Innovation and Impact

Renewing the Promise of the Public Research University

Phase One Report: Setting the Agenda

I. Context and Vision

A. Innovation and Impact: An Enduring Mission

UMass Amherst is a great public research university, with a vision that is rooted in our founding and that still resonates with our many stakeholders. We are celebrating the sesquicentennial of the Morrill Land Grant Act and of our founding, and also our evolution into the flagship of a statewide, five-campus university system. Although passage of the Morrill Act is now accepted as visionary, at the time the idea that academic research could have practical benefit to society was a radical notion that failed in its first launch, and was slow to catch on in many states. But the Act invented a new kind of institution designed to put innovation to work for the public good. Over time the impact of the early Land Grant colleges became indisputable. Eighty years later, as World War II concluded, the initial model was severely tested. The growth of the industrial economy, the demand for professional qualification in many fields, and the emergence of systematic federal support for research — not to mention the need to educate the GI Bill students — caused much soul-searching at public universities. But as the nation's needs shifted, the Land Grant institutions innovated to meet them, producing the basic public research university model that still dominates today. A generation later, the maturation of the Baby Boom required another major adjustment, vastly expanding the teaching component of the public university mission and setting the stage for the delicate and difficult balancing of research and teaching.

Through the generations, creating public impact through innovation has been our guiding vision. It remains so today. The original "agricultural and mechanical" focus has broadened into nearly every aspect of modern life, and into a larger obligation to the community we serve. Teaching and research remain at the core of our mission, but we carry them into the community in many ways. We advance socially just learning and working environments that foster a culture of excellence through diverse people, ideas, and perspectives. We form community-university partnerships designed to transform lives and strengthen society.

This is our enduring vision. But what is required to keep that vision fresh as we open another chapter in our development?

B. Renewing the Vision: Forging a New Model for Success

We recognize that our university, like society at large, faces economic, demographic, and technological imperatives that demand innovative solutions. The need for institutions like ours is as great as it has ever been. Yet today, one of the greatest challenges we face is that our basic organizing model — the convergence of immersive, residential undergraduate and graduate education in a rich research environment — may not be sustainable if it cannot adapt. While our model is extraordinarily effective at fueling innovation, it is also resource-intensive. We have now reached a juncture — long in the making — at which a new approach is needed, one that will call on us to change in two ways:

1. First, we must become more effective at demonstrating value to those who hold a stake in our success.

2. Second, we must learn to operate effectively in a new and much more challenging resource environment.

All public research universities confront these challenges. For some, the transition may be especially unsettling. Those that rode the crest of the post-war wave of federal research growth now have vast, expensive research enterprises to support. Those that expanded through enrollment-based state investment now face a reversal of fortune on many fronts. Those that sought to build both breadth and depth may now face very difficult choices.

Effective competition will require a strong student success strategy and growing confidence in our ability to serve the Commonwealth and society at large. It will require a careful strategy to recognize emerging areas of research strength, and to focus investment accordingly. The leading public research universities of the next generation will be flexible, adaptive, and creative. In that sense, UMass Amherst is well positioned to adapt. If we are successful in those efforts, there is no doubt that we will be recognized as a model in the coming years, and will take our place among tomorrow's leaders.

There is nothing new to us about engaging stakeholders or navigating uncertain financial waters. What is new is how high the stakes have become. Carrying our mission forward will require creativity and commitment. The campus has demonstrated its capacity to rise to such challenges in the past, and we can do so again. This plan marks out a course.

1. Demonstrating Value

To us, the value of what we do may seem self-evident. But to students and their families, funding agencies, policy makers, employers, donors, and other key groups on whom we rely, confidence in the value of what we do has been eroding for some time. As we make plans for the future we need to refine, reassert, and reinforce our value as a university in the public interest and rededicate ourselves to the public good. We must challenge the perception of being self-absorbed.

As the cost of attendance has increased, students and families have become more insistent on seeing an appropriate return on their investment. Policy makers, faced with impossible choices for the use of tax dollars, seek to protect their own investment and also to advocate on behalf of families. Funding agencies face their own difficult choices, and need to satisfy both themselves and their appropriating authorities that expenditures on university research can be justified in the face of other societal needs. Donors need to know that their dollars will advance the causes important to them. So with competition for tax and tuition dollars tightening, we have a compelling need to demonstrate why we remain a sound investment.

If we are to become more effective at building support for our institution then we must ensure that the public knows and understands our impact. Traditional indicators of quality — research funding, doctoral production, and faculty recognition by national organizations — obviously remain relevant, but increasingly are incomplete. Considerations of undergraduate student success and broader societal impact are essential to attracting investment to public research universities.

The leading institutions of the next generation will be highly valued by their full range of constituents who hold a stake in their success. They will be characterized by:

- Undergraduate and graduate students who achieve their educational and career goals at a cost commensurate with their success.
- An outstanding faculty engaged not only in advancing knowledge and graduate education but equally devoted to student learning using cutting edge technology and pedagogy.

- Scholars engaged not only in basic research, but also in translating its results for the benefit of society.
- A diverse and dedicated staff, working together to achieve common goals.
- A compact with the local, state, and federal governments for a share of support commensurate with their demonstrated benefit to the public.
- The support of alumni and employer communities that, as a direct result of value received, invest in the institution's continued success.

2. Marshaling resources

The business model for the flagship research university has frayed. Growth in federal research dollars has stalled. State appropriations for higher education have declined in real terms. This in turn has resulted in significant increases in tuition and fees, yet universities are under increasing pressure to control costs. At the same time, some see educational models such as free Massive Online Open Courses (MOOCs) as calling into question the value of our more expensive residential immersive model. Our challenge is to adapt our model so that it can sustain us in a new environment.

Many public universities have turned to enrollment — especially of non-resident students — as a replacement source of revenue. This can pay off, especially in the short term. But it requires considerable capital outlay in expanding capacity (classrooms, residence halls, recreational facilities). With state capital funds under pressure, universities have looked to long-term debt in the bond market for construction and renovation. The resulting debt service adds to operating expenses, requiring further fee increases. As both federal and state funding of research stagnates or (worse yet) declines, the costs of research, doctoral education and outreach also add to the student burden.

Thus, expanding our revenue base remains important, but will not by itself produce financial sustainability. We must also change our cost structure through pedagogical innovations, the effective use of technology, and other efforts to focus resources and control costs. In expansionary times we were able to take an expansive view of what research questions to pursue and what curricular options to offer. In a less expansionary time the challenge is to examine critically our choices for building on innovation, and to invest in those with the greatest prospect for success.

C. Strength through community.

There are many organizations devoted to higher education, with new variations arising every day. Similarly, organizations of various kinds engage in basic and applied research. But research universities do something special at the intersection of education and research. They bring together a group of scholars who infuse their teaching with the fresh perspectives of the researcher, who introduce their students to the important questions and emerging methods in their fields, and who multiply their personal impact by training the next generation of specialists and assembling teams essential for advancing the frontiers of knowledge. And *public* research universities add another dimension: they provide access to this rich educational environment to a broad spectrum of students at a relatively affordable cost. We form a community with an important purpose and a set of shared values that will guide our actions going forward.

- **Excellence**. Whatever we choose to do, we do with excellence. As demands have risen and resources have become constricted, universities have too often spread resources ever more thinly over what was already being done. But controlling costs cannot come at the expense of the quality that produces value and impact. Commitment to excellence signals that we are an organization that deserves and rewards investment, and therefore helps attract resources even as we find ways to put them to better use.

