Research Strategic Planning: Summary
Recommendations

Our campus blueprint for strategic planning begins, “UMass Amherst is a great public research university….” Clearly, research is central to our identity and our role as the flagship campus in public higher education in Massachusetts. So too is our special responsibility as a public institution to create impact for the public good through innovation, and through education of students at all levels, including those who will advance the frontiers of knowledge through their research. Research is a primary form of our campus’s engagement with all of its stakeholders – the citizens of Massachusetts and society at large; federal and state governmental agencies; industry; and our students, particularly the students of the Commonwealth.

Although the research mission of the campus remains as important as ever, the larger climate for research and its funding is rapidly changing. Globalization means that world-class research partnerships can be formed anywhere on the planet. World-class excellence has thus become a prerequisite for engaging in such partnerships. Increasingly, many of the most important challenges are happening at the boundaries between traditional academic disciplines. Federal and state budgets for research, as well as for education more broadly, are increasingly constrained.

The research mission of the campus is inextricably linked with its role in graduate education. We are responsible for preparing the next generation of scientists, engineers, scholars, and other professionals who will meet the needs of industry, government, healthcare, and higher education throughout the Commonwealth and the nation. Graduate student employees also contribute directly to our research and teaching missions, bringing their insights and experiences to the laboratory and the classroom. Effective graduate education today requires that we include professional development and workforce preparation as part of our graduate training, and that we seek opportunities to partner with businesses and other entities in providing our students and their employees with the combination of education and experience that are essential to success in a rapidly changing environment.

As a vibrant and diverse community of scholars and learners, we can serve as a national leader in the creation of knowledge about and best practices for diversity and community engagement through innovative scholarship, teaching, policy development, programs and services. In this respect, our research excellence extends to collecting and disseminating knowledge about the value of academic and campus diversity and community engagement, and by disseminating this research, the campus demonstrates leadership to students, faculty, staff, policymakers and communities everywhere.
In this environment, a strategic research plan must thus be built on (i) world-class excellence in faculty research; (ii) development of effective partnerships with federal and state agencies and industry to maximize the impact of our research and teaching; (iii) effectively organizing across disciplinary boundaries to address large-scale science and societal challenges. And we must meet these challenging while (iv) making effective and efficient use of resources, and (v) communicating effectively with our stakeholder about the value of our impact and emphasizing that (vi) Graduate research and education go hand-in-hand. These six themes will form the overall structure of the research recommendations from this committee.

1. Excellence in Research

**Doctoral Program Review.** We are spread too thinly. The DPR offers some strategies for correcting this, including: (i) eliminating underperforming programs that cannot be rejuvenated with reasonable time and resources; (ii) supporting high-performing programs to move them into the top tier.

**Applying the results of the Doctoral Program Review.** (R1.1) The Doctoral Program Review (DPR) is a comprehensive, data-driven study of our research doctoral programs — the first review in over 40 years. It includes input from the doctoral programs, the Deans, and a committee of distinguished faculty. A key finding of the DPR is that nearly all of our programs have fewer faculty than their (aspirational) peers (R1.7). By one measure, our ‘deficit’ in faculty numbers is over 300. This problem is particularly serious because, in many fields, the effect of adding faculty is superlinear: average research productivity rises by more than the number of additional faculty hired (R1.6).

In light of these results, the DPR recommends that we do fewer things, and that the things we do be chosen and supported in a more effective, intentional way. One recommendation is that a process be established to evaluate seriously underperforming programs, possibly leading to reduction or elimination. Another recommendation is that the resources freed up by program reductions, as well as new resources when available, be directed to programs that are overperforming but undersized. Programs that are very small but strong should be encouraged to find a niche, rather than trying to do all things, or they should be built up in response to specific external opportunities or needs.

**Hiring and retention.** Improve hiring and retention strategies. by: (i) prioritizing retention over new hiring; (ii) being more proactive in retention; (iii) improving spousal hiring policy; (iv) hiring replacements prior to anticipated retirement.

