

UNIVERSITY OF MASSACHUSETTS BOSTON

Final Report

of the

**Research and Graduate Studies (RGS)
Committee**

for the

**Chancellor's
Strategic Planning Task Force**

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Charge

"Recognizing the potential to build upon the innovative scholarly pursuits of faculty and students, this group will develop a comprehensive plan to increase significantly the research and development enterprise at the University of Massachusetts Boston, and outline a roadmap for enhancing graduate studies. Specifically, the Research and Graduate Studies committee (RGS) will (1) develop a research strategic plan, (2) recommend resources and infrastructure needed to achieve the goals of the research strategic plan, and (3) provide recommendations as appropriate for the development and use of university infrastructure necessary to achieve the goals of the research strategic plan."

Vision

"The University of Massachusetts Boston (UMass Boston) will be nationally recognized as a prominent, public research university, and, as a result, one of Greater Boston's finest research institutions. Our research reputation and our commitment to the issues of urban communities will attract superior faculty members whose research is at the forefront of their fields. The identification of research clusters and the investment of significant resources in research infrastructure will permit teams of faculty members and students to be engaged in world-class interdisciplinary, multi-departmental, and multi-institutional projects of national and international significance. Research scientists, post-doctoral fellows, and graduate students of the highest ability from diverse backgrounds will seek out opportunities at UMass Boston to study, advance their professional careers, and contribute to the discovery and application of knowledge. Legislators, government officials, and community leaders will seek out UMass Boston faculty members for their opinions, their wisdom, and their creative solutions to critical problems. The rigorous and innovative basic and applied research of our colleges, institutes, and centers will be admired for its contributions to public policy and the advancement of our understanding of multicultural, urban, social, environmental, educational, and technological issues. Business and industry leaders will view UMass Boston as a definitive source for new knowledge and discoveries, as well as a key source of highly trained personnel essential for growing the technology-driven global economy of the 21st century."

Benchmark metrics

The RGS agreed that the strategic management process known as benchmarking would be used to monitor and gauge university performance in achieving the desired goals related to increasing significantly the research enterprise and, by extension, graduate studies.

A benchmark is defined as a point of reference for a particular measurement that has been selected as necessary to establish success in achieving a specific goal. The benchmark becomes the starting point for the measurement activities. With regard to the research enterprise, the RGS recognized that the benchmarks could not be absolute. Rather, the appropriate benchmarks would be relative and derived from the best practices among a group of peer institutions. Furthermore, the RGS understood that benchmarking is a continuous process through which the university can continually seek to challenge itself to achieve greater levels of research success.

The Office of Institutional Research and Policy Studies (OIRP) professional staff generated a list, using IPEDS data, of all institutions that met the following threshold criteria: part of a public state university system but not the so-called "flagship" campus; urban or urban fringe

campus; doctoral research intensive; and student population of less than 30,000. The initial list consisted of nearly 100 institutions. An ad hoc RGS subcommittee then reviewed the summary IPEDS data for each institution and reduced the number of entries to 27 possible peer institutions. A list of 37 institutions (i.e., these 27 institutions plus the current list of 10 BOT approved institutional peers) together with the summary IPEDS data was sent to the RGS members who were asked to select (i.e., vote for) five institutions as operational peers and five institutions as aspirational peers. The institutional tallies were presented to the RGS at its November 17, 2006, meeting and following detailed discussions two sets of peer institutions (Appendix B) were adopted for use in the research benchmarking process. At least 23 performance measures were considered by the RGS for possible use in its benchmarking process. The list was reviewed and refined to derive the final set of performance measures (Appendix C) for which data were sought from peer institutions to undertake the research benchmarking process.

Obtaining the required benchmark data from UMass Boston's research peer institutions was more challenging than first anticipated (see <http://mirror.www.umb.edu/research/rgs/index.html/> for data collected as of May 11, 2007). We were unable to gather and analyze data on the following topics: composition of the university research office; number of research support staff on campus; lab space (quantity and quality); and the number and amount of graduate student stipends and coverage of fees, tuition, and benefits. In addition, certain available data are not interpretable in the absence of other information. For example, the functions, rather than numbers or title determine the efficacy of a university research office and these positions may be augmented by personnel in sub-units that are not necessarily listed in the available data. In the absence of further detail, no clear conclusions can be drawn about this issue from existing benchmarking data. An additional example, is that the number of part-time faculty or the ratio of part-time to full-time faculty is not meaningful if one does not know whether part-time faculty are being used to release full-time faculty to do research or simply to augment teaching capacity. The vice provost for research, the RGS staff person, and the OIRP professional staff will continue the data collection process during the summer of 2007.

While no definitive conclusions can be drawn from the data, there are a number of preliminary observations well worth noting.

General characteristics related to quantity of research dollars

- There is a positive relationship between the number of faculty and the sponsored program research volume: As the number of faculty increases, so does the sponsored program research volume.
- There is a positive correlation between the number of Centers and Institutes and the sponsored program research volume. Universities with high sponsored program research volume have more Centers and Institutes. Centers and Institutes are often used as a mechanism for initiating and expanding cross-disciplinary research.
- There is a positive relationship between sponsored program research volume and the number of endowed chairs; universities with higher volume have more endowed chairs.
- There is a negative relationship between teaching load and sponsored program research volume. Universities with lower teaching loads have higher research (sponsored program and otherwise) volume. The teaching load at successful research institutions is lower than that at UMass Boston.

Institutions showing large growth in research dollars in the last five years

- Universities that have shown significant growth in research have received large infusions of capital of at least \$100 million. In addition, it appears to take at least 5-10 years for this initial investment to produce a substantially increased flow of research dollars.
- Successful research institutions have strong basic research in single disciplines as well as interdisciplinary and applied research.

