredited by the Association for the Assessment and Accreditation of Laboratory Animal Care International (AAALAC).

- **Veterinary Services** provide clinical veterinary care for the animals, training in biomethodology and surgery, surgically altered animals on request, and administrative oversight for the Research Animal Facility.

- **Diagnostic Services** perform diagnostic testing for routine health monitoring and environmental monitoring programs, investigate potential disease outbreaks, and provide diagnoses for in-house research programs. Diagnostic Services participate in the stringent importation and quarantine procedures for biological materials and for imported or rederived strains of mice. Diagnostic R&D personnel continuously monitor all testing methods and improve them through ongoing research and development activities.

- **Quality Management Systems** assure that Jackson Laboratory mice and procedures meet the highest quality standards. Process Quality Control monitors the animal rooms and validates the raw materials and supplies used for animal husbandry and processing equipment including laminar-flow changing tables and pressurized individually ventilated (PIV) animal racks. The Animal Welfare and Compliance group oversees all aspects of the care and use of animals at the Laboratory, and monitors compliance with relevant laws, policies, and guidelines. The Biosecurity group assures that health risks to Jackson Laboratory mice are reduced to the maximum feasible extent, and that The Jackson Laboratory is in constant state of emergency response readiness should a biological contamination of our mice occur.

Scientific Services provides access to comprehensive, cost-effective research support including dedicated expertise and centrally managed state-of-the-art facilities and technologies.

*Computational Sciences* (CS) assists researchers to apply advanced computational approaches to complex, data-intensive biological problems. CS comprises statistical specialists and software
engineers and is equipped with state-of-the-art software and hardware computing technologies, including high performance computing clusters.

*Gene Expression Service* conducts all aspects of microarray technology including standardized RNA purification and cDNA synthesis, hybridization, custom and standard array printing, and quality control. Molecular Biology Service assists researchers with the design of protocols for generating gene-targeting and transgenic constructs and provides cloned resources including plasmid, phage, and BAC genomic libraries, for vector construction. Protein Chemistry Service provides protein purification and analysis, 1- and 2-D PAGE, and chromatography analysis. Flow Cytometry Service performs a wide variety of analytical studies including immunophenotyping; mutant detection, screening, and characterization; detection of intracellular molecules; enzyme and reporter gene detection; DNA analysis; and apoptosis studies. Mouse DNA Resource prepares high molecular weight DNA by phenol-chloroform extraction from most of the inbred mouse strains at The Jackson Laboratory. DNAs are also archived from extinct mouse strains. DNA Sequencing Service sequences purified plasmid, PCR products, BACs, cosmids, and PI clones using Big Dye Terminator Cycle Sequencing Chemistry on an Applied Biosystems 3700. Allele Typing and Single Nucleotide Polymorphism (SNP) Genotyping Service: The allele-typing component performs genome-scan projects comprising 48 or more DNAs, and the SNP genotyping component facilitates investigator access to SNP genotyping outsourced to KBiosciences (Hoddesdon, Herts, UK). Fine Mapping Laboratory provides consultations in all aspects of genetic mapping, and related laboratory services. This service also supports use of the BSS and BSB interspecific backcross panels and the Mouse T31 Radiation Hybrid panel in The Jackson Laboratory’s Mapping Panel Resource.

*The Importation and Rederivation Program* provides a centralized service for the importation of all mice onto The Jackson Laboratory campus and their subsequent rederivation. This permits access to strains from other institutions while safeguarding the health status of strains maintained at the Laboratory. The program also offers rederivation of strains from Jackson Laboratory investigators and resources as a means of health status management.

*The Cryopreservation Program* maintains a repository of cryopreserved embryos, spermatozoa, and ovaries from strains maintained or developed by Jackson Laboratory researchers and those acquired from external sources by the Genetic Resources program. The Cryopreservation Program also develops assisted reproductive technologies for more effective strain management.

*Cell Biology and Microinjection Service* provides researchers with expertise, specialized tissue culture, surgical techniques, supplies, and high-health-status animal colonies for the creation of gene-targeted and transgenic mice.

*Physiology & In Vivo Imaging Sciences*, housed in the Bioimaging and Biodetection Facility in the new Functional Genomics Building, conducts physiological phenotyping and procure and maintains in vivo imaging equipment for the phenotypic characterization of live mice. Light and Electron Microscopy Service offers transmission and scanning electron microscopy, light and confocal microscopy, and computer-assisted image analysis.
Histology Service offers routine and specialized histological methods for the preparation of murine tissues for light and fluorescence microscopy.

Necropsy Service delivers complete case management services including gross whole-animal analysis, necropsy, gross organ analysis and collection, photomicrography, tissue trimming, and work tracking. Scientific Equipment.

Repair Service maintains and repairs all shared scientific equipment (see Shared Scientific Facilities).

Biological Photography Service supports photomicrography and still and candid photography.

Conference Services operates and maintains the projection, audio, video, and videoconferencing equipment necessary to support presentations.

Graphic Services includes state-of-the-art computer hardware and regularly updated graphics software that support digital image creation and editing. Document Center provides custom printing, reproduction, and binding services.

Laboratory Glassware Service provides clean glassware and sterile supplies to the Laboratory research community.

Library Sciences provides access to extensive book, reprint, journal, and electronic-journal collections, and to important biomedical databases. The Library also participates in several electronic document delivery and interlibrary loan systems.

The Institute for Molecular Biophysics (IMB), established jointly by The Jackson Laboratory, the University of Maine, and the Maine Medical Center Research Institute, focuses on the investigation of genome structure and function at the nanoscale level using advanced optical systems, new molecular probes, and computational reconstruction and analysis of images. The IMB Biophysical Imaging Laboratory at The Jackson Laboratory is fitted out with state-of-the-art resources for nanoscale-level optical imaging, nanoparticle analysis, synthetic chemistry, and molecular and cell biology, including a 4Pi microscope with resolving capability at the 100-nm level in three dimensions.

Shared Scientific Facilities, available to all scientific staff, include an animal procedure room with facilities for gross necropsy, tissue harvesting, and short-term tissue culture; a Cs137 irradiator; dark rooms; the Diet Kitchen; and instrumentation including cryostats, PCR thermal cyclers, UV and fluorescence spectrophotometers, sequence detection systems, digital gel detection systems, digital cameras, UV crosslinkers, super and ultra-speed centrifuges, ultra-low freezers, speed vacuums, gel dryers, baking ovens, autoclaves, beta and gamma counters, a densitometer, a cell harvester, luminometers, sonicators, fluorescence and chemiluminescence detection systems, an ELISA plate washer and reader, and shaking and static bacterial incubators.
Bioinformatics/Database and Web Resources:
The Mouse Genomics Informatics (MGI) Database System comprises integrated databases that provide access to comprehensive data on the genetics, genomics, and biology of the laboratory mouse. MGI includes the following bioinformatics resources, all of which, with the exception of the Gene Ontology Consortium, were developed at The Jackson Laboratory. The Mouse Genome Database (MGD), the community database for the laboratory mouse, develops and supports an integrated representation of mouse genetic, genomic, and biological information. The Gene Expression Database (GXD) is a community resource of gene expression data on the laboratory mouse. The Mouse Tumor Biology (MTB) database is a community resource for integrated information on tumor genetics and pathology in genetically defined mice. The purpose of the Mouse Genome Sequence (MGS) Database Project is to integrate mouse genome sequence data with the genetic and biological information available in MGD and GXD. The Gene Ontology (GO) Consortium develops and supports the use of bio-ontologies for molecular biology.

The Mouse Phenome Database (MPD) was developed at The Jackson Laboratory and provides access to data gathered by the Mouse Phenome Project, an international, collaborative initiative to establish a large collection of phenotypic data on 40 commonly used and genetically diverse inbred mouse strains.

The JAX Registry database, maintained by Genetic Resource personnel, contains unique identifiers and approved strain names, as well as basic operational information, for all public and private Jackson Laboratory strains.

The Jackson Laboratory Web Site provides links to the Laboratory’s research, genetic, informatics, and educational resources.

Training and Education Resources:
The Visiting Investigator Program provides temporary research appointments for visiting scientists to conduct collaborative research with Laboratory staff scientists or for short-term training.

The Courses and Conferences Program develops, coordinates, and administers professional offerings at Jackson including advanced courses in modeling human disease and a variety of scientific meetings and workshops. Facilities for Training and Education include the C. C. Little auditorium, with seating for 125 people; Highseas conference center, which provides a lecture facility and accommodations for approximately 36 students; and the Applied Genomics Training Center, which includes an extensively equipped teaching laboratory, a demonstration animal room, and a lecture room and conference area.

The Postdoctoral Research Training Program offers postgraduate training in mammalian genetics and genomics.