**Faculty Hiring and Retention.** A university is only as good at its faculty, and decisions and policies for hiring and retaining faculty are critical to research excellence. Although we continue to recognize the need for junior faculty, we should selectively prioritize retention and support of current high-performing
faculty over recruitment of junior faculty, because current high-performing faculty are a “sure thing.” This means adopting much more aggressive, proactive strategies for retaining and anticipating outside offers (R1.4), and increasing the support for spousal hiring (R1.5), which is often an issue in retention. Because the costs of recruitment and start-up for new faculty are so high, and because counteroffers are often more expensive after the outside offer has been received, these strategies should save money in the long run.

When an excellent senior faculty member retires, the department’s research productivity and reputation suffer while a junior faculty member is recruited and launches his/her research program. This lag can be avoided in strategically-selected programs by hiring replacement faculty early, in anticipation of retirements (R1.3). The cost of this scheme is limited to the bridging funds needed to cover the new faculty member’s salary for two or three years.

**Broader impacts in research.**

Fully leverage the benefits of the Stem Diversity Institute (SDI) in our research by (i) raising awareness of SDI best practices, and utilizing its activities, as a competitive advantage in sponsored research (ii) utilize the SDI networks of partner institutions in recruiting at all levels.

**Broader impacts.** Proposals to the National Science Foundation are required to demonstrate “broader impacts”: benefits that go beyond the research itself. One of the most important broader impacts is to improve the participation of underrepresented minorities and women. UMass Amherst has established a national reputation for broadening the impact of research – a consideration of increasing importance in several funding agencies - and has recently established the STEM Diversity Institute (SDI, formerly NEAGEP) to consolidate and institutionalize gains. SDI has developed very effective means of increasing minority participation, with pipeline programs and with support for graduate students from underrepresented groups. SDI has a suite of best practices that can be modeled by many of our programs. It is an effective means for achieving broader impact in our research, and is an important competitive advantage to be leveraged in research grant proposal preparation and research execution.

2. **Aligning Research with Investor Priorities and Maximizing Impact**

Much of our research enterprise is resource-intensive, with federal funding playing a critical role in sustaining world-class campus research; the Commonwealth of Massachusetts and industry are also important partners in our research. To be an effective partner with the federal agencies, the Commonwealth, and industry, we must become increasingly effective at competing for resources as well as demonstrating impact.
Securing federal and state funding in an increasingly competitive environment.

We can maximize our collective success by (i) better leveraging campus knowledge and expertise of federal and state agency priorities, (ii) building on successful programs for grant and professional development, (iii) making investment decisions informed by likely future federal funding trends and unique campus strengths.

Federal and state funding. Federal funding is primarily awarded through highly competitive research proposal processes. We can help maximize our collective success by (i) better leveraging campus faculty who have been program managers, who serve on agency advisory committees, or may otherwise have valuable insights; (ii) more effectively disseminating information from our Boston and Washington consultants, and (iii) continuing and expanding our programs of connecting junior faculty with faculty who have previously received awards such as NSF and DOE Early Career awards, and programs that connect faculty to agency program managers (R3.1).

The campus should also constitute a small but representative, forward-looking campus committee to review (perhaps annually) recent and likely future funding trends and recommend strategic and intentional research investments based on careful assessment of our competitive strengths (R3.4).

While the Commonwealth does not itself broadly fund research activities, it does make investments in key areas (typically science and technology) that positively affect our research enterprise (R3.3). Examples include the MLSC, the MGHPCC, and several energy-related initiatives. Research-related campus activities have been effectively coordinated through the UMass system office of the Vice President for Economic Development, and our campus’ VCRE office. These opportunities can be more broadly disseminated, and research partnerships within the state, particularly with the UMass Medical School could be expanded.

Incentivizing and supporting center-scale activities. Center-scale activities are important to the research enterprise, but require significant faculty “goodwill” effort. Centers should be seeded and developed more intentionally by providing support for development and operation of center-scale proposals/activities.