Patterns of research dollars

- The composition of the research at institutions is varied and includes many small grants as well as very large grants.

In the absence of clear patterns for development emerging from the data, the RGS used the iterative process outlined in the appendices to arrive at its recommendations. These are, in effect, a synthesis of a larger set of goals stated in Appendix A.

Recommended goals

In response to its charge, the RGS recommends, in no particular order, the goals listed below. Although the university administration has made it clear that strategies and tactics necessary to accomplish these goals are within its [the administration's] purview, many of these goal statements include suggestions for strategies, as well as potential benchmark metrics.

A. **Accelerate and target faculty hiring to achieve UMass Boston's strategic research priorities.**

A faculty hiring initiative should be established that will improve the overall quality and competitiveness of research, and advance the institution to national prominence in a small number of strategic research areas. Some examples of such areas would be the following eight potential research clusters identified by the consulting firm the Battelle Memorial Institute's Technology Partnership Practice: urban health and public policy; transnational, cultural and community studies; developmental sciences; science and mathematics; computational sciences, analysis and modeling; integrated environmental monitoring; biological systems and technology; and sustainability and social venturing. Priority should be given to faculty hiring proposals of department chairpersons and deans that build upon areas of existing research strengths, leverage existing resources, or address an area of scholarship that expands traditional disciplinary boundaries. These hires should include full-time tenured and tenure-track faculty, research faculty, postdoctoral fellows, and visiting scholars. The number of endowed faculty chairs for senior researchers should be increased to ten (10) by 2012. To achieve quickly a critical mass of faculty members in strategic research areas, the university should consider the possibility of cluster hires (i.e., hiring several faculty members in the same or closely related research areas) and opportunity hires (i.e., hiring a second individual who is identified in the search for a given faculty position). The significant investments in research infrastructure (e.g., laboratories, studios, technicians, equipment, IT) necessary to support these new hires should be a priority of University Advancement (e.g., private gifts, corporate sponsorship) and of Government Relations (e.g., special state and federal budget appropriations).

B. Invest strategically in undergraduate and graduate programs with strong research components.

To attract top-quality students, the university should advertise opportunities to work with outstanding faculty in diverse fields who are engaged in world-class research. Students should be provided with training in research that complements and extends their disciplinary education and trains them to apply interdisciplinary techniques to key problems in their field. Proposals for new graduate programs, including new doctoral programs, should demonstrate that they are: (a) of the highest quality, (b) both single discipline and multi-disciplinary, (c) directed by a critical mass of faculty members engaged in related top-quality scholarly work, (d) built upon and expand the research capabilities of the university, and (e) generators of top-quality talent. A central clearinghouse should be established of data on research opportunities (e.g., research assistant positions) and research support resources (e.g., research fellowships, travel to present research at a professional conference) that are available across the university. Administrative support for graduate programs should be of the highest quality with a proactive service orientation that recognizes the uniqueness of the programmatic requirements and the needs of graduate students served by the various programs. Colleges and departments should be encouraged to develop and offer research tracks within professional degree programs to attract top-quality students who have an interest in undertaking cross-disciplinary, collaborative research activities and pursuing research careers.

C. Substantially increase support for graduate students, including teaching assistants and research assistants, in the next five years to align the level of support with our peer research institutions.

Increased support for graduate students will allow graduate programs to attract and retain the kind of top-quality students needed to expand the research activities of the university. This can be accomplished by (a) reallocating budget from other lower-priority activities and support areas to increase the university's operating budget for graduate student support; (b) encouraging and rewarding faculty members for including graduate student support as a direct charge to the sponsor of research grants; (c) increasing corporate sponsorship of graduate students; and (d) increasing private and philanthropic donations that build endowment resources that support graduate students. In addition, efforts should be made to equalize the salary scales and benefits that are awarded to research assistant and teaching assistants.

D. Establish and sustain in each college an effective research mentoring program for new untenured faculty members.

Research mentoring programs instill the attitudes and scholarly habits that are valued in the academy and, thereby, enhance the early career development of new nontenured faculty members. A research mentoring program can assist the university to build and retain an outstanding faculty recognized as leader in research by increasing the likelihood that the new nontenured faculty member will meet the professorial role expectations of the academy. Faculty members, with a special emphasis on new faculty, should be provided with guidance for positioning their research for funders and following through the process of preparing and submitting a grant proposal, ultimately leading to more faculty seeking and successfully obtaining extramural support for research activities. The mentoring

program should be tailored to each college's unique needs and aligned with the research goals of the college. In addition, the university should consider establishing a "Center for the Improvement of Research" along the lines of the current Center for the Improvement of Teaching.

E. Provide faculty members with services, resources, and incentives that promote innovative research and development ventures.

The trend in research is toward greater collaboration across disciplines and among institutions. Strategic investments should be made in partnerships that link faculty research activities and the university's graduate programs to the economic development and skilled workforce needs of the Commonwealth and the nation. Collaborations can be across units of the campus, with other campuses of the university, with other universities and research institutions, and with area business and industry. Services are needed to develop university capacity to transfer technology and support entrepreneurship, including the identification of market opportunities, strategic planning and assessment for industry engagement, access to a database of industry contacts and information on existing campus collaborations, timely assistance navigating campus business processes, and enhanced reporting and celebrating of collaborative research activities. New research facilities should be configured and existing research space should be allocated to encourage intellectual generativity, defined by connectivity, collaboration, and communication among researchers.

F. Make research administration, in all its forms on campus, a tailwind for supporting, facilitating, and generating talent to strengthen and grow the research enterprise.