Cooperative Graduate Studies: The Jackson Laboratory, in collaboration with the University of
Maine (UM) and the Maine Medical Center Research Institute, offers a five-year, inter-institutional program leading to an interdisciplinary Ph.D. in Functional Genomics of Model Organisms.

The Education Office administers the Summer Student Program, an intensive introduction to experimental research for high school and college students, as well as academic-year high school, college, and graduate school research internship programs at Jackson, including a collaboration with UM’s Master of Science in Teaching program to provide research internships for student teachers.

The Videoconferencing Facility is a 505-ft² multimedia laboratory equipped with a telecommunications infrastructure that includes a state-of-the-art ATM Internet connection for real-time MPEG-2 videoconferencing.

Information Technology (IT), with over 45 staff members, applies industry-best information-management technologies scaled to fit the specific needs of the Laboratory community. The Applications Development, Data Resources, and Database Administration groups work with users to understand their information-processing needs and identify or develop the most appropriate computer software solutions. Core Services provides operation, support, planning, and management for the IT infrastructure. Services include the areas of computation, telecommunications, network infrastructure, Laboratory-wide backup, e-mail, network printing, and Internet and Internet2 connectivity. Desktop Support provides personal computer support for hardware and software. Web Communication Technologies provides a communications channel for internal and external users through the Internet, Intranet, and other processes. The Information Security Office works with the Laboratory community to protect the Laboratory information assets by developing awareness and cost-effective controls. IT hosts several research and commercial application systems and development projects on an infrastructure that includes a campus-wide wired & wireless ethernet network with links of up to one Gigabit per second; VPN encryption for secure communication between systems on and off campus; Sun Solaris, Linux, and Microsoft NT servers; Oracle databases; 20 Mb/s Internet 1 & 2 connection; and Microsoft and Apple desktop workstations

MAINE MEDICAL CENTER RESEARCH INSTITUTE

Introduction: The Center for Molecular Medicine occupies approximately 20,000 ft² with additional shared administrative space for the Institute of approximately 3000 ft² in a 55,000 ft² state-of-the-art research facility. Research space is on two floors, and the ground floor holds the Animal Facility, Confocal Microscope Facility, and the Protein, Nucleic Acid Analysis and Cell Imaging Facility. All facilities and shared areas are easily accessible by all laboratories.

Laboratory: All Investigators have independent laboratory space, from 350 ft² to 820 ft², depending on need and staffing. Shared equipment rooms for centrifuges, autoclaves, microscopes, water purification, ice machines and incubators, as well as shared tissue culture facilities are located on each floor. The first floor has a dedicated tissue culture facility for viral production.
Clinical: Human clinical samples are available through Maine Medical Center, and can be obtained from the clinical laboratories, including Nordx, which are located on the shared Maine Medical Center Scarborough campus, 5 minutes away from the Research Institute. Any proposed use of human material will be evaluated as exempt, or reviewed by our Institutional Review Board.

Animal: The Center for Molecular Medicine has an ~8407ft² Animal Facility which currently houses mice, rats, and frogs. The animal care staff is AALAS-certified, and a board-certified veterinarian monitors animal health, policies, and experimental protocols. Our Animal Facility is AAALAC accredited. All transgenic animals and the mouse colony are housed in the barrier. Separate biosafety hoods in an isolated area are also available for biohazardous work. Within the Barrier Facility, there is a 132ft² shared procedure room, and outside of the barrier, there is a 125ft² procedure room for surgeries and tissue collection. Within each room in the Animal Facility, there are biosafety hoods for cage changing, and set ups for inhalant anesthesia of mice. The barrier facility procedure room contains an anesthesia machine, a 137Cs irradiator, and a small animal x-ray machine. Shared dissecting microscopes and fume hood are also available within this procedure room.

Computer: All investigators have full access to personal computers, including Mac and PC-based platforms, as well as numerous support and instrument-dedicated computers. There are a suite of IBM PCs (Pentium IV 3GHz with 512MB of RAM) and MACs communicating through a Novell Network system with full internet communications support via the Information Services Department. The confocal microscope facility is supported with a dedicated server with read/writable CD-ROM data storage capability, site-wide network connectivity, and full internet access.

Office: Investigators have a 288ft² office adjacent to the laboratory, and researchers and staff occupy two adjacent offices measuring 288ft² and 500ft². Office space is adjacent to the laboratories.

Other: Two full-time administrative assistants are available to assist all investigators in the Center for Molecular Medicine. Maine Medical Center (MMC) provides support for photography and graphics in their department located at the hospital. The Health Sciences Library is located at MMC, and MMCRI also has an on-site 675ft² journal library. There is a 1035ft² conference room which can be divided into three separate rooms. A 300ft² break room is provided. There is an additional 300ft² office/conference room designated for CMM use on the second floor. Videoconferencing is achieved via H.323(IP), and we can both receive and initiate connections to compatible systems. In addition, personnel in the Clinical Engineering and Quality Control Departments at MMC are available to come on-site to repair and calibrate equipment such as refrigerators, centrifuges, pH meters, scales, and pipettors.

Major Equipment: List the most important equipment items already available for this project, noting the location and pertinent capabilities of each.

With the exception of crystallographic and equipment for similar structural analysis, the Center for Molecular Medicine is well equipped to perform any aspect of modern cell and molecular
biology research. All individual laboratories contain centrifuges, refrigerators, freezers, water baths, electrophoresis equipment, PCR machines, and microscopes. Shared equipment areas contain ultracold freezers, high speed centrifuges, ultracentrifuges, luminometer, phosphoimager, liquid nitrogen storage units, a facility for work with radioactivity, ice machine, autoclaves, water purifiers, fume hoods, liquid scintillation counter, cell harvester, spectrophotometer, X-ray film developers, incubator shakers, ELISA plate reader, coulter counter, UV transilluminators, gel dryers, and hybridization ovens. Shared equipment areas are on each floor.

Automated Magnetic Cell Sorting (MACS) (Miltenyi Biotec): This system (obtained in 2004) is an automated bench-top magnetic cell sorter that sorts up to 10 million cells per second from up to 4x10⁹ total cells (selection or depletion) and is useful for the isolation of virtually any cell type (eg, cytokine-secreting cells, dendritic cells, disseminated tumor cells & transfected surface-tagged cells) for which relevant antibodies exist. To date this system has been tested and optimized using hematopoietic progenitor cells, and is now on-line for all COBRE investigators, and projects.

The Protein, Nucleic Acid Analysis and Cell Imaging Core (Vary) contains an advanced proteomic core facility including a Voyager matrix-assisted laser desorption ionization (MALDI) time-of-flight (TOF) mass spectrometer (Applied Biosystems, ABI), Qstar Pulsar quadrupole TOF tandem mass spectrometer (qTOF, ABI-PerSeptive Biosystems) equipped with a nanospray ion source (Protana), Icyycler real time PCR machine (Bio-Rad), two model 310 DNA sequencers and one Model 3100 DNA sequencer (ABI). Instrumentation approved for purchase in fiscal year 2005 includes a nano-LC liquid chromatographic system (Dionex) to enhance qTOF-based analyses, a microarray chip reader (Axon), and an RNA isolation workstation (Autogen). All equipment is located on the ground floor, or in the Vary lab on the second floor. Radiation facilities are located on the ground floor. All equipment is either within the investigators laboratories or in common areas throughout the open laboratory space, accessible to all laboratories.

Transgenics: The equipment available for the Mouse Transgenic and Magnetic Resonance Imaging Core (Liaw), all located in the Animal Facility of the ground floor include: two Zeiss Axiovert S100 microscopes, complete Eppendorf microinjection system, Kinetic Systems air table, two Zeiss Stemi 1000 stereomicroscopes, Fostec light sources, and a Hitachi black and white camera with monitor, and a CO2 incubator. The injection set-up is suitable for pronuclear injections of fertilized oocytes, injection of embryonic stem cells into blastocysts, and injection of adherent cell cultures. This equipment is housed in a room designated for microinjection and embryo transfer. Also available is the Bruker Biospin MRI Pharmascan model; 70/16 magnetic resonance scanner (100 m resolution allowing imaging of small anatomic abnormalities (Installation in 2005)).

The Flow Cytometry Facility (Ault) is comprised of three Becton Dickinson flow cytometers, the FACScan, FACSCalibur and FACS Vantage. While all three are equipped with air-cooled Argon lasers, the FACSCalibur has an additional red diode, which adds a fourth fluorescence channel. The FACS Vantage with two additional lasers, the HeNe and UV, has the capability of processing up to eight fluorescence and two scatter channels. Its digital upgrade, FACSDiva, enables high
speed cell sorting into four tubes simultaneously. The facility is located on the first floor.