- **Leadership.** Developing a sustainable model means more than achieving some measure of financial stability. Scores of institutions share our general mission and face a similar set of challenges. We want to be a leader, helping to define what value means today and tomorrow.
- **Responsibility and Stewardship.** Leadership carries responsibility. As a community we set high standards for personal responsibility and institutional stewardship, recognizing that the integrity of our ideas, the strength of our society, and the sustainability of our planet rely on continuous creativity and commitment to act.
- **Social progress and social justice.** UMass Amherst has a profound legacy of and commitment to social justice, extending across generations and spanning disciplines. We accept for ourselves and instill in our students the ongoing commitment to create a better, more just world.
- **Innovation**. Innovation has always been central to what we contribute to others, but increasingly it must apply to the way we think about ourselves. As a learning organization, innovation needs to be at our core, not something squeezed in around the edges. Throughout the organization we must stimulate, recognize and reward innovation and creativity.
- **Discovery and Impact.** We exist to advance the creation and discovery of knowledge that benefits society. Basic research creates fundamental new knowledge that provides the necessary foundation upon which innovation rests, and shapes society's direction over the long term. Applied research demonstrates the value of discovery in our daily lives.
- **Engagement**. We produce value by learning and working collaboratively on campus and with community members and organizations. Effective engagement leads to partnerships that cultivate mutually beneficial relationships built upon trust, cooperation, and shared responsibility.
- **Diversity, Equity and Inclusiveness**. By embracing diverse people, ideas, and perspectives we create a vibrant learning and working environment. Breaking down barriers to meaningful participation fosters a sense of belonging and treats all individuals with dignity and respect. In this environment we work toward an equitable society in which all enjoy equal rights and opportunities.
- **Opportunity**. A corollary to inclusiveness is opportunity, a commitment to welcoming all those who share our aspirations and high standards of performance.
- **Openness and Integrity.** As a university we are committed to free and open intellectual inquiry and expression and to high standards of professional ethics and integrity. These values permeate all that we do, and call on us to be consistent in principles, expectations, and actions.
- **Integration and Collaboration.** In our intellectual life and in the life of the institution we can achieve more when our purposes are aligned and our efforts and resources are coordinated.

With these values we can mobilize the campus community and the larger community of which we are a part to meet a new set of challenges.

The UMass Amherst community has always demonstrated ingenuity, resourcefulness, and a determination to overcome obstacles. Working together in a culture of mutual respect and cooperation we have built a remarkable institution. Going forward it will be especially important to nurture that culture.

In part that calls on us to recognize and respect the efforts of faculty and staff at all levels whose dedication and commitment sustain our quality. The contributions of each individual should clearly be valued by the institution, and be reflected in a rewarding work experience and clear paths to personal and professional growth.

In part that will mean a renewed commitment to diversity and inclusion. Our innovative scholarship, teaching, policy development, student leadership, programs and services have made us known as a forward-thinking and socially conscious university. Born of a radical vision that any deserving citizen of Massachusetts, regardless of wealth or social status, should have access to higher education, inclusive excellence has defined UMass Amherst from its origin. Women found an open door at UMass as early as the 1870s and achieved or exceeded parity with the enrollment of men by the 1980s. In 1898, shortly after the Supreme Court legalized the exclusion of African Americans from most colleges in the country, "Mass Aggie" accepted its first African American student, George Bridgeforth. In 1904, it hired Matthew Bullock, the first African American coach at an integrated U.S. college. We have taken pride in providing educational opportunity throughout our history. As we move forward we must take care to preserve that legacy, especially for students who may be vulnerable in the more challenging economic environment we face.

The international diversity of our faculty and students is a growing part of our identity and strength. Continuing to build an international culture on campus improves the climate for international students and faculty, cultivates strategic partnerships, and informs teaching. Appropriate administrative structures, ESL support, and programming aimed to better integrate international students into campus life promote the goal of creating a more diverse and inclusive campus. The special needs of those travelling to UMass Amherst from developing countries — who represent a crucial aspect of global diversity — should be recognized.

We sustain an accessible and welcoming campus culture through many efforts to promote inclusion in all facets of campus life. Sustaining and expanding those efforts will require leadership and careful planning and evaluation. For many years leadership of various kinds focused on community engagement, diversity, and social justice. This year the Chancellor renewed that focus by appointing a Faculty Advisor on Diversity and Excellence. Attention now turns to building capacity: determining how senior leadership should be provided on a long-term basis; undertaking a campus climate study; identifying and disseminating effective innovation; identifying investment priorities; and developing ways to systematically assess and monitor performance with respect to diversity, equity and inclusiveness. Development of a Campus Climate Response Team and Bias Incident Response System, recommended in the 2011 Diversity Plan, should also be pursued.

D. Doing things differently

This plan is organized around a simple idea: our circumstances have changed, so the way we do things needs to change, too. But "change" in and of itself is not a strategy. The nature of our challenge suggests four particular directions in which change will be important:

- Taking a longer perspective. The external environment – especially budgeting processes, fee-setting policies, and state capital decisions – tends to motivate short-term, reactive thinking. We need a longer perspective. We cannot control our environment, but we can choose how to react to it. We can also create the flexibility needed to enable longer-term thinking through our own policies and practices.
- Thinking more broadly. Similarly, some circumstances elicit a "watertight compartment" reaction, in which units feel more secure going it alone than acting in concert. But acting in isolation too often results in lost opportunities and crossed purposes. Thinking narrowly is often a rational, if not optimal, response that can be hard to overcome. It is not enough to argue that a more "strategic," or comprehensive, or coordinated way of doing business is needed: we must demonstrate that such an approach will produce a better outcome. This calls for high standards of transparency, rationality and fairness as we tackle difficult choices.

- Being more intentional. Without a longer and broader view it is difficult to set a course and make effective choices. Individuals and individual units do the best they can in the moment – often heroically – but are necessarily limited to a narrowed range of options. We need to sharpen our sense of what is possible and be more intentional in setting goals, mobilizing resources, and evaluating progress.
- Thinking big. All of the above can cause us to think small, avoid risks, and work around the edges of our challenges rather than at their core. But the scale of our thinking needs to be consistent with that of the task we face. From time to time, events demand a fundamental rethinking of how we fulfill our mission in society. This is one of those times.

1. Promoting a Culture of Evidence

There is another kind of focus that will support all the goals identified here. Demonstrating value, using resources wisely, and changing the way we think all rely on good information. Since so much of what we face is new or changing, we need information to support wise decisions. Since so much of our success depends on connecting with stakeholders, we need information that communicates our effectiveness and supports improvement. Supporting theories with evidence is at the core of our research and teaching mission; our strategy will be stronger to the extent that this perspective permeates institutional decision making.

The campus has many excellent individual sources of analytic and evaluative information. We can build on that base in several ways.

- Demonstrating meaningful accountability. Our mission is to serve the public good. We must always be capable of demonstrating our success. There is no easy way to sum up what a public research university does, and often little agreement on what constitutes value. Challenging though it may be, if we are to maintain public confidence and support we need to find meaningful ways to display our performance. In so doing we must remain true to our purposes and aspirations, and to demonstrate the "value of our values." As we embrace accountability, we must also work to expand and enrich its language.
- Build institutional information resources. Our many reporting tools and software systems leave us awash in data, but we sometimes struggle to convert that data into usable information. One hallmark of an effective learning organization is that its members have relatively easy access to the right information, both for making decisions and evaluating success. A central challenge in developing a culture of evidence is therefore building better information structures that draw widely from available data and inform institutional decisions meaningfully.
- Embracing student outcomes assessment. The next generation of higher education leaders will demonstrate how they establish learning objectives, communicate them to students, express them in the curriculum, gather evidence of success, and, most importantly, use that evidence to improve curricula and pedagogy. We now make effective use of indirect measures of student achievement (student self-report), and have begun to incorporate direct measures, based on systematic evaluation of actual student work, into selected efforts such as the Integrative Experience. The next step is building capacity for direct measures across the curriculum, and integrating direct and indirect data in performance assessment. Similarly, the campus has been developing learning outcomes and assessment techniques for co-curricular aspects of student learning, and those efforts, too, should expand.
- Promoting evidence-based, intentional resource allocation. Our internal allocation of resources largely reflects an incremental approach. In a changing environment, reliance on past practice is not likely to result in an effective investment strategy. One of the most important changes we can undertake is to extend a culture of evidence to the job of resource allocation. This means

not only developing the analytic tools necessary to evaluate the costs and benefits of different choices, but also adopting practices that reinforce the link between evidence and decisions.