All units of the university that provide research administration and support services—the Office of Research and Sponsored Programs; the budget, bursar, controller, environmental health and safety, facilities, human resources, marine operations, procurement departments in Administration and Finance; the corporate and foundation group of University Advancement—should embrace a service ethic that goes beyond compliance, seeking unity of purpose with the university research community and its goals; seek to improve university-wide communication to foster interdisciplinary research and resource sharing; and, overall provide more transparency and shared responsibility for attaining success in the research and training enterprise. The university should benchmark the most highly regarded sponsored programs services offices at peer research institutions for their best practices and then establish service and practice goals, timelines for achieving these goals, and methods (e.g., an annual survey of customer satisfaction) and metrics (e.g., time required to select, order, and receive a piece of research equipment) for determining improvement in sponsored programs services.

G. Expand those research institutes' and centers' activities that achieve the university's research and graduate studies vision.

The university should establish and communicate expectations and provide incentives for the research institutes and centers to engage faculty members in collaborative research activities through such means as visiting or joint faculty appointments between academic departments and a research institute or center, seed grant funds for collaborative research projects, or a colloquium to highlight joint research activities. Those research institutes and centers for which it is appropriate should be encouraged to increase their connections with

the academic departments to play a greater role in achieving the graduate studies vision of the university. For example, the university should support efforts of the research institutes and centers to provide top-quality research experiences for students, and research consultation for faculty.

H. Establish and maintain state-of-the-art library services.

Establishing and maintaining state-of-the-art library services are essential to sustain the intellectual inquiry of students and faculty and maximize support of interdisciplinary research activities. These services should be provided in a flexible, functional, inviting, technology-rich library space that exploits cutting-edge digital technology. Faculty members and students should be afforded convenient, seamless, and optimal access to essential research resources.

I. Continue expanding IT resources to support research activities.

The university data network should be updated as soon as possible to enable researchers to take full advantage of maximum available bandwidth for data-intensive research activities. Other needed research support services include the expansion of central massive data storage, file backup systems, and central data servers. IT services should evolve with the needs of the research community. For example, in meeting the special needs of researchers, IT must remain flexible in its support of multiple operating system platforms. This support should include both hardware and software, and it should extend to researchers' individual workstations. In particular, IT should enhance the level of support it provides for hardware and applications based upon the Unix operating system, which is essential for the functioning of special purpose research resources. Support for a data visualization center and a high performance computing (HPC) cluster are essential to expand research.

J. Increase specialized core research facilities (CRFs) that provide the necessary essential equipment and technical expertise to meet the research needs of faculty members and graduate students.

These needs of faculty members and graduate students include not only the support for research projects, but also assistance in the development of competitive grant proposals. The university should capitalize upon the opportunity presented by: (a) specialized equipment that is provided a new faculty hire as part of a startup package, (b) equipment grants from a federal agencies, (c) equipment donations through business and industry partnerships, (d) federal or state research earmarks, and (e) the identification of overlapping research interests and CRF needs of faculty members. Core research facilities should offer essential training to expand the user community and to assist users across the university to focus the capabilities of the facility on research problems relevant to them. The establishment of core research facilities at the university and at collegiate/departmental levels should be investigated in a number of areas, including: statistical and research methodology, data analysis, high-performance computing, data visualization, behavioral testing (i.e., for infants, children, adolescents), imaging (e.g., fMRI, laser-scanning confocal microscopy, EEG, MEG), and genomics (e.g., plant genomics, genetic sequencing).

K. Increase stakeholders' awareness of the university's research capabilities and products through a centralized marketing campaign.

A research marketing campaign should be undertaken by External Affairs and the Office of Communications to identify our research strengths, showcase research accomplishments, and promote the university's talent generation capabilities to state and local governments and to business and trade associations to encourage them to make use of the research capabilities of faculty members and the research institutes and centers. Advocacy efforts are needed that inform and educate stakeholders about the university's research enterprise, thereby increasing the likelihood that extramural support will be awarded to worthy projects. External Affairs, in conjunction with the provost and the vice provost for research, should develop an aggressive program to market university research to state legislators and agencies, as well as the Commonwealth's congressional delegation and key federal agencies, including contracting for the services of a professional advocacy organization located in Washington, DC to enhance communications and increase support for special research initiatives. Identification and cultivation of university alumni who can provide important linkages with business and industry, as well as with government agencies, should be a priority. Efforts should be expanded to obtain gifts from corporate and foundation sources that enhance the research capabilities of the university. An annual *Student Research Showcase* could feature paper presentations, creative and multimedia presentations, and poster sessions developed and presented by undergraduate, masters, and doctoral degree candidates and recent degree recipients from programs across campus.

Conclusion

Recognizing that excellence in research is one of the distinguishing characteristics of a great university, and a vital part of our contribution to the City of Boston and the Commonwealth of Massachusetts, UMass Boston is committed to significant expansion of the research and sponsored programs that advance knowledge and create a better society for all. Our deliberations and a careful review of the Battelle preliminary report lead us to conclude that the potential exists to achieve significant growth of the university's research enterprise. This will require discovering our research strengths, identifying opportunities, and making strategic investments in research clusters that build upon our strengths and take advantage of the opportunities. We believe that the goals recommended in this report provide a clear roadmap for the university as it prepares to make the next leap forward to realize its ambitious research mission.

Additional information and details about the tasks undertaken and accomplished by the RGS can be found in Appendix D, the process used to create the RGS vision statement in Appendix E, the nature of the consulting firm Battelle Memorial Institute's Technology Partnership Practice's work with the RGS in Appendix F, and the process that led to the selection of the benchmark metrics in Appendix G.