The Confocal Microscope Facility (Prudovsky) located on the ground floor contains the Leica confocal microscope TCS-SP. The system includes an upright and an inverted microscope for observation of fixed and living cells. The inverted microscope has an attachment chamber with regulated temperature and CO2 content. The microscope was recently upgraded with an addition of a unique 430nm laser. The facility has an Eppendorf single cell injection apparatus mounted on an inverted Leica microscope.

The Pathology Core (Lindner) located on the second floor includes: tissue processor, paraffin embedding station, 2 microtome (one motorized), cryotome, vacuum oven, microscopes, digital camera set up for microscopy, staining stations in a fume hood and Zeiss Axioskop photomicroscope for bright field, dark field, and immunofluorescence.

The Cell Culture and Viral Vector Core Facility (Mouta) located on the first floor includes: a dedicated tissue-culture room (144ft2, rated BL-2), two laminar flow hoods (Sterilgard III Advance), four tissue-culture incubators (Heraeus Hera Cell), refrigerator for storage of specialty media and reagents within the tissue-culture room (VWR), ultracentrifuge for viral elutriation (Beckman Optima XL-100K), bench-top clinical centrifuge (Sorvall Legend T), Magnetic Cell-Sorter (Invitrogen), two Boyden Chambers (Neuro Probe A Series 96 well Chemotaxis Chambers), water bath (Isotemp 220), Bright Field Microscope (Zeiss), Chromatography Column (Model C-26/40), AC26 Adaptor and RC26 Reservoir for Purification of Human Fibronectin (Amersham-Pharmacia Biotech), Orbital Shaker (25x25 cm, Bellco Biotechnology).

MOUNT DESERT ISLAND BIOLOGICAL LABORATORY

Site History: The Mount Desert Island Biological Laboratory (MDIBL) is located in Salisbury Cove, Maine, on the shores Frenchman’s Bay in the Gulf of Maine. It is among the oldest cold-water marine laboratories in the eastern United States. The Laboratory was founded in 1898 in South Harpswell, Maine. The MDIBL has a growing year-round research program based on the historical strength of its summer research program. The Marine DNA Sequencing Center and the Center for Functional Marine Genomic Studies were established in 1999 and the Comparative Toxicogenomics Database was established in 2001—marking the beginning of MDIBL’s efforts to expand its year-round scientific program.

The MDIBL has long been an international center for studies in the comparative physiology and biochemistry of osmoregulation, renal function, and epithelial transport in vertebrates and invertebrates. The Laboratory is also the site of research groups investigating a broad range of other basic biological topics, e.g., the physiology of cell division in marine invertebrates, neurotransmitter synthesis and release, G-proteins and signal transduction mechanisms, the regulation of steroidogenesis in the fish ovary, acid-base balance and osmoregulation in euryhaline fish, sensory and neural physiology and embryogenesis, the role of inorganic and organic solutes in cell volume regulation, neonatal and adult cardiac electrophysiology, amino acid transport and metabolism in marine invertebrates and vertebrates, and sea bird nutrition and ecology. Specimens collected and studied at the Laboratory were recently the source for the
cloning of two new electrolyte transport proteins and unique G protein coupled receptors, as well as the isolation of a novel antibiotic (squalamine).

Biological Resources: The relatively undisturbed ecology of the Mount Desert Island area provides a unique setting in which to investigate a wide range of fundamental biological questions. The Laboratory owns over 200 acres consisting of extensive shorefront, a freshwater lake, marshland, old-growth fields, and forest in various successional stages, including climax communities. The marine environment is particularly rich. Gulf of Maine tides range nearly four meters in Frenchman Bay and contiguous waters, and provide a diversity of marine habitats including open water, rocky shores, tidal streams, salt marshes, mud flats and sea grass beds.

The lack of significant pollution allows the use of local species for investigations. Species which have been used in recent years include: Ilyanassa obsoletus, Cancer borealis, Cancer irroratus, Cancer maenas, Homarus americanus, Asterioa vulgaris, Echinarachnius parma, Strongylocentrotus droebachiensis, Cucumaria frondosa, Boltenia ovifera, Myxine glutinosa, Squalus acanthias, Raja erinacea, Fundulus heteroclitus, Lophius americanus, Pseudopleuronectes americanus, Myoxocephalus octodecimspinosis, Alosa pseudoharengus, Glycera dibranchiata and Salmo salar. A local fisherman is contracted to provide larger vertebrates to Laboratory investigators. Invertebrates and small vertebrates are abundant in the waters near the Laboratory and are usually collected by investigators and MDIBL staff.

Danio rerio is available through the MDIBL Zebrafish Facility. Several strains are available including: wildtype, golden, neomycin-resistant, albino YFP transgenic, and albino YPF/golden. Golden and neo strains are highly inbred, going back 20 generations.

Scientific Resources: Three major research Centers support these scientific cores and units. The research centers include: the Center for Membrane Toxicity Studies (established in 1985) is a Marine and Freshwater Biomedical Sciences Center of the National Institute of Environmental Health Sciences; the Maine Biomedical Research Infrastructure Network (established in 2001) is a biomedical research and training network comprised of Bates College, Bowdoin College, Colby College, College of the Atlantic, MDIBL (lead institution), The Jackson Laboratory, and The University of Maine, and is based at MDIBL; finally, the Center for Marine Functional Genomic Studies (established in 1999) guides MDIBL’s overall research efforts and provides support through state and federal sources.

Animal Services Core. Because MDIBL investigators utilize species from a marine environment, an Animal Services Core is in place to provide the highest level of care for research animals. The Laboratory's animal holding facility is comprised of 24 different circular tanks that range in size from 45 gallons (3’ dia.) to over 5,000 gallons (16’ dia.). All tanks are ‘flow-through’ and are supplied with ambient temperature seawater pumped directly from the nearby ocean. Freshwater or variable salinity systems are also available. A full-time technician provides animal care and monitors environmental conditions within the system.

Bioinformatics Core. The Bioinformatics Unit provides analysis tools for the interpretation of sequence data and design of molecular reagents. The function of the Bioinformatics Core is to: 1) develop the Comparative Toxicogenomics Database (CTD); and 2) provide technical support
and access to a collection of analysis tools for designing molecular reagents and analyzing genomic and proteomic data.

The major initiative of the Bioinformatics Core is to develop CTD. CTD will be the first publicly available database to: 1) annotate genomic and proteomic data in a toxicological context; 2) provide a platform that facilitates phylogenetic and comparative studies of toxicologically significant genes and proteins from diverse species, including mammals and aquatic vertebrates and invertebrates; and 3) create a centralized resource for information about molecular reagents used in toxicogenomic research. The goal of this project is to facilitate studies evaluating the significance of conserved sequences, polymorphisms, the genetic basis of variable toxicity, molecular evolution, and environmental adaptation. CTD is being developed in collaboration with investigators at other NIEHS sponsored Marine and Freshwater Biomedical Sciences (MFBS) Centers, and other scientists with expertise in molecular biology, toxicology, and informatics. Bioinformatics databases are curated on a Sun Ultra 60 workstation and a Sun Sunfire 280R with D2 disk array. Data back-up services are provided by a Sun StorEdge L9 autoloader.

Cell Isolation, Culture and Organ Perfusion Core. The Core provides expertise, equipment, and services related to established cell lines or primary cell cultures as well as the development and characterization of novel cell lines. This includes gene transfection and expression, in vitro assays, media formulation, microinjection and cell banking. Many established animal cell lines are stored and available. The facility houses several inverted phase microscopes including a Zeiss Axiovert 200 fluorescence microscope with an Axiocam MRm digital cooled camera as well as laminar flow hoods, incubators, a Coulter counter, centrifuges, an electroporator, liquid nitrogen cell storage tanks, and a FACSCalibur flow cytometer. The Axiovert microscope will soon be fitted with DIC, micromanipulators for microinjection experiments.

At present, there are no established cell lines from marine species that have been developed by commercial or private sources. The Cell Lines Unit is establishing these marine cell lines for ongoing and future expression and transport studies of marine model organisms. Established cell lines include cells from puffer fish (Fugu rubripes eye and Fugu crysops fry) and moray eel (eye and tumor). New cell line development is currently focused on the following tissues: shark rectal gland, spiral gland, kidney, spleen, brain, eye and skate embryo and yolk sack. Long-term primary cultures already exist for some of these tissues. Freshwater fish cell lines are available as well. Organ perfusions are executed in four isolated gland perfusion stations in the Neal Laboratory.