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This first phase of planning applies these goals and principles to the core mission of the campus. How can we demonstrate impact and focus resources in terms of the teaching, research, and outreach activities that define us? How can thinking more broadly and acting more intentionally point us toward success in a period of intense competition? How can we develop better information and insights to guide our choices? In short, what is an agenda that can equip this campus for leadership in the years ahead?

We begin to answer these questions in the following pages. Section II discusses how we can be the "destination of choice" for talented and highly motivated students, and in so doing secure the societal and stakeholder support necessary to carry our mission forward. Section III describes how our research excellence and community engagement can position us as the "investment of choice" in a state that relies on innovation for its success. Section IV considers the steps needed for the campus to mobilize in support of its mission-based strategies, with emphasis on financial and facilities issues.

This agenda sets a context. Subsequent planning at the campus and unit levels will result in priorities and specific actions to bring planning to life. With this agenda in place, the whole institution can align its work and focus its resources to execute a strategy for success.

II. Establish UMass Amherst as a destination of choice for the next generation of the Commonwealth's high school graduates.

The higher education delivery system is undergoing a revolution of sorts, blending face-to-face instruction, online platforms and self-directed and self-paced learning. In that sense, our traditional classroom-based approach is severely challenged. It is also true, however, that what makes us distinctive is a highly immersive residential educational experience that combines educational, social, and developmental opportunities for students. Public research universities are destinations, not just educational delivery systems.

Many students are looking for more than just course content and credentials, and a lower cost will not necessarily trump quality for many students. Families continue to make financial sacrifices to secure what they believe to be the best experience. UMass Amherst is positioned to respond to these broader interests, but the competition among residential universities is intensifying. We must be a clear choice by delivering a more responsive, interesting, and distinctive education that results in student success.

Being the "destination of choice" does not mean that UMass Amherst will be the right choice for every Massachusetts student. Many will not satisfy our standards for admission, and will find a better fit at another institution. A few will have the opportunity to attend one of a handful of elite private institutions. Our mission is to serve the many talented, highly motivated students who can benefit from a world-class research university, not just an exceptional few. For them we must be the clear choice.

The students for whom we compete will value the immersive undergraduate residential experience. But they will choose to attend the institution that offers the greatest prospect of success for them. We can become more competitive in several dimensions.

A. The Complete Educational Experience

A great institution has a character that helps define its community and guide its actions. Our undergraduate experience should contribute to and reflect that character. In planning our institutional strategy we should give special attention to what defines a UMass Amherst education. It need not, and given our diversity probably cannot, have a single or narrow focus of distinctiveness. We can, though, come together and identify the values, traditions, and aspirations that guide the expectations we set for students and ourselves. We can, and should, be more intentional in establishing campus-wide learning objectives that permeate the educational program. We can reflect and act on why choosing UMass Amherst matters.

In this effort we are not starting from scratch. Clear learning objectives have been defined for our General Education curriculum, aligned closely with AAC&U's Essential Learning Objectives (www.aacu.org/leap/index.cfm). These objectives complement and, in many cases, echo the learning objectives associated with specific programs of study. It is also possible to see in parts of our curriculum various themes, including enterprise, engagement, expression, sustainability, and social responsibility. And throughout the educational experience the sense of individual initiative and responsibility is strong.

The complete educational experience also includes robust co-curricular opportunities with a focus on personal development to promote mental and physical well-being, the development of meaningful relationships, facility in collaborating with others of diverse backgrounds and identities, and personal accountability and leadership. Opportunities for experiential learning can be found through involvement in Registered Student Organizations (RSOs), community service, performing arts, athletics and recreation, student governance and other student activities of many kinds. These opportunities are essential aspects of the immersive residential experience and contribute to students' intellectual, spiritual, physical, social, cultural, moral, and emotional growth. Student orientation and other out-of-classroom learning experiences — such as the "Common Read" can also play a valuable part in setting a context for learning.

One important dimension of the "complete" educational experience is that it is broadly inclusive. To this end, we must work to increase the success of students throughout the pre-K to graduate/professional school pathway. The University's many pre-college initiatives reach out to communities statewide to foster a culture of academic success for students from first-generation or low-income families or who attend high schools that are underrepresented in higher education. Once students are enrolled we offer academic support, mentoring and tutoring necessary to success at a research university, and provide exposure to research experiences and graduate study. These aligned initiatives provide a bridge for students to reach their highest postsecondary goals.

International diversity lends a special richness to the immersive educational experience. Multi-faceted opportunities reinforce each other and multiply impact: curricula with significant global perspectives; the presence of international students, scholars and visitors; and opportunities for study abroad and other international experiences.

With all of this as a starting point, the first phase of planning developed five foci for continued definition and improvement of our distinctive undergraduate educational experience:

- Curricular Coherence
- Engaged Learning
- A Rich Choice of Opportunities
- The Research Advantage
- Career Development and Preparation

Taken together, these are features of a complete educational experience that will demonstrate value to students and their families, and make us a more distinctive and competitive choice.

1. Curricular Coherence

One of the most compelling reasons for attending a public research university is the sheer scope of opportunities for students. The choices of degree programs, communities of interest, co-curricular opportunities, and trajectories into career and life are unmatched. This array of choices benefits both students who enter with clear learning objectives and those who need time to explore.

However, the broader the array of choices the greater the need for structures and cues that can guide effective decisions. Later in this section the challenges of advising in this context are discussed. Here the focus is on steps we can take to promote greater coherence in the curriculum.

Curricular coherence is at the core of educational impact. We establish goals for learning that serve our students well now and in the future. But our impact depends on the extent to which students actually experience what we intend. We must strike a balance between independence and enterprise on the one hand and intentionality on the other. We must also balance disciplinary perspectives with broad institutional objectives. This is especially important if we hope to convey to students the character of a "UMass Amherst education," something that goes beyond mere accumulation of courses on the way to graduation.

There are a number of ways in which we can focus on the question of curricular coherence:

- In the broadest sense, this should be a self-conscious aspect of every curricular conversation going forward. When we are designing or revising courses and programs we should always ask ourselves how they fit into the larger curriculum and how students will navigate the frontier between the particular and the general. The recent reexamination of General Education learning goals and the introduction of the Integrative Experience are examples of how this can occur on a large scale, but more common and more modest opportunities occur in departmental discussions and governance review.
- Ongoing discussion of campus learning objectives will be important. We begin with a solid foundation built during the General Education discussion, but work remains to determine the full set of institutional learning objectives. Recent efforts to articulate learning outcomes related to sustainability are an example of how the broad themes that span departments can be reflected in institutional learning objectives.
- As part of formal curricular reviews — for example, during AQAD reviews or when new programs or major revisions are being considered — we should insist on careful curriculum mapping to demonstrate how learning goals translate to actual student experience. These are also opportunities to examine (or reinforce) links between institutional and departmental objectives.
- We have some curricular "pillars" to build on: designed curricula (such as the Writing requirement, the Integrative Experience, and Community Service Learning) that reinforce specific learning objectives. We need to understand how these work and fit into the larger curriculum, and explore similar structures that can support coherence.
- Similarly, there are some defined curricular pathways — such as departmental honors — that we can build on. One suggestion described below calls for formalized integrated degree programs. Other opportunities undoubtedly exist.
- In this document we ask the question of what it should mean to be educated at UMass Amherst, but we do not answer it. That is a task for the campus to engage in the next phase of planning. It is a deep and important question, and JTFSO should organize that discussion as a central feature of ongoing planning.