Appendix A

Iterative process that produced the RGS's recommended goals

The charge to the Research and Graduate Studies Committee (RGS) of the Chancellor's Strategic Planning Task Force was the following: *Recognizing the potential to build upon the innovative scholarly pursuits of faculty and students, this group will develop a comprehensive plan to increase significantly the research and development enterprise at UMass Boston, and outline a roadmap for enhancing graduate studies.*

The RGS's recommended goals were obtained by allocating the eleven areas (identified below as headings) identified by the Chancellor's Strategic Planning Task Force to three workgroups. Workgroup A, comprised of Kenneth Campbell, Jan Mutchler, Paul Nestor, and Bala Sundaram, developed goals for the areas of research and graduate studies personnel resources, research and graduate studies infrastructure, intellectual capital, and core research facilities. Workgroup B, comprised of Mary Ellen Colten, Greer Glazer, Peter Kiang, and William Kiernan, developed goals for the areas of graduate studies programs, research institutes and centers, and connecting activities for economic development. Workgroup C, comprised of Jeffrey Keisler, Anna Madison, and David Terkla, developed goals for the areas of sponsored programs services, student research opportunities, research communication and marketing, and government relations. Over a two-month period draft goals were provided to the RGS and an iterative process of lengthy deliberations and substantial revisions resulted in a full set of proposed goals (see below). The RGS cochairs and staff then consolidated the full set of proposed goals into eleven comprehensive goal statements for consideration by the Chancellor's Strategic Planning Task Force.

Larger set of goals that serve as the basis for the synthesis that produced the RGS recommended goals A through K

Research and graduate studies personnel resources

- Full-time faculty hiring should be accelerated to move expeditiously toward a peer research institution teaching load benchmark and targeted to achieve strategic research goals of the university.
- University Advancement should increase the number of endowed chairs for senior researchers and research cluster hires in targeted strategic research areas.
- To achieve quickly critical mass of faculty members in strategic research areas, the university should consider the possibility of cluster hires (i.e., hiring several faculty members in the same or closely related research areas) and opportunity hires (i.e., hiring a second individual who is identified in the search for a given faculty position) using a discretionary salary pool that is replenished each year.
- A pool of funding should be available to provide resources for hiring postdoctoral fellows, visiting scholars, and research faculty in targeted strategic research areas.
- The current budgets for graduate student support, including teaching assistantships and research assistantships, should be increased three-fold in the next five years to attract top graduate students by offering graduate assistant stipends that are competitive with our peer research institutions.
- The computation of faculty workloads should account for and promote faculty research activities and research-related pedagogical strategies.

Research and graduate studies infrastructure

- Research facilities should be configured and research space should be allocated to encourage intellectual generativity, defined by connectivity, collaboration, and communication among researchers.
- Accounting, budgetary, and procurement procedures should be studied and revised as necessary to streamline the acquisition of research equipment and related resources.
- Adequate university budget resources should be made available to pay for maintenance contracts and for the replacement costs of research equipment.
- Adequate professional and technical staff should be provided to support, operate, maintain, and troubleshoot research equipment and to provide essential research support services to faculty members (e.g., lab technicians, glass blowers, electronics technicians, musical instrument technicians, archivists, animal care technicians).
- Sufficient resources should be provided so that the university can offer state-of-the-art library resources and services to support faculty and graduate student research.
- IT should remain flexible in its support of multiple operating system platforms that are essential to the special needs of researchers. This support should include both hardware and software, and it should extend to researchers' individual workstations. In particular, IT should enhance the level of support it provides for hardware and applications based upon the Unix operating system, which is essential for the functioning of special purpose research resources (e.g., data visualization center, high performance computing (HPC) cluster). [See also, recommendations concerning Core Research Facilities below.]
- The university data network should be updated as soon as possible to enable researchers to take full advantage of maximum available bandwidth for data-intensive research activities.
- The university should continue to expand common core IT resources, which evolve with the needs of the research community (e.g., central massive data storage, file backup systems, central data servers).

Intellectual capital

- A Center for the Improvement of Research should be established that offers training programs and provides support for professional development activities relating to research, with special programs targeted to new tenure-track faculty. An example of a center activity would be setting up mock review panels to provide an initial round of review before grant proposals leave campus. Another example would be providing resources for faculty to attend off-campus, fee-based training (e.g., advanced research and statistical methodology training).
- Resources should be provided to encourage and support collaborative research relationships of faculty members across units of our campus with other campuses of the university, other research universities in the region, and research and service organizations in the Greater Boston area.
- The university should assist the deans of each college to establish an effective research mentoring program, tailored to each college's needs, which will enhance early career development of new nontenured faculty members.

- The establishment of a time resource pool should be considered so that adjustments to the workload of faculty members can be made on a competitive and time-limited basis to allow them to pursue research in strategic priority areas.
- Resources should be expanded to support preliminary research, fund new and experimental research initiatives, and bridge extramural funding gaps that may occur in a faculty member's research trajectory.
- Additional resources should be provided so that the university can continue to increase the annual budget support for the internal grants competitions.

Core research facilities (both at the university as well as collegiate/departmental levels – please see *A Note Concerning University Core Research Facilities* at <http://www.umb.edu/research/documents/UCRFnote.pdf>)

- Specialized and core research facilities (CRFs) should be available to provide the resources, equipment, and technical expertise necessary to meet the research needs of faculty members and graduate students, and to expand the research enterprise. This can be done by capitalizing upon the opportunity that is presented by (a) specialized equipment that is provided a new faculty hire as part of a startup package, (b) equipment grants from a federal agencies, (c) equipment donations through business and industry partnerships, (d) federal or state research earmarks, and (e) the identification of overlapping research interests and CRF needs of faculty members. The establishment of core research facilities at the university and at collegiate/departmental levels should be investigated in a number of areas, including: applied statistics and data analysis, high-performance computing, data visualization, behavioral testing (i.e., for infants, children, adolescents), imaging (e.g., fMRI, laser-scanning microscopy, EEG, MEG, genomics (e.g., plant genomics, genetic sequencing).
- Core research facilities should offer essential training to expand the user community and to assist users across the university to focus the capabilities of the facility on research problems relevant to them.
- The university's animal care facility should be updated and expanded to support a broader range of scientific investigations that rely on animal models in strategic research priority areas (e.g., developmental sciences).