Gene Expression Unit. Gene expression and microarray analysis is conducted in the Gene Expression Unit. Single-gene expression analysis is offered using the Stratagene MX4000 Real-Time Quantitative PCR system. A GeneMachines OmniGrid Accent arrayer with 12 spotting pins is equipped to print up to 30,000 DNA spots on a treated microscope slide. Three 96- or 384-well plates can be processed simultaneously without manual intervention, printing up to 50 replicate slides during a run. Investigators supply their library clones, PCR products, or oligonucleotides in a format specified by the Unit staff. Binding of labeled cDNA to the printed arrays is visualized on an Axon GenePix 4000B scanner and the resulting images are analyzed with GenePix Pro 4.0 and Acuity 1.0 software in consultation with the DNA Facility staff.
Marine DNA Sequencing Center. The Marine DNA Sequencing Center provides next business day sequence analysis to investigators on- and off-site. Sequence analysis is performed on two 16 capillary ABI 3100 model DNA Sequencers. Thermal cycling reactions are performed on three MJ Research DNA Engines, two of which have gradient capabilities. An Agilent 2100 Bioanalyzer is available for analysis of RNA quality and quantity. The facility also makes use of a Beckman-Coulter Biomek 2000 robotic workstation for 96-well plate PCR reaction set-up and post-reaction purification. The Center provides a centralized oligonucleotide ordering service and stocks common primers for investigators.

Imaging Core. The Imaging Core houses two confocal microscopes—an Olympus Fluorview with Ar and Kr lasers, and an Olympus IX70 Fluorescence microscope. They are capable of imaging dual-labeled samples in fluorescence mode as well as bright field, phase and DIC. Image analysis is further supported by specialized software within the Olympus package, as well as freestanding Mac and PC image analysis workstations. A variety of leading instruments have been made available during and after the Quantitative Fluorescent Microscopy Course, held annually at MDIBL the third week of June.

Instrumentation Core. The Instrumentation Core maintains the basic laboratory equipment that investigators would not otherwise be able to easily bring to the laboratory. Major common use equipment includes mass absorption spectrophotometer, two vapor pressure osmometers, various pH meters, Fluro IV flurometer, IL 943 flame photometer, Dynatech MR5000 microplate reader, and two −20º C freezers; common molecular biology equipment includes common use PCR machines, vacuum ovens, gel-dryers, incubators, hoods, spectrophotometers and centrifuges (high speed and ultra). Other major equipment is identified under Scientific Resources.

Oocyte Expression and Electrophysiology Unit. The Oocyte Expression and Electrophysiology Unit makes available specialized equipment and expertise required to perform electrophysiological assays on cells and tissues and to utilize the Xenopus oocyte expression system for the purpose of conducting mechanistic studies of the molecular basis of membrane transport. The Unit provides vibration-free tables, a two-microelectrode voltage clamp setup for oocyte recording, an Axon Geneclamp-500B amplifier, Digidata 1322A A/D D/A converter, pClamp 8 software, and Pentium 4 computer for data acquisition and analysis. There is also a Sutter P-87 electrode puller and Narashige microforge for electrode and pipet fabrication.

Research Staff and Scientific Environment: Ten principal investigators operate year-round laboratories at MDIBL in the areas of bioinformatics, marine cell lines and stem cells, crustacean physiology and genomics, renal development in marine species and osmoregulation. Seasonal investigators of the MDIBL come from a variety of university departments and research institutes in the United States and Europe. Among marine stations, the Laboratory is unique in affording the opportunity for basic scientists and clinical investigators to interact daily in an intense and close-knit laboratory setting, cooperatively directing their efforts to the solution of fundamental biological problems. During the summer of 2005, 85 doctoral level scientists (including 58 investigators), plus associates, students and technical staff worked at the laboratory. Within this scientific cadre were 71 Ph.D.s and 16 M.D.s. Two investigators held more than one doctorate; 11 held appointments as Chairpersons, Directors, or Chiefs of their
respective academic/research units, an indication of the high stature of MDIBL research staff. In 2004, 55 Principal Investigators (PI) at MDIBL received a total of 117 grants, including 67 grants from the NIH and 18 from the NSF. In 2003, 51 PIs have received 115 grants - 48 from NIH and 14 from NSF. These outstanding federally-funded scientists are proven excellent mentors for developing scientists, including junior faculty, undergraduate students, graduate and medical students, and postdoctoral fellows.

Present Facilities: Laboratories. There are 9,400 ft² of research space in 11 major laboratory buildings. Laboratory space is both year-round and seasonal. Sixty percent (6,004 ft²) of laboratory space is available for year-round research. The individual laboratories are supplied with benches, sinks, electric outlets, telecommunication and LAN ports, epoxy-poured or concrete floors, shelving, refrigerators, and adjacent or internal running seawater troughs. Newly renovated labs are climate-controlled.

Conference and Videoconference Facilities. The MDIBL Conference Center is comprised of an auditorium (1998) linked to a renovated, historic, one-room schoolhouse. Dahlgren Hall, (circa. 1875) is an 864 ft² winterized lecture hall seating 120 people. The Maren Auditorium is a 155 fixed-seat auditorium, and has been utilized in over 60 courses and conferences since its construction in 1998. Maren Auditorium is also equipped with new telecommunications infrastructure including a state-of-the-art ATM Internet connection for real-time video conferencing and facilities for large-screen projection and digital presentation.

Residential accommodations for Students and Principal Investigators. The MDIBL COOP is a seasonal dining hall, run by a professional cook, and serves as the social center of the Laboratory. Eighteen cottages and six efficiency apartments house Investigators. Eighty-two students can be housed on campus simultaneously, 32 in two newly constructed residence halls and 50 additional students housed in converted family dwellings.

Computer: GillNet is the institutional local area network providing 100 Mbps Fast Ethernet over a fiber optic and Category 6 copper backbone. Filesharing, backup, SSH, POP, DHCP, IMAP, SMTP, HTTP, and DNS services are currently in place on enterprise-level Sun and Dell servers. Nightly file backup and recovery is accomplished with a Sun L9 StorEdge tape autoloader. A high bandwidth ATM circuit is provided by UNET, through the University of Maine System’s wide area network. An Information Systems Group is in place to provide desktop troubleshooting and helpdesk services, as well as systems administration.

Major Equipment: Major common use equipment includes a mass absorption spectrophotometer, two vapor pressure osmometers, various pH meters, Fluro IV fluorometer, IL 943 flame photometer, Dynatech MR5000 microplate reader, and two –20°C freezers; common molecular biology equipment includes common use PCR machines, vacuum ovens, gel-dryers, incubators, hoods, spectrophotometers and centrifuges (high speed and ultra). Other major equipment is identified under Scientific Resources.
THE UNIVERSITY OF SOUTHERN MAINE

The University of Southern Maine is the largest of the seven campuses of the University of Maine System, as well as one of the oldest, with its founding in Gorham in 1878. USM is a major educational force in the overall growth and improvement of the economic, civic, social, and cultural fabric of southern Maine. From its campuses in Portland, Gorham, and Lewiston, USM offers baccalaureate, master's, and Ph.D. degree programs, providing students with rich learning opportunities in the arts, humanities, politics, health sciences, business, mass communications, science, engineering, and technology.

Facilities available related to the GSBS

Animal:
The USM animal facility occupies 3000 square feet with areas for fish and rodent housing, a separate rodent surgical area, an isolation room, storage for feed and bedding, an administrative area, and several facility support areas. The animal facility provides husbandry and technical support services to principal investigators and their assistants. Animal care is provided by an AALAS-certified registered laboratory animal technologist and a consulting veterinarian. The facility and all laboratory animals are maintained in accordance with the guidelines set forth by PHS policy and in the Guide for the Care and Use of Laboratory Animals.

Rodents are housed in an 890 square foot barrier section of the animal facility. Entrance to this part of the facility is restricted to properly trained personnel. Three rodent rooms each contain 4 mouse racks or 4 rat racks. Each mouse rack can hold 140 mouse cages and each rat rack can hold up to 30 rat cages for a total of 560 mouse cages or 120 rat cages in each rodent room. Overall, the rodent housing area can hold over 1600 mouse cages or 360 rat cages. All animals are maintained in a micro-isolator caging system to protect them against microbial exposure. Also included in the barrier facility are a sterilizer room (~127 square feet) and a rodent procedure room and surgical suite of 135 square feet. One rat and one mouse room in the barrier facility are currently assigned to the PI. A quarantine room is adjacent to the barrier facility. This room is used to isolate animals shipped to USM from other institutions or to house animals with known pathogens. Quarantined animals are also maintained in a micro-isolator caging system.