Seeding Center-scale Proposals. Federal funding of center-scale proposals is increasing. These centers tend to be interdisciplinary, and enable research opportunities not achievable by individual or small groups of faculty. They enhance institutional research reputation, have significant educational components, last for an extended period of time and are at high funding levels. However, center-scale proposal preparation requires significant time, effort and funding. Relying on faculty to put in the time and effort as an overload is not an effective strategy for creating center-scale proposals and interdisciplinary
synergy. The campus can increase the number, and competitiveness, of federal center-scale proposals by creating a fund to provide resources to develop these large scale proposals, possibly including release time, administrative assistance, summer support and travel funds (R3.2).

**International Research Funding.** Existing and emerging opportunities exist to increase internationally funded research. Several actions can be taken to more successfully compete: (i) Inventory sources of international research funding, and assist faculty in identifying international partners to complement UMA research expertise. (ii) Continue to develop strategic partnerships with selected international institutions with a broad purpose, including promoting specific research collaborations and exchange of faculty, graduate and undergraduate students. (iii) Provide seed grant support for new international research collaborations.

**Expand and more fully engage industry in research partnerships.** Take advantage of the full range of industry funding opportunities by (i) promoting strategic alliances with companies; (ii) better marketing ourselves to industry; (iii) using UMII to develop and enable applied research, and exploring a UMII presence in Boston; (iv) becoming more “business friendly” through streamlined research administration procedures (v) more intentionally targeting strategic partnerships in Western Massachusetts.

**Industry: Expanding opportunities.** The translation of research into demonstrable impact in society has been an important goal since our founding focus on agriculture. Partnerships with established companies are an important route to impact and funding, e.g., by placement of our graduates or by licensing of intellectual property developed in our research. However, innovations based on new knowledge may have no obvious established industry partners or partnering may be too risky. Because the creation of new knowledge is at the core of our research enterprise, we should put in place more faculty and more resources to address the translation of new knowledge into new ventures, and amplify the impact of our basic research excellence.

An agile and resourceful research university seeks opportunities in an ever-changing funding landscape. These opportunities may involve partnering with industry to win SBIR, STTRs or other large federal grants. The establishment of UMII now makes possible contracts of a more applied nature. Also, foundation grants have an impact and can lead to productive opportunities. By expanding interactions such as these, we become more attractive for long term strategic partnerships that enhance our basic research mission, foster innovation, and impact economic development (R5.5).

We must increase our prospective partners' awareness of UMass Amherst’s research enterprise - Getting them to know about us is a necessary first step in expanding industry interactions. Interested companies should more easily be
able to discover what UMass Amherst has to offer, how specific research and innovation activities and experts can benefit them, and how they can engage with us in projects and partnerships. (R5.1).

**More effectively engaging the campus in business partnerships.** In order to achieve a campus goal of increasing partnerships with industry, the entire campus must come to recognize the value and explore such opportunities to the fullest extent. Some UMA departments may be interested in making connections with industry, but may not know how to make the connection, or how to extract some benefit from it. Other departments may not realize their value to industry. Our strategy should include fostering a campus climate that embraces connections to industry and encourages research that follows emerging developments in the non-academic world (R5.4).

**Expand campus awareness and engagement in industry research.** Uncover and develop new on-campus potential for industry partnerships by (i) creating an understanding of the benefits of industrial research; (ii) aiding departments in recognizing potential industry partnerships.
A commitment to provide high value to our partners and stakeholders in business and industry requires that we continuously improve our methods and capabilities. While University services (UMII, CVIP, OGCA, etc.) constantly strive to reduce obstacles to successful research and technology transfer projects with industry, there is more that can be done in terms of processes and capabilities that augment our value to partners and assure that the campus reaps the full fruits of its engagement efforts with industry (R5.2).