Graduate studies programs

- The university should continue to make strategic investments in graduate programs, including new doctoral programs, that are: (a) of the highest quality, (b) both single discipline and multi-disciplinary, (c) directed by a critical mass of faculty members engaged in related top-quality scholarly work, (d) built upon and expand the research capabilities of the university, and (e) generators of top-quality talent needed to contribute significantly to the well-being of the Commonwealth and its citizens.
- The university should ensure that each graduate student has training and involvement in research that complements and extends the student's graduate education and trains students to apply interdisciplinary techniques to key problems in the field. Graduate students with such training and experience are highly valued by employers because academic research requires traits that include problem solving, teamwork, motivation, organization, insight, and perseverance.
- Adequate resources should be made available that will allow graduate programs to attract and retain the kind of top-quality graduate students needed to enhance the reputation and expand the research activities of the program. [*See also, research and graduate studies personnel resources.*]

- The provost's office should undertake a review of graduate courses in core areas (e.g., statistics, research methods, measurement methods) to determine potential overlap and duplication. The offering of graduate courses in core areas through cross-department and cross-college collaborations should be explored.
- Administrative support for graduate programs should be of the highest quality with a proactive service orientation that recognizes the uniqueness of the programmatic requirements and the needs of students served by the various graduate programs.
- Support should be provided for core research services in the areas of statistical and research methodology to assist graduate program faculty members and graduate students who are undertaking research projects and developing grant proposals. [*See also, core research facilities recommendations.*]
- To enhance retention of graduate students, a mechanism should be designed and implemented to enable graduate programs to offer periodically courses with low enrollments that are of high importance to the

Research institutes and centers

- The *University of Massachusetts Boston Policy on Institutes and Centers* should be reviewed by the provost's office and revised, as appropriate, to ensure that the policy and procedural guidelines are in place to encourage and reward research institutes and centers that seek to achieve the strategic research goals of the university.
- The university should establish and communicate incentives for departments and colleges to encourage and reward faculty members who engage in collaborative research activities with the research institutes and centers (e.g., visiting or joint faculty appointments between academic departments and a research institute or center, seed grant funds for collaborative research projects, a colloquium series to highlight joint research activities).
- Research institutes and centers of our university, for which it is appropriate, should be encouraged to increase their connections with the academic departments and to play a greater role in achieving the graduate studies vision of the university.
- The university should enhance support for joint efforts of the academic departments and the research institutes and centers to provide top-quality research experiences for graduate students (e.g., graduate research assistantships funded jointly by an academic department and a research institute or center, a collaborative research institute and center graduate student research showcase).

Connecting activities for economic development

- The university should establish and communicate incentives for faculty members and graduate students to engage in top-quality innovative research and development ventures and entrepreneurial activities that connect the academic departments, colleges, and research institutes and centers, as well as the university's graduate programs, to the economic development and skilled workforce needs of the Commonwealth, region, and nation.
- The university should provide faculty members with services and resources designed to help them successfully collaborate with industry partners, including:
 - identification of market opportunities, strategic planning and assessment for industry engagement;
 - access to a database of industry contacts and information on existing campus collaborations;

- streamlined processes to propose and negotiate industry research collaborations;
 - timely assistance navigating campus business processes that support industry-sponsored research collaborations; and
 - enhanced tracking, reporting, and celebrating of campus research activities with industry.
- University Advancement should expand its efforts to obtain gifts from corporate and foundation sources that enhance the research capabilities of the university and expand the research enterprise in alignment with the university’s strategic research priorities. [*See also, research and graduate studies personnel resources.*]
 - The university should explore the potential advantages of establishing a research foundation, a private, nonprofit educational corporation that administers externally funded grants and contracts for and on behalf of UMass Boston to support the achievement of the university’s research, development, education, and public service missions.

Sponsored programs services

Note: Although the primary responsibility for sponsored programs services is assigned to the Office of Research and Sponsored Programs, a number of other units of the university, many of which are outside of Academic Affairs, provide services to principal investigators that are critically important (the procurement, facilities, budget, controller, bursar, environmental health and safety, marine operations offices in Administration and Finance; the corporate and foundation group of University Advancement). The following recommended goals apply to sponsored programs services regardless of the unit that is responsible for providing them.

- All units of the university that provide sponsored programs services should embrace a new role of service that goes beyond compliance, seeking unity of purpose and a feeling of connectedness with the university research community and its goals, and a “hassle-free” service structure. The desired goal for research administration should be: “*To provide a tailwind to the campus research enterprise.*”
- The university should benchmark the most highly regarded sponsored programs services offices at peer research institutions for their best practices and then establish service and practice goals, timelines for achieving these goals, and methods (e.g., an annual survey of customer satisfaction) and metrics (e.g., time required to select, order, and receive a piece of research equipment) for determining improvement in sponsored programs services.
- New faculty members should be provided with guidance (e.g., by a research mentoring program) for positioning their research for funders and following through the process of preparing and submitting a grant proposal, ultimately leading to more faculty seeking and successfully obtaining extramural support for research activities. [*See also, Intellectual capital*]
- The university should proactively monitor research activities in the colleges, units, and research institutes and centers across the university that correspond with the strategic research priorities of the university (i.e., the research clusters), with the aim of increasing both the number of applications for extramural support for research that are generated and the success rate of submitted proposals.