Service areas in the animal facility contain clean and dirty cage wash areas, feed/bedding storage, an administrative area, and a sterilization room on the barrier side of the facility. The cage wash and preparation areas feature a double door cage and rack washer providing separate spaces for soiled and clean equipment in two different rooms. An autoclave is located in the clean cage area and also has double doors. The cages and water bottles can be easily placed into the autoclave after preparation and unloaded directly inside the barrier area after sterilization. The barrier side of the autoclave room serves as a storage area for a backup supply of sterilized cages and water bottles. The feed and bedding areas have over 120 square feet of storage space and the administrative area houses three technician stations. Personnel can complete tasks without leaving the animal facility. An unassigned area of 450 square feet adjacent to the animal facility could be utilized as additional animal housing or expanded rodent behavioral assessment laboratory.
The designated fish room has approximately 450 square feet of space. Fish can be housed in bench-top or multi-rack tank systems made by Aquatic Habitats. In total, the fish room has a 450 gallon capacity in 192 tanks with the availability of both fresh and marine tanks.

Computer:
Each laboratory staff member, full-time technician, post-doc or visiting scientist is provided with an up-to-date computer, attached to printers, data storage servers and the campus-wide network. Undergraduate students and interns share computers. Analytical instruments are connected to computers dedicated to their use and configured to access the shared data network. All microscopes in the microscopy suite are connected to digital cameras and imaging software. Two of the microscopes are part of automated systems to scan specimens for metaphase spreads and “comets” for measuring genetic damage. These systems are capable of unattended operation and processing large numbers of slides without user intervention. Computers are fully equipped with a suite of software including office and data software, e-mail, internet access and connection to a central data server.

The central data server is located on an adjacent floor and is accessed across the building-wide network. A full-time IT staff monitors the operation of the network and provides computer and software support to users. The network contains a 14 terrabyte storage server with redundant drives and automated backup server.

Other:
A full time administrative assistant is available to assist with clerical, travel and other duties.
USM provides support for photography, graphics and computer support through those departments at the University.

USM’s modern, 7-story library has current subscriptions to the leading journals in the field. Electronic access to the library’s catalog, searchable databases, and interlibrary loan system is available from each workstation.

The immediate environment at USM and throughout the MCTEH offers the opportunity to collaborate with a dynamic faculty with wide ranging expertise in toxicology, epidemiology, cancer research, genetics, molecular biology, bioethics, virology, biostatistics and other related fields. The larger environments provided by connections to Brown, Dartmouth, Harvard, Yale and the University of Connecticut offer access to additional resources.

Major Equipment:
Major equipment includes a Coulter Multisizer 3 for cell counts and particle sizing, 4 Zeiss and two Olympus light microscopes, three of which are is capable of light and fluorescence microscopy and photography, and a Pentium III computer equipped for image analysis including Viscomet for analyzing the comet assay, an Olympus fluorescent, inverted, phase microscope with imaging system and a firewire digital camera, an NPE analyzer that can determine cell number and position in the cell cycle, 2 refrigerated centrifuges, water baths, balances, refrigerators, freezers (-20°C (2), -70°C (3) and liquid nitrogen (3)),3 Biometra PCR machines, each with a temperature gradient block and 96-well capacity plus a 384 well capacity block, 1
Hybaid PCR machine with 96 well capacity, a Packard robotic arm, a Perkin Elmer Microarray Scanner, a Syngene GeneGnome chemiluminescent imaging system and darkroom for UV imaging, computers with image analysis capability, agarose and acrylamide gel electrophoresis units with power supplies. MCTEH is well equipped to perform modern toxicological and epidemiological research, spectrophotometers, speed vacuum centrifuges, lyophilizers, luminometers, gel imaging systems, pH meters, balances HPLCs, Gamma and scintillation counters, autoclaves, water purification systems, and ultra and super speed centrifuges with multiple rotors, among others.

Cellular And Molecular Imaging Core
The cell & molecular Imaging core facility is comprised of: the Flow cytometry Suite which consists of a BD FACS Calibur 2 laser 4-color system. Also available are CellqQuest 4.0, Winlist 5.0, and MODfit software packages for data analysis. The Confocal Microscopy suite consists of an Olympus FV300 laser scanning confocal microscope system attached to an Olympus IX-81 motorized inverted microscope. The FV300 LSCM is equipped with 4 lasers capable of generating 6 excitation wavelengths (405 nm, 458 nm, 515nm, 543nm, & 633nm) and 3 PMT detectors (2 fluorescent detectors & 1 transmitted light detector). The Calcium Imaging suite consists of an Olympus IX-71 inverted microscope with fluorescent illumination equipped with a Hamamatsu Orca ER CCD camera and a Vincent Uniblitz shutter wheel and controller. A dedicated computer running IP Labs Image analysis software controls both image acquisition and the shutter.

Gene Expression Core
This core facility contains an ABI 310 automated capillary DNA sequencer, a LiCor Odyssey infrared imager, an Agilent bioanalyzer, a Syngene Bioimaging system, a Nanodrop ND-1000 nucleic acid spectrophotometer, an Axon GenePix 4200A 4-color microarray scanner, and a Stratagene MX4000 quantitative PCR thermocycler.

THE UNIVERSITY OF NEW ENGLAND COLLEGE OF OSTEOPATHIC MEDICINE
The University of New England is a private institution comprised of three colleges housed on two campuses. The Biddeford campus overlooks the Saco River as it flows into the Atlantic Ocean and houses the Colleges of Osteopathic Medicine and Arts and Sciences. The Westbrook campus in suburban Portland is home of the College of Health Professions, which offers undergraduate programs in dental hygiene and nursing and graduate programs in nurse anesthesia, occupational therapy, physical therapy, physician assistant, and social work.

Center for the Integrative Study of Pain
The mission of the Center for the Integrative Study of Pain is to reduce the burden that acute and chronic pain have on human health and wellness through research, education and the practice of medicine. Combining the resources of all three colleges, the center emphasizes translational research medicine from basic molecular mechanisms of the pathology of acute and chronic pain states, to development of novel medications and non-pharmacological treatments for pain, ultimately bringing these efforts to the clinical practice of medicine.
The College of Osteopathic medicine houses a comprehensive core facility for preclinical studies on pain and drug addiction. Laboratories in Stella Maris are well equipped for techniques in molecular biology, histology and immunohistochemistry. The Additional laboratories of are equipped with electrophysiology rigs for performing in vivo single unit neuronal recordings in rodents, in vivo microdialysis in rodents, and assaying various monoamine neurotransmitters in the central nervous system. Several laboratories are well equipped for studying pain elicited and pain suppressed behaviors, including chronic inflammatory and neuropathic pain states. The core facilities also include a surgery suite and fully automated equipment for measuring locomotor behavior, learning and memory, and drug reinforcement and whole body plethysmography.

The Harold Alfond Health Sciences Center houses additional core facilities in analytical and synthetic organic chemistry and molecular biology. The center houses the osteopathic manipulative medicine laboratory and six additional clinical offices for seeing patients. The state of the art anatomy laboratory features a fresh tissue facility that is frequently used by anesthesiologist and pain specialists for practicing clinical techniques. The center also houses robotic patient simulators.

The Biomechanics Research Laboratory (BRL) at the University of New England, which is located on the Portland Campus, is equipped to study a wide array of issues related to human movement. The lab consists of a 4- Camera motion analysis system, an electromyography system (which measures muscle activation levels) and a force plate (which allows researchers to determine force characteristics within the foot and lower extremity during standing or movement). The lab also includes two balance devices that are used to assess how well a patient is able to shift their weight when adjusting their balance under a variety of conditions. Current studies being conducted in this lab focus on improving functional outcomes in rehabilitation through the development of novel therapeutic devices and/or interventions. For instance, several studies are being conducted which examine the effect of balance training on reducing the risk of falls during walking in individuals with transtibial amputations. Additional studies involving this patient population are in the area of improving prosthetic design. Other studies have included identifying muscle activation patterns during common shoulder exercises to improve treatment efficacy, ergonomics, and improving treatment of peripheral nerve injuries.

Center for the Study of Metabolic Disorders
The Center for the Study of Metabolic Disorders contributes to the focus on primary care, because patients with diabetes and metabolic syndrome and their complications comprise a major portion of a primary care practice. Diabetes is a multifactorial disease and is often complicated with co-morbidities such as hypertension and obesity. To the extent that type 2 diabetes is more prevalent in older individuals, the activities of the Center will also contribute to the geriatric focus area of UNECOM. Type 2 diabetes is a progressive, multifactorial disease which typically involves co-morbidities such as dyslipidemia, obesity, hypertension and insulin resistance. The Center’s research efforts are directed toward developing programs to evaluate the consequences of diabetes (and metabolic syndrome) on heart disease. These research efforts are directly in line with UNECOM’s commitment to primary care.