2. Engaged Learning

Effective learning results when students actively participate in the educational process. Students and the institution mutually engage in a process of learning that should be universal across all domains of the university experience: physical, virtual, on- and off-campus, in and out of the classroom. We should maintain a sharp focus on effective engagement in all aspects of curricular and co-curricular planning.

Active and applied learning.

In terms of the formal curriculum, the importance of engaged learning suggests broad application of the principles of active and applied learning. Active learning uses a variety of pedagogical strategies to encourage students to take responsibility for their own learning. In active learning environments, students and instructors are partners in discovery, working together to address complex disciplinary questions and real-world problems. Students engage with new material in a variety of ways: reading, self-directed research, online tutorials with immediate feedback on performance, and exploration of varied information sources like websites, discussion boards, and multi-media resources. Active learning stresses peer collaboration and problem solving, active listening, oral communication, and writing. Measuring performance also engages students through reflection and self-assessment of strengths and areas needing improvement. Coursework challenges students to practice skills at increasingly advanced levels and apply their learning in new contexts.

Active learning is a centerpiece of our effort to improve the educational experience because of its power in promoting student learning. Actively engaging students is a more effective way to teach, and the effects are deeper and more enduring. UMass Amherst is engaged in a number of active learning strategies and curriculum design initiatives that include team-based learning, "blended" classrooms, The Integrated Concentrations in Science (iCons) program, the Junior Year Writing program, and the upper level Integrative Experience (IE) component of General Education. Our challenge is to build on these initiatives and infuse active learning throughout the curriculum in a strategic and cost effective manner.

Our interest in applied learning draws from emerging research revealing the difficulty of applying what is learned in one setting to new contexts, especially for novice learners. Yet it is the transfer and application of skills that supports success at more advanced levels of scholarship, and more generally in life after college. It is well established that learners improve their skills through practice and experience, so we are committed to expanding opportunities of that kind both inside and outside the classroom.

Active and applied learning concepts underpin many recognized "high-impact" educational practices, including those identified by the Association of American Colleges and Universities (www.aacu.org/leap/index.cfm) that have influenced thinking on this campus. When properly designed and implemented, living-learning communities, service learning and community engagement, study abroad and other international opportunities, and internships all promote effective learning and provide lasting benefits to students. Expansion of active and applied learning opportunities should be a central feature of our strategy to make the educational experience more effective and attractive to highly motivated students.

- One aspect of that effort is to make active and applied learning more common and more coherent. The distribution of opportunities is uneven, and not always well integrated with students' programs of study. Active and applied learning should be a feature of every student's education in both General Education and requirements for the major, and should relate to course content in deep and meaningful ways.
- Barriers to participation in these kinds of opportunities should be identified and removed. For example, internship opportunities could be developed to support many different majors beyond those in which they are currently common.
- Active and applied learning is not necessarily more resource-intensive than traditional methods, but it often does require specialized support. For example, the campus has made a major commitment to active learning through the introduction of team-based learning classrooms and other active learning environments. But taking full advantage of that investment also requires support for new curricular and pedagogical approaches, time to re-tool courses, and technology that can support student-initiated work. Instructional and support resources need to be carefully aligned with curricular reforms.
- Peer education models view students as teachers as well as learners. With proper preparation and oversight students can serve as peer mentors, advisers, and educators in a broad range of curricular and co-curricular settings. The campus should promote appropriate peer education opportunities and clearly identify learning goals and assessment approaches.

Co-curricular opportunities.

Opportunities for engaged learning should be promoted at every point of contact with the institution. The evidence is clear that students who are actively involved have a more satisfying and successful educational experience. An immersive residential experience challenges students to take advantage of multiple opportunities for learning. Co-curricular offerings encourage student innovation and foster ownership, involvement and connection to the mission and the University community. A wide variety of living and learning contexts provide opportunities in which to develop, apply and practice skills and knowledge, and to integrate in- and out-of-class educational experiences. RSOs provide laboratories that engage students in organizational and individual learning and development to effectively communicate and resolve issues of conflict, build trust, and collaborate.

Civic engagement and community service.

Civic engagement and community service are particularly relevant to our mission of public impact through innovation. We have the opportunity and the obligation to prepare students for a lifetime of engaged citizenship. UMass Amherst is recognized nationally for its work in this field, and is well positioned to develop opportunities for students to develop the knowledge, skills, values, cultural competency and intercultural fluency, and other capacities that underpin civic engagement. Civic engagement represents a broad context that spans the undergraduate experience. In terms of the curriculum, consideration of differing views, choices, and the public consequences of those choices can be embedded in a broad range of areas of study. Coursework with a civic engagement focus also lends itself well to active and applied learning approaches. In terms of co-curricular opportunities, programs organized around civic engagement encourage students to understand the continual need for self-development and engagement beyond college. In all cases, students can actively participate in the campus's mission of engagement with the broader community (see also Section III, "Community Engagement and Impact").

- The Civic Engagement and Service-Learning (CESL) program, which had been housed in Commonwealth Honors College, was moved last year to the Provost's Office with the charge to promote and support service-learning opportunities for all students. This expanded focus opens up new opportunities for providing information to students and supporting faculty in developing courses with a civic engagement and service-learning focus. The next step is to evaluate program goals and resources in conjunction with the Provost's Committee on Service-Learning.
- Some civic engagement and service-learning opportunities may be attractive to donors, and specific targets should be developed through the *UMass Rising* campaign.

3. A Rich Choice of Opportunities

As noted above, an important component of our distinctive undergraduate educational experience is the wealth of choices we offer students. In addition to the many advantages these options offer in terms of engaged learning and curricular richness, they also represent real value to students who hope to emerge from college with useful credentials, career opportunities, and broad perspectives. Increasingly, students look for distinctive opportunities like study abroad, community service, living and learning communities, honors study and the like, and they are interested in educational opportunities that provide additional value for their money: "4+1" graduate programs, certificates (especially credentials with career relevance), meaningful internship experiences, and leadership opportunities. The opportunities available through the Five College consortium — including course cross-registration, cooperative certificate programs, and study in more than forty languages and dialects — add another distinctive element.

Departments have demonstrated great initiative and creativity in developing opportunities of this kind for students. The institution can support this process in several ways:

- Processes for developing new credentials can seem confusing and time consuming. In the past several years the faculty and administration have worked together to clarify and simplify processes for certificates and "accelerated" Master's programs. Efforts to improve processes should extend to the full range of programs and credentials, and address special planning issues such as international collaboration.
- Incentives for programs to develop new credentials are not always clear. As part of the broader review of resource allocation methods recommended elsewhere in this plan, the impact of creating new credentials should be clarified and made more easily incorporated into planning at the departmental and college levels.
- In the interest of coherence, planning for new credentials should include explicit reference to campus and departmental learning goals, and indicate an appropriate assessment strategy.

4. The Research Advantage

Research universities have the special capacity to introduce undergraduates directly to new knowledge and insights. This process takes many forms: scholarship woven into coursework, new tools and techniques demonstrated in the teaching lab, or direct experience as a student works beside a faculty member. In addition to the advantage of exposure to the leading edge of knowledge, many of the ways in which undergraduates interact with research faculty promote active and applied learning. Direct research experience may not be of interest to all students, but for many the rich opportunities of the research environment can be an important feature.

Expanding and integrating undergraduate research opportunities.

Participation in research opportunities varies considerably. For some — such as those who participate in Commonwealth Honors College — it is built into their curriculum. For others opportunities may be less formal and require greater initiative. Research opportunities may not be desired by every student, but they should be easy to discover and easy to integrate into a program of study. This can be accomplished in several ways.