**Student recruiting as one component of business partnerships.** Many of our research partners in business and industry value knowing our graduates as a key benefit of engaging with us; these partners may additionally rely on us for advanced degree programs for their employees. Similarly, our students and their families want to know that a UMass education gives graduates an advantage in landing jobs. Many industry partnerships begin with the hiring of our students. By adjusting and supplementing our academic programs in a business-aware manner, the university can provide great value to both students and industry partners (R5.3). Doing this in coordination with research engagement efforts enhances the likelihood that companies will view UMass as a place to go for both students and research.

**Leverage students as a key link with industry.** (i) promote educational efforts that meet industry needs; (ii) Mine hiring patterns for likely partnerships; (iii) Use externships more broadly.
Externships (external internships) provide a way for the University to more than match a partner’s willingness to employ one of our graduate students as an intern. If a partner hires one of our graduate students in an internship paying about $4500/semester, the University waives tuition and curriculum fee – a waiver whose value could be twice the $4500 that the partner has invested.
Currently, only a few of our graduate programs use externships on a regular basis, but many others could benefit.

3. Building Bridges: Interdisciplinarity

Strong disciplines are as necessary as ever, but solutions to many societal challenges in which research universities can and should play a key role require knowledge and insights from multiple disciplines working together. We have many strong interdisciplinary programs and should adapt and grow these as needed in response to evolving opportunities.

Quality of centers and institutes. (i) Review criteria for centers and institutes; (ii) implement a more regular and stringent review process; (iii) develop alternative ways to demonstrate institutional commitment to external funding proposals.

Assure and assess the quality of centers and institutes. Many centers and institutes are clearly successful in supporting cross-disciplinary collaboration and outreach, especially to local communities, schools, NGOs, industry, other research networks, and institutions. However, centers and institutes can proliferate unnecessarily when they are established to serve as evidence of institutional support to potential funding agencies, or when they are seen as the only way for faculty from different departments/colleges to share GOF accounts and obtain administrative support. This results in centers and institutes that have short shelf lives and wither away after an initial grant expires. Centers and institutes should be long-lived, robust sources of interdisciplinary collaboration that bring prestige and resources to the university.

At this point it is important to review and revise the criteria for creating and terminating centers and institutes. This could be done by a standing Committee on Centers and Institutes, which would also assess regular center/institute reports and make specific recommendations and sunset clauses for improving or changing center/institute missions to align with campus priorities (R2.1). For collaborations that do not rise to the level of centers/institutes, we need another way of demonstrating institutional commitment to external funding agencies.

Nurturing and facilitating interdisciplinary research. We need to support new interdisciplinary ideas, and make it easier to engage interdisciplinary partners on and off campus by (i) supporting nascent interdisciplinary research groups; (ii) supporting problem-centered interdisciplinary seminar series; (iii) developing a publically available interdisciplinary research database.

Nurture interdisciplinary research. Small exploratory collaborations are often where the most cutting-edge ideas are born. It would be to our advantage to
support short-term research interest groups that seek to develop ideas, especially ‘high-risk/high-reward’ concepts that are critical to the changing research landscape (R2.2). We need a flexible and nimble mechanism to support nascent interdisciplinary research groups with specific short-term goals (e.g. external grant proposals, meetings among research groups, interdisciplinary publications, hosting conferences/workshops). On an even smaller scale, we can seed the initial development of interdisciplinary ideas by offering an annual competition to support self-initiated, 1-year seminar series that stimulate interdisciplinary problem solving. Access to funding and administrative support for both of these short-term interdisciplinary research initiatives should be competitive (e.g., as with the case with the Faculty Research Grant program).

There is a wealth of cutting edge interdisciplinary research happening on campus, but it is difficult to find out what it is. This is a significant impediment to matching researchers to one another, industry, and community partners that span disciplines. This problem could be addressed with a well-advertised, publically available interdisciplinary research database (R2.3).

Intentional inter-disciplinary hiring is another significant way to increase and facilitate interdisciplinary research that spans department boundaries (R1.2).