The cardiovascular research laboratories are equipment with video microscopy designed to
assess single muscle cell mechanical activity and dynamic calcium transients (fluorescent microscopy), molecular biology measurements (including spectrophotometry and immunoblotting), apparatus to isolate heart muscle cells and assess whole heart function, maintain sterile cell cultures, specialized electrophysiology equipment for whole-cell patch clamp measurements and video microscopy, scintillation equipment, film developer, and PCR machine. A separate laboratory is conscribed as a radioactive room for glucose uptake and metabolic measurements using 32P isotopes. Whole heart function is assessed ex vivo with Langendorff perfusion apparatus.

Therapeutic strategies to prevent/reverse metabolic disorders are used routinely in whole animal studies and include; dietary supplementation, subcutaneous implantations, exercise protocols (exercise wheels). Metabolic status is evaluated with standard ELISA assays, glucose and insulin challenges, and radioisotope tracers.

Animal Facilities
The University of New England has recently constructed a new animal facility, and maintains a valid Assurance with the NIH's Office of Protection from Research Risks (OPRR). This new animal facility houses rodents, and is equipped with automatic water system, quarantine area, surgical suite, and behavioral testing areas. The facility is in compliance with PHS policy on care and use of animals for research, using the Guide for the Care and Use of Laboratory Animals as our criteria for compliance with OPRR rules.
Envisioning the Future
Today, more than 110,000 alumni of our universities are living and working in Maine, contributing more than $2.5 billion annually to our State economy. Those alumni with bachelor’s degrees will average more than $1 million in additional lifetime earnings than the average person with just a high school degree. The average earnings of alumni with graduate degrees are even higher. We must make this opportunity come to reality for thousands more Mainers who want to live, study, and work in the place they call home.

The System also recognizes the importance of its role as an economic engine for the State of Maine. Increasing the number of Maine residents with baccalaureate and graduate degrees is critical to helping Maine improve its economic status and to assisting individuals to improve their earning power. Increasing research capacity and funding will not only enrich the University System and enhance faculty and student experiences, but also support the development of new businesses for Maine.

The UMS Strategic Plan states its intent to…
Support a land- grant/sea- grant research university with state-wide and national responsibilities, including primary responsibility as Maine’s graduate- level, research, and public service outreach institution.

UMS Strategic Directions
Strengthen and leverage research throughout the State to ensure greater breadth and depth of research. Develop a greater capacity to use research, scholarship, and creative expression to enhance Maine’s economy. Generating innovative, sponsored research is a critical factor in Maine’s economic development. Top quality graduate programs and research programs will attract resources and businesses to the State, helping to fuel the economy and contribute to growth. The System is committed to strengthening sponsored research throughout the System, particularly at the University of Maine and the University of Southern Maine—both as a way of enhancing the educational experience of faculty and students, and because research and development are such important contributors to economic growth.

Enhance students’ educational experience. At the heart of this strategic direction is a commitment to expand and improve educational opportunities for students. By restructuring the System and better defining each institution’s mission and niche, it will be easier for students to make choices about the type of institution that will best meet their needs. Furthermore, with enhanced collaboration between and among institutions, students will have access to greater academic offerings, including expanded graduate programs and expanded options for Distance Education.

From the minutes to the January 2005 BoT meeting
In addition, the Board received a preliminary report on the proposed establishment of the University of Maine Graduate School of Biomedical Sciences. According to Westphal, the new
program would serve as the organizational framework for the further development of research and doctoral-level education in biomedical science and associated academic and scientific fields. As explained by UMaine's interim president, Robert A. Kennedy, the new graduate school initially would be comprised of faculty and scientists from UMaine, The Jackson Laboratory, Maine Medical Center Research Institute, and Mount Desert Island Biological Laboratory. USM faculty would also be involved as part of this initiative, Kennedy said.

“Together we will be nationally competitive to attract and create the human capital that is absolutely essential to the growth of [biomedical research] in this state,” Kennedy explained.
Retention is a significant issue on college campuses. At UMaine, a pilot program in 2004-05 has blossomed into an integrated, campus-wide initiative. In 2004-05, the staff, through a supportive and directive retention pilot program, identified behaviors and traits that could lead to retention or persistence problems while strengthening and reinforcing behaviors and traits which were likely to ensure success. By establishing caring and supportive relationships early in students' academic careers, well-trained retentionists attempted to identify students' needs, attitudes, motivational patterns, resources, coping mechanisms, and receptivity to intervention.

The program was staffed with six retention specialists who were tasked with meeting first-year students within the first six weeks of the semester. After that meeting, students and staff met periodically as necessary. Staff and faculty were encouraged to make referrals as well.

Questions related to college preparedness and adjustment were answered at the first meeting. These meetings were informational for both the retentionists and the students. In addition, the meetings provided key talking points for future student contacts. Every first-year student was contacted by e-mail on average four times and nearly 1,300 students were seen for one on one visits through the program. These students earned significantly higher grade point averages (GPAs) in both the first and second semesters. Additionally, group programs were held in residence halls and the Memorial Union. A number of complicated life problems were uncovered ranging from separation concerns to psychological problems, to financial issues, family concerns, and so forth.

The Retention Advising Program (now Connections) identified goals for the inaugural year of the program. These included:

1. Assess students' need and strengths;
2. Identify at-risk students;
3. Recognize students' motivational patterns;
4. Use information to implement successful referrals and intervention to programs and services;
5. Enable retentionists to have contact with first-year students early in their first semester and throughout the academic year.

The overarching goals of the program were to reduce drop-outs and to have a positive impact on students. By helping students deal with academic issues, make social connections, and access support services, retentionists made real connections with students. Based on the feedback that was received, the program was very well received by students, faculty, staff, academic administrators, and parents.

In 2005-06, the primary goal of the Connections Program is to improve UMaine's retention rate incrementally each of the next five years. To that end, Connections refined its approach by reaching out to those students most at risk first. We also joined forces with our academic colleagues and other Universities through our participation in the MELMAC grant. This year is a planning year. The grant period of five years begins in earnest next year. To identify highly at risk for dropout students, Connections used the Noel-Levitz's College Student Inventory (CSI). This survey was administered to first-year students during their first weekend at UMaine. Noel-Levitz scored the surveys and sent back results within a week. Armed with this information, the Connections staff began contacting and meeting with high-risk students as identified by
the CSI. Further, CSI information was shared with academic associate deans and the director of the Explorations Program as well as certain Student Affairs staff members. To help reach all first-year students early in the fall semester, Resident Directors (RDs) were trained to discuss CSI results and reports with students. RDs then began contacting and meeting with first-year students in their halls.

To maximize the use of the CSI, the Connections Advisory Committee, a broad – based campus constituency group) was formed and meets regularly. The purpose of the advisory committee is to provide input and feedback about the Connections Program and its initiatives. Some of these initiatives have included: reaching out to first-year, out-of-state students during break periods through resident assistants (RAs) and resident directors; developing and offering study success seminars (time management, test taking, note taking, etc.); identifying students who have failing grades on preliminary exams, and helping students who failed to register for spring semester classes.

A key improvement in the Connections Program this year has been greater involvement with Academic Affairs. Tremendous support and cooperation by deans and faculty have led to the development of an extensive network of support for students. Regular consultations about issues and specific students have built stronger relationships resulting in an improved network which has lead to early intervention for students in trouble and the development of safety networks spread throughout the University. We continue to refine the program. There are plans in play for a top to bottom review of retention efforts, the development of a first year academy for faculty teaching large first year classes, expanded use of the CSI, and development of a more coherent first year experience.

**BUDGET**

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<td>Office renovations &amp; asbestos removal</td>
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<td>Noel-Levitz College Student Inventory</td>
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<td>Retention Summit @ MBNA</td>
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### Interdepartmental

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<td>Retention training programs for task force</td>
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### Equipment

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**Total**                                                   | **$101,426.00** | **$119,572.00**
Revised Financial Aid Strategies

Last year UMaine changed the awarding parameters for the Top Scholar Merit Scholarship Award. In the prior year the top Scholar award had been awarded to the valedictorian and salutatorian from each accredited Maine high school. The change for this fall's class (entering first-year students in fall 2005) was to make this award to the very best of the entering class who applied by February 1st, 2005 as measured by a combination of class rank, SAT Score and cumulative grade point average (when no class rank was available).

For the coming fall's class (first-year students entering in fall 2006) we have made several changes to our merit awarding program. We are now giving priority for all merit awards awarded by the admission office to those students applying through our early action program. The early action deadline date of December 15 corresponds to one of the dates used in the past for a merit award deadline date. We eliminated the use of two merit award deadline dates (December 15 and Feb 1), because of the confusion it caused, in favor of using early action as a priority date. If all of our funds are not expended by the early action pool then we will continue to make awards on a rolling basis until the funds have been expended. This allowed us to make merit awards earlier in the process and in some cases to include them with the offer of admission letter. It should reduce the occurrence of our making some awards early (the December date) and then taking them away when the student qualified for another more generous award later in the cycle (the February date).