- Emphasize the opportunities that already exist. Some aspects of the curriculum — like honors study and community service learning — already include a formal research component. Drawing more students into that base is cost-effective and builds on good design.
- Infuse research opportunities into more aspects of the curriculum. In some cases, programs may wish to emphasize research experience as an intentional feature. For example, a research-intensive concentration could represent one path to degree completion in a given major. Research-intensive certificates are also possible.
- Consideration should also be given to more formal approaches. A "research curriculum," reflected in specific courses or modules, could operate as an option as students progress: first year emphasis on basic research skills; second year focused projects that put those skills to work; upper division experiences such as labs, internships or capstones. Large-scale opportunities of this type would undoubtedly require development of resource strategies in subsequent planning, but could leverage existing courses and achieve good integration with students' courses of study.
- Consider how graduate assistants can facilitate undergraduate research participation. Many lab sciences have a successful model in which undergraduate research training is shared among the faculty member, post-docs, and research assistants. This may be a model for other fields.

Engaging student interest, early and often.

Participating in a research experience may not occur to every student who could benefit. Information should be easily available, barriers should be low, and benefits should be evident.

- A central clearinghouse for different kinds of research experiences would stimulate interest and ease participation. The Office of Undergraduate Research and Studies (OURS) provides important information that should be expanded (for example, by including links to departmental undergraduate research pages) and made available more prominently.
- Students are effective advocates and ambassadors. At low cost the campus could host a research-oriented blog through which students could share experiences, highlight opportunities, and build networks.
- Research activity could be more intentionally highlighted in courses, especially in introductory classes. Short presentations or video clips from research-active faculty members — not necessarily the course instructor — or students could demonstrate the link between the research lab or field site and content in selected courses.

Supporting intentionality and sustained effort.

Infusing research opportunities more broadly into the undergraduate experience will require support of several kinds:

- The Office of Undergraduate Research and Studies (OURS) represents an important institutional investment. Its success to date argues for a more visible and effective role, and greater capacity to provide information and support.
- Research opportunities appropriately originate in academic departments, but institutional policies can make them more widely and effectively available. For example, campus-level instructional expectations should acknowledge that research-intensive instruction also tends to be resource-intensive.
- A clear faculty governance home for undergraduate research issues could be helpful since issues cross the usual lines of responsibility and an appropriate mechanism for advocacy and oversight may not be obvious.
- Some research opportunities may be especially attractive to donors, and should be featured in the *UMass Rising* campaign.

5. Career Development and Preparation

Research universities have career preparation as only one element of their mission, but it is an important one. We focus on broad preparation rather than vocational skills, with the objective of preparing students for productive lives and lifelong learning. UMass Amherst offers many opportunities for career preparation, but there are several areas in which the campus can be more intentional and effective.

Curricular alignment.

The AAC&U initiative to identify learning outcomes and "high impact" educational practices reflected extensive interaction with employers to find the appropriate intersection between broad education and workforce needs. This provides us with a sound framework for matching our expectations with those of employers. Similar work by the National Association of Colleges and Employers (NACE) reinforces these insights.

- The recent reform of General Education and implementation of the Integrative Experience drew heavily from that framework. As a next step, the campus should undertake a careful examination of undergraduate majors in terms of high impact practices and employer expectations.
- This framework sets a national context. To provide local insight we need feedback from employers, alumni, and other stakeholders familiar with us. For that we need a systematic mechanism to elicit views on both expectations and our performance.
- A clear focus on employer expectations and high impact practices makes it possible to evaluate the extent to which our curriculum maps to these expectations and to assess student outcomes in a way that is meaningful to employers.
- Careers shift rapidly. Many campus departments have need for alumni employment data, and a coordinating group was recently formed to share ideas, avoid duplication, and achieve the highest possible participation from alumni. That effort should continue and focus on developing a systematic and effective mechanism to collect alumni information.

Career services.

With the escalating cost of education, students and families are more concerned than ever about employment upon graduation. Students receive formal career and professional experiences and guidance from an assortment of academic and support units. Some variation in how services are provided from college to college is understandable and appropriate. At the same time, the campus should develop a shared understanding of the career and professional experiences important to undergraduates, and ensure that staffing and support are responsive regardless of student major. This should include consideration of emerging needs such as preparation for international careers.

The recently completed external review of Career Services represents an excellent opportunity to launch discussions of a Career Services organizational model and action plan. Recommendations intended to better align career preparation with curricula, including potential organizational changes, coming from the external review should be given serious consideration. The Provost, in collaboration with the Vice Chancellor for Student Affairs and Campus Life, should evaluate the external review and proposed recommendations to determine an action plan moving forward.

B. Creating Capacity for Educational Effectiveness

We are designing an educational experience well suited to the challenges our students will face, organized around opportunities that promote deep learning and promise life-long value. As we bring this plan to life demand for the UMass experience will grow, and with it will grow recognition of the extraordinary value we offer. But the best design still requires effective implementation. Our plan must also ensure that we have the capacity to deliver on the goals we have set.

1. Supporting curricular innovation

This is a time of enormous change in how educational programs are designed and delivered. Harnessing the power of technological innovation and new curricular and pedagogical approaches will require support of several kinds. The campus has no lack of creativity or interest in exploring and adopting curricular innovation, and some exciting examples are in place. What our experience reveals, however, is a range of obstacles that faculty innovators face in understanding, applying, implementing and evaluating new tools and techniques.

Leadership.
Foremost among these is a need for dedicated leadership and a clear center of gravity to encourage, coordinate and promote activities that by their nature range across different parts of the institution. Units such as the Center for Teaching and Faculty Development, the Office of Academic Planning and Assessment, the Office of Information Technologies, and the University Libraries have supported many curricular innovations with very modest resources. An effective, durable effort to infuse innovation throughout the curriculum depends on marshaling these resources and developing others, which in turn calls for leadership at a high level to develop an agenda, focus on institutional opportunities and obstacles, and advocate with deans, departments and faculty governance.

At one time there was a senior administrator in the Provost's Office with an instructional technology portfolio, but that focus no longer exists. Moreover, the mandate at that time was too narrowly defined to address the range of issues requiring leadership today.

- The Provost should put in place senior leadership with a broad charge to support aggressive development of curricular innovation and support faculty efforts across the institution.
- The charge should include inventorying and disseminating effective innovation, with special attention to effectiveness in meeting diverse student needs; identifying investment priorities; promoting new instructional technologies; and systematically assessing the learning impacts of innovative approaches.

Nurturing innovation.
Administrative leadership, while essential, is not sufficient. The campus must also provide a forum for innovation and an ongoing means of tapping into talent and perspectives among the faculty and support units. As an initial step, the Provost, in consultation with the Faculty Senate, should form a broadly representative group to advise senior academic leadership on curricular innovation issues involving application and use of new technology, construction and renovation of instructional spaces, and pedagogical improvement.

- To help focus efforts and highlight our plans, we should demonstrate some early and prominent examples of alternative approaches to instruction (e.g., blended classes, "flipped" classes, MOOC-style courses).

- A group of faculty early innovators should be recruited and supported to launch these initiatives, with special attention to evaluation and dissemination. These case studies will help focus on obstacles to be overcome, incentives, and sustainability.

Supporting innovation through effective teaching.

Major transformations require careful planning and sustained effort. The opportunity for change is exciting, but it is easy to underestimate the resources required. As an organization that values and supports effective teaching, we need to provide opportunities for faculty members to explore new teaching approaches or to enhance their teaching in general, whether they are first-year assistant professors or senior faculty members. We have demonstrated a steady record of success that inspires confidence and further investment, so we must be ambitious but at the same time be careful not to overreach. Going forward, our ambitions for curricular change should be proportionate to our willingness to support them. A comprehensive review of staffing and budgets in key instructional and technical support areas will focus resources on efficient and effective ways to keep pace with innovation and reach the broadest cross section of faculty.

Our central resource in this effort is the faculty. Exploring and adopting curricular innovations add to the many demands we place on faculty time and effort.