Student research opportunities

- To attract top-quality graduate students to come to UMass Boston, the university should advertise opportunities to work with outstanding faculty in diverse fields who are engaged in world-class research. [*See also, Graduate studies programs*]

- The university should create and maintain a central clearinghouse of data on research opportunities (e.g., RA positions) and research support resources (e.g., dissertation research fellowships, travel to present research at a professional conference) that are available across the university and establish a means to link graduate students with research opportunities that are appropriately matched to their interests.
- The university should increase the availability of resources that are allocated to graduate assistant salary scales and benefits and undertake to equalize the salary scales and benefits that are awarded to research assistant and teaching assistants. [See also, *Research and graduate studies personnel resources*]
- Colleges and departments should be encouraged to develop and offer research tracks within professional degree programs (e.g., the MBA program in the College of Management) to attract top-quality professional students who have an interest in undertaking cross-disciplinary, collaborative research activities and pursuing research careers.
- The university should sponsor annually a *Student Research Showcase*, featuring paper presentations, creative and multimedia presentations, and poster sessions developed and presented by undergraduate, masters, and doctoral degree candidates and recent degree recipients from programs across campus. Such an event will (a) highlight the range of outstanding research being done at UMass Boston and the research talents and accomplishments of degree candidates and recent graduates; (b) showcase the range, diversity, and high quality of degree programs offered across the university campus; (c) demonstrate the connection and importance of our degree programs to meeting the research and workforce development needs the Greater Boston region; (d) prepare students for presenting research in scholarly conference formats; and (e) provide a forum for students to see what kind of work is required of degree candidates at the next level.
- The university should investigate the potential benefits of joining the *Council on Undergraduate Research (CUR)*, a national organization of individual and institutional members representing over 900 colleges and universities whose mission is to support and promote high-quality undergraduate student-faculty collaborative research and scholarship.

Research communication, marketing, and government relations

- University Communications and Community Relations should develop a centralized marketing campaign to increase public awareness of the university's research products and capabilities, involving the identification of our particular research niches and strategies for showcasing the accomplishment in research niches. In addition, efforts should be directed to promoting demonstrations of the scholarly activities of faculty members and students, such as research conferences, working paper series, special exhibits, readings, drama and musical performances, and publications.
- The university should improve university-wide internal communication to faculty members and graduate students to foster interdisciplinary research collaborations and resource sharing.
- Economic development efforts of the university should promote the university's research and talent generation capabilities to state and local governments and to business trade associations in order to encourage them to utilize university faculty members and the research institutes and centers to address their research and development needs and to design and conduct analyses to address policy issues.
- The university should enhance advocacy efforts that are designed to inform and educate stakeholders in research enterprise, and thereby increase the likelihood that extramural support will be awarded to

expand the research enterprise, including: (a) a centralized database of contacts with key government offices at the local, state, and national levels; (b) retaining the services of a professional advocacy organization located in Washington, DC to enhance communications with the legislative branch of the government and with the key federal agencies that implement the research components of legislative mandates; and (c) identification and cultivation of university alumni who may provide important linkages with business and industry, as well as with government agencies.

Appendix B

RGS Peer institutions

Operational peers

Cleveland State University
 CUNY Brooklyn
 CUNY City College
 CUNY Queens
 Old Dominion University
 Portland State University
 Rutgers University Newark
 San Francisco State University
 University of Memphis
 University of Missouri St. Louis
 University of North Carolina at Charlotte
 Wichita State University

Aspirational peers

George Mason University
 Georgia State University
 SUNY Albany
 University of Alabama at Birmingham
 University of Illinois at Chicago
 University of Louisville
 University of Maryland Baltimore County
 University of Rhode Island
 University of Wisconsin Milwaukee

Appendix C

Performance measures for the benchmarking process

TIME POINTS FOR ALL DATA:

Most recent fiscal year
5 years ago

1. Proposals:

Total number of Proposals submitted

Number of Proposals to Federal Gov't, State and Local Gov't, Foundations/NGOs, Other

2. Awards:

\$ Amount of Awards: total and by sponsor, type, and discipline

of Awards: total and by sponsor, type, and discipline

Award Sponsor:

Federal Gov't–TOTAL
 NSF, NIH, DOE, NASA, ED, NEH, NEA, DOD, STATE
 State and Local Gov't
 Foundations/NGOs
 Other

Project Type:

Individual PI, Group Grant/Center, Educational, Outreach, Other

Discipline:

Social Science, Natural Science, Humanities, Education, Medical/Public Health/Nursing, Public Policy, Interdisciplinary, Other

3. Expenditures:

TOTAL \$\$ and \$\$ by sponsor, type, and discipline

Award Sponsor:

Federal Gov't–TOTAL

NSF, NIH, DOE, NASA, ED, NEH, NEA, DOD, STATE
State and Local Gov't
Foundations/NGOs
Other

Project Type: Individual PI, Group Grant/Center, Educational, Outreach, Other

Discipline: Social Science, Natural Science, Humanities, Education, Medical/Public Health/Nursing, Public Policy
Interdisciplinary, Other

4. Number of types of Federal Awards:

RO1, CAREER, Research Centers, GOALI, IGERT, SREP/STEM, SBIR, LSAMP

5. Research Office FTE total and by role

preaward, postaward, compliance, communications, combination, other

6. Number of Doctorates granted total and by discipline:

Social Science, Natural Science, Humanities, Education, Medical/Public Health/Nursing, Public Policy,
Interdisciplinary, Other