As a result of the Scannel and Kurz report, we have increased the amount of our two merit awards dedicated to out-of-state students. The Presidential Scholarship (for the top 10% in their high school class with combined SAT critical reading and mathematics scores of 1250 and above) was increased from $7,500 to $10,000. The Dean's scholarship had its parameters changed from the top 20% with combined SAT critical reading and mathematics scores of 1150 or better to the top 40% and combined SAT critical reading and mathematics scores of 1100 or better. Its award amount increased from $3750 to $5,000. These changes should help us increase both our percentage of out-of-state students and our overall average SAT scores.

Results for the changes adopted in the Spring of 2004 for the entering class in 2005 have been quite positive. Out of state enrollments have surged in excess of 20%, undergraduate enrollments, graduate enrollments, and doctoral enrollments are all at record levels.
Introduction: The Center for Tourism Research and Outreach (CenTRO) is supported by State funds from the Department of Economic and Community Development as well as funds from the University of Maine System via the University of Maine and the University of Southern Maine. Further, CenTRO is supported by contributions from the state's tourism industry through 6 trade associations, the Maine Tourism Association, the Maine Innkeeper's Association, the Maine Restaurant Association, the Maine Merchants Association, the Maine Campground Owner's Association and the Ski Maine Association. State cash match to the Center for Tourism Research and Outreach this year is $100,000 from the Tourism Marketing Promotion Fund.

Tourism has become one of Maine’s most important industries, generating over $344 million in tax revenues and $2.5 billion in wages in 2001. Maine’s natural and cultural resources are primary tourist attractions in the state. In 2003, the Blaine House Conference on Natural Resource Industries recommended the development of a tourism research center at the University of Maine and the Governor called for that development in his 2004 State of the State Address. The Center for Tourism Research and Outreach is the University of Maine System's response to that call. Emerging as a partnership between the University of Maine and University of Southern Maine, CenTRO now involves faculty from all 7 campuses in the University of Maine System in tourism research for the state as Maine Tourism Fellows and in curriculum development. CenTRO is an interdisciplinary effort involving faculty from both business schools in the state (UMaine and USM), the Colleges of Liberal Arts and Sciences from both partner universities, the University of Maine's Resource Economics and Policy; and Parks, Recreation and Tourism programs, as well as The Muskie School of Public Service on the campus of USM and The Margaret Chase Smith Center for Public Policy on the UMaine campus. The University of Maine's Cooperative Extension program is also a key partner in CenTRO, teaching community and business leaders how to use the center's knowledge products to address their needs.

1 “Tourism” is usually thought of as the activities of those who come to Maine from other states and countries for a number of purposes, including business travel, visiting friends and relatives, and recreation. “Recreation” includes the activities both those who come to Maine from other locations and Maine citizens who purchase recreation-related goods and services in the state. In this document “tourism” refers to economic activity of both types.
Funded July 1, 2005, CenTRO has formally operated for less than 6 months. Its mission is to support the decision makers in the state’s tourism industry as well as community planners with high quality data collection and analysis. The center will also create outreach programs to the businesses and communities that currently rely on tourism or plan to. To the degree that it is possible, CenTRO will also seek to enhance the educational offerings in the state to support the industry with qualified candidates for the staff and management positions that it creates.

**CenTRO Achievements**

CenTRO’s first achievement is the development of a web site that will benefit the tourism industry by providing information resources for tourism businesses and the state’s communities. The web site will be a central point of delivery for CenTRO reports, as well as communications about CenTRO sponsored outreach events and other noteworthy events in the state.

**Research Products:** We have sought to develop unique knowledge products that will aid policy makers and business planners without duplicating services already provided by the Maine Office of Tourism and its suppliers. Toward that end, CenTRO has benefited from 2 meetings of the Maine Tourism Advisory Committee (MaineTAC) this year. MaineTAC is the select group of industry and government representatives who advise the center and its management. Using the insights of MaineTAC members, the following research projects are actively being developed:

**Current Research Projects**
- Economic Impact of Tourism in Maine
  - Property Tax Contribution of the Hospitality Industry in Maine
    This project seeks to determine the contribution of the Hospitality Industry to local economies in the state.
  - Statewide Hospitality Inventory
    This project seeks to determine the state’s lodging capacity.
  - Guest Survey
    This is a major project for the center in that it seeks to measure the economic impact of tourism in each of the state’s 8 tourism regions. It will supplement Longwoods’ data by better capturing the contribution of Canadian tourists to the state’s economy and those of its tourism regions.

- New Tourism Forecasting Tools
  - Short term forecasting model
    Based primarily on Maine Turnpike Authority data, this project will result in a forecasting model to help businesses and communities anticipate tourist traffic and respond accordingly.
  - Annual Outlook Conference
    This event will coincide with planning cycles in the tourism industry and provide

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3 As a center, CenTRO is not recognized as an educational unit and can not develop its own curriculum. However, CenTRO can serve as a catalyst for the development of curricula by educational units at the UMS campuses.
a venue for presenting and supporting the use of the forecasting tools to be developed.

- Tourism Labor Supply & Compensation
  - Employment and Workforce Profile
    This research is designed to profile the tourism labor force in the state to document the quality of jobs that the industry is able to provide for the citizens of the state.

Projects Under Development for Future Funding
The following are projects that are under development for future delivery:

- Improve Our Understanding of Tourism Markets
  - Maine Tourism Market Analysis
    Based on a new approach to market segmentation, this research will seek to understand traveler preferences for tourism experiences. This will help identify target markets for and serve as a catalyst to the development of innovative new tourism products and businesses that will help support communities in the state. This research will also identify target audiences for the existing tourism products in the state as well as help identify the meaningful messages about the state's tourism products for those markets.

- Enhance the Quality of Tourist Experiences in Maine
  - On-Going Customer Satisfaction and Service Quality Measurement
    This on-going service will provide customer satisfaction measurement for businesses in the state, creating the basis for developing customer orientation for business operations in the state. This research will also provide a means of tracking progress toward a state of customer orientation, for each participating business that can be aggregated for the state.

- A Model for Community Tourism Planning
  - Maine Highlands Tourism Task Force Case Study
    CenTRO will develop a set of measurements to document the progress of the tourism economic development activities of the task force for use as a case study to inform similar efforts in the future by other communities in the state. The Maine Highlands Tourism Task Force is engaged in the development of a tourism program that will enhance the economic activity of the region while minimally impacting the quality of life for its residents.

- Monitoring the Health of Tourism in Maine
  - Tourism Indicators
    This project will yield a set of economic indicators that can be tracked over time to monitor the health of the state's tourism industry.

Outreach Products:
- Short Courses for Maine’s Frontline Tourism and Hospitality Workers
- Partnership with the Hospitality & Tourism Institute
  CenTRO has partnered with the Hospitality & Tourism Institute (HTI) to support the development of high quality educational outreach for Maine's front line worker force.

- Tourism Workshops for Municipal, Regional & State Policy Makers
  CenTRO faculty will develop insightful workshops and short courses to support policy makers in communities that seek economic development through tourism.

Curricular Support:
- Higher Education for Tourism
  - Tourism Minor/Certificate
    CenTRO faculty are developing a tourism minor to complement the business management major currently delivered at the University of Maine's Hutchinson Center in Belfast. The development of a certificate program in tourism will follow.

- Articulation Agreements w/ MCCS
  CenTRO faculty have taken lead roles in the development of articulation agreements with campuses of the Maine Community College System, facilitating the movement of community college students to the campuses of the University of Maine System. A prototype agreement has been drafted to facilitate movement of students from Eastern Maine Community College to the University of Maine. CenTRO faculty have also been involved in the development of the AdvantageU program.

Student Marketing Research Projects:
CenTRO has also supported graduate student projects in the Maine Business School devoted to supporting the tourism industry in the state.
- Improve Our Understanding of Tourism Markets
  - Maine Tourism Market Analysis
    A pilot of the Maine Tourism Market Analysis project was conducted in the MBA marketing research class at the Maine Business School and funded by CenTRO.
Small Conventions & Meetings in Maine
- Greater Bangor Convention & Visitors Bureau
  The MBA marketing research class taught by CenTRO faculty conducted an analysis of potential for attracting small business meetings to Bangor. The research project identified the city's potential strengths as a site for such meetings and potential barriers to attracting such tourism business. Strategies were developed to avoid the barriers and capitalize on the city's strengths to attract business meetings to the area.