- Careful attention to support, incentives and reward structures will stimulate innovation, and specific attention should be given to effective professional development opportunities and methods of providing the flexibility and time necessary to develop new pedagogies.
- Since many of the trends transforming education will have long-lasting implications, formal reward structures (such as tenure, promotion, and merit processes) should be examined to ensure they are aligned with our evolving expectations for faculty.

Assessment.

Success in an emerging and rapidly changing enterprise relies on systematic assessment to drive correction, adaptation and wise investment. This seems especially important at this moment of change: there are limitless ideas but few proven models. It is therefore essential to embed systematic assessment in instructional and curricular innovations, and to provide ongoing and substantive feedback to innovators and stakeholders. Innovation does not exist in a vacuum: the question must always be, “innovation for what?” Assessment that is aligned with the institution’s established learning goals will guide innovation that drives improvement at all levels.

2. Effective paths to success

We often talk of educational “offerings” and educational “delivery” as if we were engaged in a one-sided transaction. We are not. Education is effective only when students align with the experiences and opportunities that are right for them. One of our responsibilities as educators is to promote an effective match between the institution and the student. Increasingly, students are looking for assurance that their choice of a college will work for them from admission to graduation and beyond. We must offer the prospect of timely progress, in a program of choice, with access to courses when and as needed. We must support their progress through advising and other services, and to position them well for employment or additional study.

We must also recognize that effective paths to student success rely on institutional capacity to continuously assess the challenges that students face and provide services that support students’ well-being. Creating a campus culture of mutual care; offering mental health treatments and interventions; providing culturally appropriate support for the members of our diverse student body; promoting dignity, respect and safety; and supporting students through crisis are some of the many ways to enhance well-being and effective learning. Supportive connection with others is essential, and for students to thrive academically we need to support their emotional, developmental and relational needs.

Over the past several years the campus has made significant strides in promoting student success. Retention and graduation rates have risen markedly. Specific course bottlenecks have been addressed. A new college-based advising system has been adopted. A major initiative supporting students in the first year has been launched. The campus-wide "UMatter@UMass" initiative seeks to create a campus climate of mutual support that promotes student well-being and success. Challenges remain, however, and with that foundational work in place the next generation of improvements is coming into focus.

Balancing instructional supply and demand.

Since 2002, undergraduate enrollment has grown by 18%, and planned increases over the next few years will bring that to 22%. That substantial growth in teaching demand, however, has not been accompanied by equivalent growth in instructional resources. Moreover, significant shifts in student interest have occurred and are anticipated to continue. These changes tax our ability to provide students the courses and programs they need when they need them. Developing a sustainable strategy for balancing instructional supply and demand is therefore a high priority.

Methods for matching resources with instructional demand need a systematic overhaul. Allocation of base budgets to units is not sufficiently rooted in analysis of instructional expectations or trends, and central funds lack flexibility. Over time this has led to substantial imbalances across units that only deepen as a result of periodic base budget reductions, long-term enrollment growth, and curricular changes. Recent efforts to better align resources with instructional demand, such as the out-of-state student revenue sharing initiative, provide mitigation but not a fundamental solution.

The impact on student satisfaction and completion can be significant. Student progress is disrupted if courses are not available or course capacity is insufficient. The processes of monitoring student progress, managing student changes of major, and providing effective advising are all complicated by lack of predictability in course offerings. Campus-wide expectations for instructional quality are threatened when demand exceeds supply. A more responsive system is needed.

- An essential step is to develop a comprehensive system for analyzing and projecting instructional demand, addressing the full range of activity: courses offered to majors; service courses to the general student body (including courses used for minors, certificates, pre-requisites for majors' courses, etc.); and General Education courses.
- This system should inform a resource allocation strategy that better aligns enrollment and course delivery expectations with resources. An Undergraduate Program Review being launched this spring will offer valuable insight into enrollment patterns, instructional productivity and the student experience. Results will form the basis for discussion with departments and Deans, and will help support evidence-based resource decisions. The results of the doctoral program right-sizing exercise recommended in Section III provide a further context for decisions about TA allocation.
- Clear responsibility for managing instructional supply and demand should be assigned at each level. Responsibility for balancing the overall system resides with the Provost's Office. Each College should maintain or develop a coordinated strategy and designate college-level staff responsible for interacting with the Provost's Office.
- Integration with institutional enrollment management strategies is critical, so that recruiting is in balance with capacity and units can plan for instructional demand.

An alternative model for degree completion.

For many UMass students the currently defined disciplinary and interdisciplinary majors work well. But some students do not necessarily align well with the standard pattern. Some of these are students who enter without a clear sense of what they want to study, and do not easily find a home. Some enter in an “alternate” major because their first choice was not available to them. Others began with a clear choice of major, but find that their interests change or their progress is not satisfactory. These students are either formally or informally cut off from the support and guidance of a clear academic home that can lead to a degree. Campus support for “undeclared” students is intentionally transitional, not a substitute for being rooted in a defined program of study. These students are technically in good academic standing, but may not be making effective progress toward a degree. Often, they accumulate considerable course work that does not mesh well with any single traditional major.

We need to be more intentional in the way we support these students, and make it possible for them to be more intentional in moving toward a degree.

- This argues for an alternative model for degree completion that emphasizes an integrated curriculum designed around themes that draw from different disciplines. The Bachelor’s Degree with Individualized Concentration (BDIC) program, which allows students to craft an individualized course of study, is a model of sorts, but it requires strong student initiative and individual faculty guidance. A “BDIS” (Bachelor’s Degree in Integrated Studies) program could offer some flexibility, but within in a more structured set of options and with more directed support. This would allow a variety of students to be connected to a degree-granting program as that need arises, and reduce time wasted in transition.
- The Vice Provost for Undergraduate and Continuing Education should lead exploration of such an option, with appropriate consultation with governance and other groups.

Unified strategy for student success.

In recent years the campus has made a major commitment to promoting student success, especially in the first and second years. An impressive array of individual initiatives aim to ease the transition to college, orient students to the challenges of successful university study, support timely progress, and identify and respond to students encountering obstacles to success.

All of these programs target academic progress, and many include elements intended to link to the curriculum. Over time, three challenges have arisen that argue for taking a fresh look at how we organize this effort. First, these initiatives have sprung up in different units and with different emphases — Student Affairs, Residential Life, and various units in Academic Affairs — and therefore did not emerge from a common strategy, design or assessment protocol. Second, and related, just as organizational responsibility is dispersed, so are funding sources and resource allocation decisions. A mechanism for developing an overall investment strategy for student success initiatives could help achieve economies of scale or coordination. Third, the sheer volume of programs and approaches can create confusion for students and staff, and complicates the task of encouraging participation by faculty and academic departments.

The energy evident in these programs speaks well to the dedication and talent of the staff who launched them. The seeds of working across organizational boundaries have been sown in the past few years but need further cultivation. To move to the next level of effectiveness we need to bring the organization of these efforts in line with our ambitions and adopt a more integrated approach.

- The challenge of coordination has already been recognized, and a working group led by the Provost provides a forum for discussing specific issues arising across the different areas. A more comprehensive approach can articulate goals, design strategy, and evaluate success.
- The common core of these programs is their focus on supporting student academic success. One priority should be to deepen connections with faculty and students’ formal programs of study. To ensure that those relationships are strong, that efforts are coordinated, and that resources are used efficiently, the Provost, in collaboration with the Vice Chancellor for Student Affairs and Campus Life, should organize a review of the full range of academic student success programs and establish a common vision, organizational structure and funding strategy.

More intentional advising and guidance.

Students vary in their need for support and guidance. Some come to UMass Amherst with a clear sense of direction, others come to explore. Some are animated by the choices they face, others are anxious. Some attach readily to groups, others rely on their own resources. And, of course, some come in one way, and then become someone else. With so many students traveling so many paths, providing effective and timely guidance is challenging.