7. Masters students total number; Doctoral students total number and by discipline:

Social Science, Natural Science, Humanities, Education, Medical/Public Health/Nursing, Public Policy,
Interdisciplinary, Other

8. Postdoctoral appointees total and by discipline:

Social Science, Natural Science, Humanities, Education, Medical/Public Health/Nursing, Public Policy,
Interdisciplinary, Other

9. Research Faculty (not staff) total and by discipline:

Social Science, Natural Science, Humanities, Education, Medical/Public Health/Nursing, Public Policy,
Interdisciplinary, Other

10. Endowed Chairs total and by discipline:

Social Science, Natural Science, Humanities, Education, Medical/Public Health/Nursing, Public Policy,
Interdisciplinary, Other

11. Number of Faculty

FTEs—# full time; # part time
Percent of courses taught by part-time staff

12. Teaching Load

Stipulated course load
Effective average teaching load in contact hour units

13. Total square footage of lab space

14. Number of graduate assistantships

15. Average graduate assistantship stipend

Are tuition and fees included in stipend?

16. Does the University have an incubator or venture unit?

Appendix D

Summary of tasks undertaken

Beginning October 10, 2006, the RGS met on a close to biweekly basis, or twelve times for a total of 22 hours.

For the purpose of benchmarking, the RGS identified two sets of peer institutions (Appendix B). Operational (or organizational) peers consist of institutions with similar constraints and performance levels on most of the critical characteristics relevant to the benchmarking activity. Aspirational peer institutions have some background characteristics similar to UMass Boston (e.g., second largest public research university in the state, located within a large city), but higher levels of accomplishment (e.g., total federal research expenditures) or specific characteristics (e.g., existence of a national center in a particular research area) that represent a research enterprise goal for the university. Comparisons with aspirational peers provided insights not so much about UMass Boston's relative performance, but about how UMass Boston might realistically replicate elements of other institutions' paths to success.

The RGS determined that its work would be aided significantly by the work of a consulting firm, the Battelle Memorial Institute's Technology Partnership Practice, already engaged by the vice provost for research to undertake a comprehensive assessment of the opportunities for enhancing UMass Boston's research enterprise on behalf of the Venture Development Center.

The Battelle consultants, as the result of exhaustive interviews and other forms of data collection, identified the following eight potential research clusters: urban health and public policy; transnational, cultural and community studies; developmental sciences; science and mathematics; computational sciences, analysis and modeling; integrated environmental monitoring; biological systems and technology; and sustainability and social venturing. After careful analysis and discussion, the RGS combined its benchmarking data with the proposed research clusters to form its foundation of knowledge for developing and articulating goals to grow the research enterprise. Goals were proposed in each of the following eleven areas identified by the Chancellor's Strategic Planning Task Force, during its initial meeting in September 2006: research and graduate studies personnel resources; research and graduate studies infrastructure; intellectual capital; core research facilities; graduate studies programs; research institutes and centers; connecting activities for economic development; sponsored programs services; student research opportunities; research communication and marketing; and government relations.

Appendix E

Process used to create the RGS Vision Statement

The UMass Boston mission statement was established by the university's Board of Trustees and was not subject to modification through the strategic planning process. This statement of the organization's core purpose led to the UMass Boston overarching vision statement, also approved by the Board of Trustees and not subject to modification. The next task for the RGS was developing its vision statement, describing the university's desired future position with reference to research and graduate studies.

To begin developing its vision statement, the RGS members were asked to submit one or two paragraphs expressing their desired future positions of UMass Boston with regard to research and graduate studies. The timeframe for these desired future positions was taken to be at least 2010, although it was understood that some desired future positions may take longer to achieve (e.g., 2016 or 2030). The RGS members' paragraphs were synthesized by the co-chairs and staff person to create a draft vision statement. An iterative review and revision process, similar to the process used for developing the RGS charge, led to the vision statement that appears on page 1 of this final report.

Appendix F

Nature of the consulting firm Battelle Memorial Institute's Technology Partnership Practice's work with the RGS

The RGS determined that its work would be aided significantly by the efforts of a consulting firm that had already been engaged by the vice provost for research to undertake a comprehensive assessment of the opportunities for enhancing UMass Boston's research enterprise.

During the summer of 2006, the vice provost for research, in consultation with the chancellor and the provost, had prepared and published a Request for Proposals for consulting services to assist with updating the research component of the *UMass Boston 2008 Strategic Plan: Retention, Research, and Reputation*. The goal for the consultation was the identification of interdisciplinary areas of research excellence as well as means to strengthen these areas while the university develops a more effective infrastructure for all faculty research. The consultation contract was awarded to the Battelle Memorial Institute's Technology Partnership Practice.

The Battelle consultants were invited to the December 1, 2006, RGS meeting to understand how the outcome of their work could assist the RGS in developing goals related to research and graduate studies. The Battelle consultants are practitioners from various backgrounds who are policy and program experts. They attempt to understand what the university's core research competencies are and how these core competencies relate to mission-driven activities of the faculty. In addition, the Battelle consultants seek to understand how the university connects to needs beyond the campus and what regional research needs are not being, but could be, met by the university. Although the Battelle reports to be received by vice provost will not constitute a full research strategic plan for the university, it will provide the foundational analysis for much of the RGS's work.¹

At the RGS's request, the Battelle consultants outlined the steps of their future work. Following the vice provost's final approval of the project work plan, the consulting project steering committee² and the consultants developed a list of key researchers and administrators, as well as external stakeholders and leaders of organizations in Greater Boston and the New England region. The consultants undertook extensive interviews with these individuals and gathered critical information on the university's core research competencies, talent generation capacity, and competitive position regionally and nationally. They also conducted in-depth analyses of UMass Boston's research and sponsored program activities over the last five years, and collected information on educational programs, new faculty hires, industry collaborations, technology transfer activities, and university research facilities and infrastructure. They identified and secured key studies and reports from various public and private regional and national organizations that provide information on potential opportunities to grow the university's research enterprise. The consultants identified areas of industry specialization not well served currently by local universities, examined occupational needs where educational institutions are failing to generate graduates, and sought gaps in continuing education and manpower professional development not currently addressed by local universities.