**Encourage Interdisciplinary Teaching.** To more fully develop high value interdisciplinary teaching, (i) support new interdisciplinary courses; (ii) support essential courses left uncovered by interdisciplinary teaching; (iii) credit departments and faculty for interdisciplinary teaching.

**Encourage and facilitate interdisciplinary teaching.** Faculty are often isolated in their departments, without significant interaction with faculty from other disciplines. Interdisciplinary teaching can break that pattern by providing a venue for bridging disciplines in creative, collaborative ways (R2.4). Interdisciplinary teaching brings students into faculty labs, stimulates faculty research programs, gives undergraduates the skills to be better future employees, and produces PhD students who are well-poised for success in academia and industry. There are several relatively simple actions that could increase interdisciplinary teaching and remove impediments to teaching across departmental boundaries: hold an annual competition for the development of interdisciplinary courses; credit faculty for interdisciplinary teaching outside of their departments; when needed, provide funds for departments to cover essential courses taught by faculty who teach inter-departmental courses; cross-list interdisciplinary courses so that all departments receive credit for teaching the students enrolled in them.

**Interdisciplinary hiring.** Interdepartmental cluster hires are not entirely effective. Additional forms of interdisciplinary hiring, such as true split appointments, should be explored.
**Hiring to Encourage Interdisciplinarity.** The campus’s principal interdisciplinary hiring strategy to date has been the cluster hire concept: faculty, mostly junior, with similar interests are hired simultaneously in several departments, with the expectation that they will collaborate to establish new interdisciplinary programs. This strategy does not always yield a coherent interdisciplinary group.

Other options should be considered: (1) Encourage high-ranking departments to collaborate on a new round of cluster hire proposals. (2) Hire a single post-tenure faculty member with interdisciplinary interests via a true split appointment: each department has > 0% of the line. (3) Hire a single senior faculty member, who then has influence in the hiring of a small number couple of junior faculty in subsequent years. (4) Hire an entire functioning research group from another institution. E.g., one senior faculty member and several junior faculty.

**4 Effective and efficient support for infrastructure support and the research enterprise**

*Better integrate faculty hiring with facilities funding.* (i) appraise infrastructure cost to establish research priorities; (ii) increase academic representation on Capital Assets Board; (iii) incorporate realistic annual expenditures for renovation of existing space for new hires into the Capital Plan; (iv) establish a protocol for faculty hiring that increases the hiring timeline to a minimum of 30 months.

Providing support for research has been a challenge, and has tended to vary from unit to unit. Increasing research competitiveness relies on continued progress in equipping the campus to support faculty innovation, and in committing to ongoing evaluation and improvement of research support.

*Better integrating faculty hiring and determination of research priorities with near-term funding of facilities and long-range facilities planning.* Current hiring priorities are established primarily at the departmental level, without sufficient consultation/integration with campus-established mid- or long-term priorities. As a result, new research areas needing laboratory facilities often wait several years before appropriate space is available (R4.1, R4.2).

*Establish IT support as a primary research component.* (i) CIO to map out level of current IT support and needs; (ii) identify best practices for funding IT support at peer institutions.

*Develop a comprehensive campus IT plan that treats IT support as an essential component of the research enterprise (R4.3).* Computing hardware, software and technical support has become a basic building block for research,
but services for academic research computing support are piecemeal and departmental-based at best.

**Improving research award and compliance processes.** (i) prioritize implementation of Huron recommendations; (ii) assess level of award support to faculty and determine appropriate level of centralized vs departmental support; (iii) solicit regular evaluation reviews of OGCA and RBM performance and establish monitoring metrics; (iv) improve coordination with departments on IRB procedures.

**Assess adoption of recent recommendations to improve pre-/post- award support and compliance.** The 2010 Huron Study recommended improvement in UMass’ research support services. The Strategic Planning process is an opportunity to preliminarily evaluate those reforms that have been put into place and to prioritize the implementation of others (R4.5).

UMass has seen large growth in research requiring IRB and other compliance-related approvals. The review and approval process can be more efficient with greater coordination and communication of central IRB staff and members with department staff (R4.6).