At a large university the advising model sometimes emphasizes opportunity over intentionality. UMass Amherst offers a multitude of services and support mechanisms, but generally relies on students to avail themselves of these opportunities. Safety nets are in place to address obvious issues related to behavior or academic progress, but these involve relatively few students. Emphasizing student enterprise is an important part of the educational process, but enterprise is not always enough to ensure that students take full advantage of the opportunities the University offers.

Two opportunities exist to increase the chances that UMass students will get the most out of their time with us:

- Formal academic advising is the foundation of a rewarding educational experience. Historically, advising had been largely decentralized, following a variety of models. Several years ago the campus moved to a college-based model in which overall responsibility for advising resides at the Dean's level, with departments contributing according to a college-wide plan. Different colleges have experimented with different approaches, and we now have a rich pool of experience from which to learn. The time is right for a comprehensive evaluation of the academic advising system to assess strengths and identify aspects in need of improvement. Advising practices can and should vary, but the institution should set and monitor overall expectations.
- With so many opportunities — choices of major (or double major), minors, certificates, honors, individualized programs, residential programs, research experiences, international opportunities, internships, community service, and more — matching students with what might work best for them is a daunting task. Often, timing is important, and advance planning is essential. The campus needs better mechanisms to match students with appropriate opportunities. One way of supporting that matching process and many other important purposes is to take advantage of technological advances that now permit effective institution-wide curricular tracking and advising systems. These systems create an environment in which student preparation, performance, progress and interests can be integrated, and through which advisers and students can monitor progress.
- Advising occurs in many settings. The advising strategy should recognize multiple roles — faculty, professional staff, and student peers — and provide for appropriate expectations, guidance, training and evaluation.

3. Comprehensive student outcomes assessment

The criterion for success in mounting an educational program is impact. We establish learning goals, design an educational experience around them, and devote time and attention to students for the purpose of making a particular kind of difference in their lives. All that effort — along with our students' time and money — is wasted if the outcomes we intend are not achieved. At the most fundamental level demonstrating value means proving that the educational experience worked as intended. That proof is the focus of student outcomes assessment.

Our current assessments of curricular effectiveness rely primarily on input and process analyses (e.g., syllabus analyses and course proposal reviews) and indirect indicators of student performance (e.g., faculty and student surveys). These provide valuable insights, but do not evaluate actual student work in the context of defined expectations. We are currently piloting direct assessment of student learning in the Integrative Experience (IE), and exploring a variety of direct assessment techniques. Supporting our ambitious plans to improve student learning and demonstrate the impact of a UMass education requires moving to a more systematic student learning outcomes assessment program that will provide direct evidence of our students' preparation for success.

- Currently, through the Academic Quality Assessment and Development (AQAD) process, all academic programs undergo external review on a seven-year cycle. Effective program-level assessment should be integrated into that process, with specific milestones throughout the seven years of the cycle. Departments would identify program-specific learning objectives that, together with selected university-wide outcomes (e.g., critical thinking and written communication), would form the basis for specific assessment activities and analyses leading to plans for curricular improvement. These curricular improvement plans would then help feed the AQAD self-study process, and be available to the outside reviewers. Recommendations emerging from the review would then be incorporated into the assessment and improvement cycle.
- To complement these program-based assessments, the campus should further develop university-wide assessment activities to provide evidence on the effectiveness of the General Education program and other educational efforts not specifically housed in academic departments. The Joint Faculty Senate/Administrative Task Force on Student Learning Outcomes should be charged with designing and implementing the outcomes assessment program.
- A more aggressive assessment program will require different forms of support. Specialized training and tools can assist departmental efforts, but the essential resource is the effort devoted by faculty, the individuals qualified to judge student performance and set performance standards. Faculty involvement is also important because they must use the evidence of student performance to make changes to the curriculum that may be needed. A successful program will therefore rely on appropriate incentives and support.

C. Focusing on Value

It is important to have the components of a rewarding and effective educational experience in place: responsive degree programs, rich experiences, sound preparation for life and career. It is important for these components to be well designed and well delivered. But building the kind of institution we aspire to be, and which can attract the support on which our success depends, goes beyond assembling components.

Promoting a more intentional, more coherent undergraduate program will be a long-term effort, involving actions large and small across the institution. An ongoing focus on explicit goals and demonstrated impact will help align our decisions and make our work more rewarding and effective.

UMass Amherst graduates will be known as individuals who have excelled in a challenging environment, participated in rewarding and diverse intellectual and applied experiences, and succeeded in setting and achieving high expectations. They will be known as innovative thinkers and problem solvers, effective communicators, valued team members, and socially aware and responsible citizens.

III. Establish UMass Amherst as an investment of choice in the Commonwealth's and nation's future.

"Having no other mines to work, Massachusetts has mined into the human intellect; and from its limitless resources, she has won more sustaining and enduring prosperity and happiness than if she had been founded on a stratification of silver and gold, reaching deeper down than geology has yet penetrated."

Horace Mann
First Massachusetts Secretary of Education (1837-48)
Founder of public education in America

Massachusetts is America's "state of mind." Many of the nation's political, social, cultural, intellectual, technological, and educational innovations have their roots in Massachusetts, and that leadership defines both our history and our future prospects.

Through long investment in intellectual capital, Massachusetts has become a global center of innovation and higher learning. The state's innovation economy sustained it through economic contraction, and now positions it for leadership in the next generation of expansion and investment. As the Commonwealth's flagship public university UMass Amherst is an essential partner in securing that leadership.

The partnership takes many forms. Our excellence in research and scholarship helps secure the state's position of leadership in innovation. Our commitment to the state and its challenges makes us a powerful force for progress in education at all levels, economic development, the creative economy, and public policy. No single institution educates more of the Commonwealth's citizens or produces more graduates who contribute to the state's strength. Our ideas are at work in every industry and economic sector, and our contributions to social and cultural capital continue to grow. For a century and a half we have supported the Commonwealth's leadership, and our contributions will only increase.

The Commonwealth is blessed with two of the world's great private research universities, Harvard and MIT. Their impact in Cambridge and the greater Boston area demonstrates the power of research universities in the 21st century economy. Over the decades, the research profiles of the state's major public research universities have grown. The UMass Medical Center in Worcester has taken a leading role in biomedical research. UMass Amherst has expanded far beyond its agricultural origins into many other areas essential to the state's innovation economy. Indeed, within its research domain, NSF funding for UMass Amherst is next only to Harvard and MIT. In fields such as polymer science, computer science, food science, radar technology, alternative energy and many others, UMass Amherst is demonstrating its impact on the Massachusetts economy. With the recent creation of the University of Massachusetts Innovation Institute in Amherst, this impact, especially in western Massachusetts, has enormous growth potential. Through excellence in critical research areas, and a growing culture of outreach and collaboration, UMass Amherst intends to be one of the primary destinations for investment in research and development, complementing the other world-class universities in the Commonwealth.

Our deep connections to Massachusetts give us a unique role. Our mission is to put innovation to work for the public good. We represent the single largest concentration of state investment in innovation, and we repay that investment through our impact in and for the state. As the Commonwealth confronts a wide range of emerging innovation challenges in the years ahead, public and private, we will demonstrate through the scope and quality of our impact that we should be the investment of choice.

UMass Amherst will be known as an innovative, responsive and rewarding partner for investment with clear areas of national and international research strength, and the capacity to work collaboratively in creating knowledge and putting ideas to work.

A. Research and Graduate Education

Our research strength and our programs in graduate education are core drivers of our impact. It is through these efforts that we advance the frontiers of knowledge and disseminate those insights throughout society.