Following a detailed review of the Battelle consultants' presentation and discussion of the relationship of this engagement to the RGS's work, the RGS members decided that the majority of its work related to the

¹ The consulting engagement with Battelle is not scheduled to conclude until the end of May 2007, at which time the final report will be delivered for review and acceptance by the vice provost for research, the provost, and the chancellor.

² Richard Antonak (chair), Dan Simovici, Kenneth Campbell, Bala Sundaram, William Kiernan, William Brah, John Ciccarelli, and Valera Francis.

development of goals, while the specification of strategies and tactics would be the purview of the university administration. The RGS was kept fully informed of Battelle consultants' work, a communication process facilitated by the consultants' meeting several times with the RGS to provide updates and seek additional comments.

Appendix G

Process that led to the selection of the benchmark metrics

The RGS agreed that the strategic management process known as benchmarking would be used to monitor university performance in achieving goals related to increasing significantly the research enterprise. The RGS's initial tasks then became the selection of the best practices that would constitute the benchmarks and the selection of an appropriate group of peer institutions.

The November 2006 meeting of the National Council of Research Administrators included a half-day senior research administrator's workshop, attended by Vice Provost for Research Richard Antonak, on "Tips to Successful Benchmarking" conducted by Elizabeth Capaldi, the vice chancellor and chief of staff of the State University of New York and former provost of the University of Florida. Dr. Capaldi is also the co-editor (with John V. Lombardi) of *The Top American Research Universities*, the annual report of an entity called TheCenter, which is located at the University of Florida. The workshop's substance was shared with the RGS.

Dr. Capaldi outlined the university performance measures that were selected by TheCenter for the analyses reported in the most recent issue of *The Top American Research Universities*. These performance measures were grouped into nine clusters: total research expenditures, federal research expenditures, endowment assets, annual giving, national academy members, faculty awards, doctorates granted, postdoctoral appointees, and median SAT scores of students. A university's performance on each of these measures is analyzed to determine its rankings, which are published with the associated tables of data and analyses.

At least 23 performance measures were considered by the RGS for possible use in its benchmarking process. The list was reviewed and refined to derive the final set of performance measures (Appendix C) for which data were sought from peer institutions to undertake the research benchmarking process.

Dr. Capaldi suggested that benchmarking the research activity of a university requires establishing two groups of peer institutions. One group is known as operational (or organizational) peers and consists of institutions that have similar constraints and performance levels on most of the critical characteristics relevant to the benchmarking activity information on current status (i.e., relative strengths and weaknesses) with respect to the research enterprise benchmarks. This information provides a sense of what UMass Boston can expect from improved operations toward achieving research goals. The second group is known as aspirational peers and consists of institutions each of which has some background characteristics similar to UMass Boston's (e.g., second largest public research university in the state, located within a large city), but higher levels of accomplishment (e.g., total federal research expenditures) or specific characteristics (e.g., existence of a national center in a particular research area) that represent a research enterprise goal for the university. Comparisons with aspirational peers provide insights not so much about UMass Boston's relative performance, but about how UMass Boston might realistically replicate elements of the other institutions' paths to success.

The RGS first considered the list of UMass Boston peer group institutions that was developed by the Office of the President of the University of Massachusetts in 1999 and approved by the Board of Trustees. In discussions with the professional staff of the Office of Institutional Research and Policy Studies (OIRP), it was clear to the RGS that, since this list was developed, both UMass Boston and many of the institutions on the list have changed significantly. In addition, the characteristics that led to the selection

of these peer institutions (e.g., academic quality, student success and satisfaction, access and affordability, financial health, community engagement and service) might not be the same characteristics that would be necessary for the university to undertake the proposed research benchmarking process. Finally, the list of institutional peers generated by the president's office did not distinguish between operational and aspirational peers. For these reasons, the RGS engaged in a process that would generate two lists of peer institutions, a list of operational peers and a list of aspirational peers.

One question that arose during this discussion was the presence of either or both of a medical school and an engineering school at a peer institution. It was thought that the overall data on research and sponsored programs from institutions with either or both of these types of schools would be significantly skewed. The RGS decided to accept the recommendations of Dr. Capaldi and her colleagues at TheCenter that such institutions not be disqualified for potential inclusion as a peer institution. However, the institutional research and sponsored program data would require disaggregating to exclude the medical school and engineering school data prior to undertaking the analyses for these comparisons.

The RGS then established an ad hoc subcommittee to carry on the remaining work prior to the initiation of the benchmarking process. In particular, this subcommittee was charged to carry out the following tasks: review and recommend to the RGS a preliminary list of institutional performance measures; identify the data necessary to make comparisons on these performance measures; identify potential sources of data and assess feasibility of collecting these data; and recommend means and methods to collect, sort, organize, and analyze these data. The subcommittee proposed that the professional staff of OIRP, supplemented by the committee resource persons and the committee staff, would initiate the data collection and analysis processes. The final step was synthesis of the analytical outcomes to determine the reference points to be used for the continuous research enterprise benchmarking process.³

³ The challenge of obtaining the required data from our research peer institutions was much greater than anticipated. The benchmarking process will be completed by late summer 2007.