**Better integrate library services into the research enterprise.** (i) promote partnerships between library and campus research entities, e.g. by having the Library Data Working Group provide training, consultation and support services in data management; (ii) increase library resources to meet the needs of emerging research areas.

**Promote research and training partnerships with the library and increase funding for the libraries to meet the needs of emerging areas of new research (R4.4).** New directions in library research resources are increasingly tied to faculty and graduate student needs for data and citation management. Since 2011, the National Science Foundation requires that all proposals submitted to NSF include a data management plan. Other funding agencies are also moving in this direction. The Libraries’ acquisition funds have not been adequate to meet faculty demand for journals, monographs and other information resources and the interlibrary loan system is an unsustainably expensive remedy.

### 5. Enhancing awareness of campus research and scholarly activities

**Improve visibility of faculty research to off campus audiences.** (i) provide additional support to faculty to publicize their success; (ii) provide and promote publicity and media-training workshops; (iii) develop a pipeline to gather news on faculty achievements; (iv) develop a speaker’s bureau of faculty who are qualified, willing, and trained to respond quickly to media requests.

The campus has a number of offices and activities that promote our research results and achievements. Each office has particular audiences for their news and publications and use varied media to “get the news out.” Faculty are often
unaware of the process for submitting a news article or the type of news that is appropriate for each outlet; they may also be reticent to promote their work. We do not make it efficient for external news media to contact faculty for response to the daily news cycle. The contributions and impact of our research can be more broadly communicated and our value (including non-financial indicators of impact on the Commonwealth such as services, engagement, and outreach) better understood by improved publicity of faculty research news and achievements to citizens of the Commonwealth, legislators, and potential funders (R5.1). Public awareness is similarly enhanced when our faculty to share their research expertise via external news organizations (R5.4).

**Increased number of external professional & disciplinary awards and fellowships.** (i) publicize “best practice” award processes in departments and colleges (ii) promote nominations for awards (e.g., via departmental awards committees) and publicly celebrate these awards internally and externally.

Disciplinary and other awards and honors received by campus faculty are an important indicator of research excellence; these should be communicated broadly to many constituencies (R5.2). There are likely more awards to be earned by faculty who may be reticent to apply, who have not prioritized award submissions, or who do not understand the benefits that awards provide to the recipient, the department, college and University. Increasing the number of named Professorships is also a way to increase research capacity and visibility (R5.3).

### 6. Excellence in Graduate Education

Further recommendations from the Doctoral Program Review. Other important DPR findings deal with graduate students: our funding offers are non-competitive; the time to degree completion in most of our programs is longer than average; and the enrollment in many programs is unplanned, with the primary determinant being the need for TAs and TOs to staff courses, rather than realistic PhD employment prospects.

**DPR recommendations.** Engage faculty in two campus-wide efforts: (i) right-sizing our doctoral programs; (ii) reducing time to degree and improving completion rates.

Doctoral enrollments need to be right-sized and TAs and RAs reallocated, so students are adequately funded and PhD output is matched to the market. Because the Curriculum Fee charge reduces funds available to support students, growth in this charge needs to be reduced from the current 5%/year, lest it outstrip growth in federal funding. The recommendations of the DPR should be heeded as part of a concerted campus-wide effort to improve doctoral degree completion rates and time to degree.
ED.: There are additional insights, findings and recommendations regarding graduate education from the strategic planning group on that topic. Our strategic planning group provided input on TA/TO allocations (R1.8) and the curriculum fee (R1.9). There are also additional insights, findings and recommendations regarding research in undergraduate education; we also provided a recommendation (R1.10) to that group.

1. This draft document was created by the Research Strategic Planning group as input to the Phase 1 (“Setting the Agenda”) strategic planning document (“Innovation and Impact: Renewing the Promise of the Public Research University”) produced by the Joint Task Force on Strategic Oversight (JTFSO). Last modification: V7, 4/16/2013.