Professional Development:
CenTRO has also supported travel to universities whose tourism research centers and tourism programs represent key national reference points and whose faculty represents the cutting edge of tourism research. The director of CenTRO has been fortunately to visit the following:
- University of Minnesota Tourism Center
  CenTRO's director met members of the center's faculty and the university's extension educators as well as key individuals in the state's tourism industry, including the director of the Minnesota Office of Tourism.
- NC State University, Parks, Recreation & Tourism Management program
  CenTRO's director met faculty developing a national center for tourism research to serve as a hub for a network of tourism research centers. Investigated the opportunity for collaboration with and membership in the emerging center.
- University of Florida Center for Tourism Research and Development
  CenTRO's director met members of a large faculty devoted to the development of specialized knowledge products. He also met key individuals involved in the tourism economic development in the state.

These experiences yielded a more complete understanding of tourism broadly defined, as well as Maine tourism. These contacts now represent a network of expertise on which CenTRO can draw to create innovative solutions for the state's tourism industry and the communities that seek its benefits. This understanding and the expertise on which the center's director can now draw will enhance the CenTRO's performance.

Conclusion: While the Center for Tourism Research and Outreach is an extremely young endeavor, it has attracted a diversified faculty partnership with broadly applicable expertise. It is developing numerous high value knowledge products for the tourism industry and communities in the state that currently do or hope to incorporate tourism into their economic development portfolio. With direction from its advisory committee and faculty, the center is poised to make a major contribution to a major economic engine in the state.

The following pages document Professor Harold Daniel’s personal efforts with regards to CenTRO this academic year. Please note both the national and state level activities.

Activities 2005-2006 Academic Year
December 14, 2005
University Tourism Research Centers & Tourism Programs Visited
Sept. 19 – 23 University of Minnesota Tourism Center
Faculty Interviewed
Ingrid Schneider, Director University of Minnesota Tourism Center
Jerrilyn Thompson, Research Coordinator, National Park Service, University of Minnesota, College of Natural Resources
Stephen Ross, University of Minnesota School of Kinesiology
Kenneth Bartlett, University of Minnesota Department of Work, Community and Family Education, College of Education and Human Development
Cynthia Messer, University of Minnesota Tourism Center
Kent Gustafson, University of Minnesota Tourism Center

Industry Personnel Interviewed
John Edmond, Director Minnesota Office of Tourism – Explore Minnesota
David Siegel, President & CEO Hospitality Minnesota
Jan Joannides, Executive Director, Renewing the Countryside

Oct. 10 North Carolina State University, Parks, Recreation & Tourism Management
Discussed Membership in a Planned National Network of Tourism Research Centers
Gene Brothers, Associate Professor
Larry Gustke, Associate Professor

Nov. 7 - 11 University of Florida, Department of Tourism, Recreation and Sport Management, Center for Tourism Research & Development
Faculty Interviewed
Lori Pennington-Gray, Associate Professor, Director CTRD
Stephen Holland, Associate Professor & Department Chair, Former Director CTRD
Galen Trail, Associate Professor Tourism, Recreation and Sport Management
Brijesh Thapa, Assistant Professor and Graduate Coordinator
Heather Gibson, Associate Professor
John Confer, Assistant Professor
J.O. Spengler, Associate Professor
May Kim, Assistant Professor
Richard Makapondo, Assistant Professor
Sonja Lilienthal, Assistant Professor

Support Staff Interviewed
Melissa Wolstein, College of Health & Human Performance, Development Officer – Discussed fund raising for CenTRO

Industry Personnel Interviewed
Roland Loog, Director Alachua County Visitors & Convention Bureau
Wende Blumberg, Hilton Hotels
Jayne Moraski, Director of Economic Development, North Central Florida Regional Planning Council
Tourism Conferences Attended
June 10 - 13 Travel & Tourism Research Association, New Orleans
Sept. 14 - 16 International Eco-Tourism Conference, Bar Harbor
October 26 – 28 Travel Industry Association’s Marketing Outlook Forum, Seattle

CenTRO Staff Meetings
August 16, 2005 with Kevin Boyle, UM
Sept. 1, 2005 with Charles Colgan, USM
Sept. 1, 2005 with John Daigle, UM
Sept. 2, 2005 with Kimberly Junkins UM
Sept. 9, 2005 with Tom Allen UM & Charles Colgan USM
Sept. 14, 2005 with Charles Colgan USM
Oct. 4, 2005 with Kimberly Junkins & Lee Webb, UM
Oct. 6, 2005 with Charles Colgan, USM
Oct. 18, 2005 with Tom Allen, UM
Nov. 1, 2005 with Lee Webb, UM
Nov. 4, 2005 with Tom Allen, UM
Nov. 18, 2005 with Tom Allen, UM
Nov. 21, 2005 with Lee Webb, UM
Nov. 22, 2005 with Tom Allen, UM & Charles Colgan, USM
Dec. 7, 2005 with Charles Colgan, Bruce Andrews & Collin Baker
Dec. 8, 2005 with Lee Webb
Dec. 9, 2005 with Tom Allen
Dec. 16, 2005 with Tom Allen

CenTRO UMaine Campus Meetings
Aug. 23, 2005 Daniel Innis, Dean College of Business, Public Policy & Health
Oct. 4, 2005 Charlene Kimball, UM ORSP
Oct. 31, 2005 Daniel Innis, Dean College of Business, Public Policy & Health
Dec. 19, 2005 Michael Eckardt, UM VP for Research

Meetings w/ Maine Tourism Commission - Augusta
August 18, 2005
October 20, 2005
November 17, 2005
December 15, 2005
Other CenTRO Industry Meetings

August 30, 2005 Freeport
Greg Dugal, Director Maine Innkeepers Association
Nancy Gray, Owner Haraseeket Inn, Freeport, Me.
Lee Webb, UM

August 30, 2005 Hallowell
Vaughn Stinson, Director Maine Tourism Association, Hallowell, Me.
Caroline Manson, Maine Tourism Association, Hallowell, Me.
Lee Webb, UM

October 5, 2005 – Bangor
Donna Fichtner, Director Greater Bangor Convention & Visitors Bureau

October 19, 2005 - Bangor
Creative Economy Council, Bangor Public Library

October 20, 2005 - Bangor
Peter Daigle, Lafayette Hotels, Bangor, Me.

Nov. 17, 2005 - Augusta
Rick Abare, Executive Director Maine Campground Owners Association

Dec. 1, 2005 - Augusta
Rudy Nardelli, Warren Kremer Paino (Advertising Agency)
Karen Pendoley, Marketing Director Maine Office of Tourism
Tom Allen, UM

Dec. 13, 2005 Augusta
Richard Grotton, President Maine Restaurant Association
James McGregor, Executive VP, Director of Government Relations, Maine Merchants Association

Dec. 13, 2005 Lewiston
Board of Directors Meeting - Maine Campground Owners Association

Maine Tourism Advisory Committee (MaineTAC) Meeting

October 24, 2005 – Marriott Sable Oaks, South Portland, Me.

CenTRO Presentations

Sept. 13, 2005
Steering Committee for the Governor’s Council on Natural Resource Based Industries
(corresponded with the release of findings and recommendations from the Fermata consulting project)

Nov. 2, 2005
Maine Innkeepers Association Annual Meeting
Dec. 8, 2005
Old Town Rotary Club

Maine Tourism Fellows Meeting
Sept. 12, 2005 – Brought faculty from University of Maine campuses together for meeting about tourism research, outreach and education in the state

CenTRO Curriculum Committee Meeting
Nov. 14, 2005 Point of discussion tourism minor & certificate program to be delivered from the Hutchinson Center in Belfast.

CenTRO Work Plan Status
UMaine Projects
Web Site – available at www.umaine.edu/centro w/ January press release planned
Maine Hospitality Inventory – In Process
Maine Guest Survey – Data Collection Instrument in Development, Sample Frame under Development
Hospitality Industry Contribution to Property Tax Receipts – In Process
Maine Tourism Industry Tax Contributions & Promotional Spending – Re-development based on feedback from 10/24 MaineTAC meeting

USM Projects
Short Term Forecasting Model – Development
Annual Outlook Conference – Planning for March
Employment and Workforce Profile – In process

Spring Semester 2005 MBA Student Projects
Maine Tourism Market Structure Study, Client: Maine Office of Tourism
Awareness & Usage Study of the Market for Small to Medium Sized Professional Meetings in Bangor, Client: Greater Bangor Convention & Visitors Bureau

Spring Semester 2006 MBA Student Project (Planned)
Creating a Self Supporting Wilderness Experience Brokerage Service, Client: United Cerebral Palsy of Maine

Grant Proposals
Evaluation of the Maine Tourism Marketing Partnership Program, Draft near completion, Value: $TBD, Due: January 4. Since a graduate student from USM will be employed to execute the project, Charles Colgan has taken the lead on this.