But even as we celebrate our accomplishments, we face many challenges. The global 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 attracting such partnerships. Increasingly, many of the most important challenges are occurring at the boundaries of disciplines, so interdisciplinary research is increasingly important. Federal and state budgets for research, as well as for education more broadly, are increasingly constrained, thus making focus and alignment of research activities crucial.

Graduate education, which is inextricably linked with our research, is also rapidly changing. We are preparing the next generation of educated citizens who will meet the needs of industry, government, healthcare, and higher education for the Commonwealth, the nation and our global partners. 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 others in providing our students and their employers with the combination of education and experience that are essential to success.

As a vibrant and diverse community of scholars and learners, we can also 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. By disseminating this research, the campus demonstrates leadership to students, faculty, staff, policymakers and communities everywhere.

1. Excellence in Research

Our ability to serve the public good through innovation rests in large part on the quality and impact of the research and scholarship we undertake. Quality, in turn, is a function of the wisdom of the choices we make in selecting and supporting research priorities. In our increasingly competitive environment no institution can be all things to all people. Our strategy therefore focuses on opportunities that have high potential impact, and that we can pursue at a high level of quality.

Applying the results of the Doctoral Program Review.

The first step in focusing on quality is to understand where we have current and emerging strength. The Doctoral Program Review (DPR) is a comprehensive, data-driven study of our research doctoral programs — the first campus-wide review in more than forty years. It includes analysis and insights from the doctoral programs, the Deans, and a committee of distinguished faculty. It points to action in three areas:

- A key finding of the DPR is that nearly all of our programs have fewer faculty than their aspirational peers. By one measure, our "deficit" in faculty is more than 300. This finding is particularly important because, in many fields, average research productivity is higher the larger the faculty group. In light of these results, the DPR recommends concentrating faculty resources selectively: doing fewer things, but supporting those things in a more effective, intentional way. Excellence should be maintained in recognized top programs, and investment should be focused on programs that are over-performing but undersized.
- Consistent with campus governance policies, a process should be established to assess the prospects for programs that have been identified as seriously underperforming and, where appropriate, plan for orderly reduction or elimination.
- Many programs fall in between, and not all can be targeted for growth. Programs that are relatively small but strong should be encouraged to define the niche in which they will demonstrate excellence, rather than spreading resources too thinly. Programs should also be encouraged to seek support and target growth in response to specific external opportunities or needs.

Faculty Hiring and Retention.

A university is only as good at its faculty, so research excellence requires effective policies for hiring and retaining faculty. The campus has put in place many policies to increase our ability to compete for the best new assistant professors, but at least two issues deserve attention: retention and anticipated retirement.

- For a variety of reasons — the desire to grow the size of the faculty among them — the campus has tended to emphasize faculty recruiting over retention. Increasingly, however, other institutions actively recruit our most promising faculty. Excellence requires greater emphasis on retention. Current high-performing faculty have demonstrated value, while new hiring inherently involves greater uncertainty. Moreover, given rapidly escalating start-up and renovation costs in many fields, retention investments may make better financial sense. The campus should therefore pursue more aggressive, proactive strategies for selectively retaining faculty. This involves anticipating outside offers and removing obstacles to success that cause faculty to be willing to consider relocation in the first place. A number of specific factors require attention: support for partner hiring; mentoring and inclusion, especially at the assistant professor level; inter-rank dynamics; obstacles to career advancement and timely promotion; and developmental opportunities for heads and chairs. The campus's ongoing attention to work/life and work/family issues will also be important in promoting retention.
- 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 is avoidable. From time to time individual departments and colleges attempt to hire in anticipation of retirement, but tightening resources crowd that strategy out. The campus should adopt a longer planning horizon, implement more formal faculty succession planning, and identify bridge funding to support selective hiring in anticipation of retirement in top-performing programs.

Expanding the Pool of Excellence.

America is becoming a more diverse society in a global marketplace of ideas. Our ability to compete in that marketplace relies on our effectiveness in tapping into the broadest possible pool of talent. Creating a successful pathway for underrepresented minorities and first-generation students as they progress from pre-K through graduate and professional school is crucial to our future. While important progress has been made in recent years, progress in diversifying the tenure-track faculty — especially in the STEM disciplines — has been slow. This represents a lost opportunity with implications for both the research enterprise and society as a whole. UMass Amherst has demonstrated national leadership in building bridges and supporting members of underrepresented groups to select and succeed in academic STEM disciplines, as well as other fields. This demonstrates value both here on campus and to broader society, and positions us well to attract an expanding pool of talent.

- The recently established STEM Diversity Institute (SDI) grew out of successful and widely acknowledged efforts such as NEAGEP to bring underrepresented minority graduate students into STEM disciplines and the STEM professoriate. SDI has a suite of best practices that can be employed by many of our programs, and also has a leading role in a national network of institutions committed to diversifying the professoriate.
- SDI's work can be especially important in demonstrating "broader impact" as required by the National Science Foundation and of increasing importance to other funding agencies. One of the most important broader impacts is to improve the participation of underrepresented minorities and women, and effectiveness toward that end is an important competitive advantage in grant proposal preparation and research execution.

2. Aligning Research Priorities

Another dimension of excellence in innovating for the public good is aligning our priorities with those of the society we serve. This can take many forms, from formal participation in grant-funded activity to contributions to the creative economy, advancement of social justice, preservation of historical sites, and myriad other research-based engagement activities. The point is to recognize and demonstrate our obligation to employ society's resources with which we have been entrusted — including our time and the opportunities that provides — in ways that repay that investment. Exactly how alignment occurs and is evaluated will vary (e.g., direct economic vs. developmental, long vs. short term), but as a public research university our contributions to meeting society's needs should always be evident.

Federal.

Federal funding is primarily awarded through highly competitive processes. Alignment is therefore demonstrated in competitive success. We can help maximize our collective success in several ways:

- Review recent and likely funding trends, and better utilize the perspectives of campus faculty who have been program managers, serve on agency advisory committees, or otherwise have valuable insights.
- More effectively disseminate information from our Boston and Washington consultants on funding interests and trends.
- Continue and expand our programs 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.

State.

- While the Commonwealth does not itself fund research at large scale, it does make investments in key areas (typically science and technology) with which our research enterprise can align. Examples include the Massachusetts Life Sciences Center (MLSC), the Massachusetts Clean Energy Center (MassCEC), the Massachusetts Green High-Performance Computing Center (MGHPCC) in Holyoke, and collaborative activities with Bay State Medical Center in Springfield.
- Alignment opportunities with other Massachusetts educational institutions have been coordinated effectively at the UMass system level by the Vice President for Economic Development, working with the campus's chief research officers. These opportunities should be more broadly disseminated, and research partnerships within the public higher education community — especially the UMass Medical School — should be deepened.

Seeding Center-scale Proposals.

Federal funding emphasis is increasingly on center-scale proposals. These centers tend to be interdisciplinary, and enable research opportunities not achievable by individual or small groups of faculty. They represent high-profile opportunities for alignment that also 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 extra effort to make that commitment 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 mechanism to seed development of these large scale proposals, via release time, administrative assistance, summer support and travel funds, or other necessary resources.
- Selection of center-scale opportunities to receive such support should be competitive and aligned with the DPR and other mechanisms to focus research support.

Expanding Interactions with Business and Industry.

Effective partnerships with the private sector can help translate academic research into practical outcomes for society and thereby produce impact on the economy. Business and industry are key contributors to a state's success in terms of employment, tax base, and population growth. The public research university should support economic development and industry interests wherever appropriate, especially in areas designated by the state as high priorities.

- The campus recently made a major commitment to improving interactions with business and industry through establishment of the UMass Innovation Institute (UMII), which supports a wide range of contracts of an often more applied nature. Through UMII, the campus should pursue opportunities to position itself to compete for large federal grants, as well as to partner with small firms on SBIR and STTR projects. Strategic alliances with companies should be promoted, with an increased focus on regional partnerships (e.g., Springfield and Holyoke). In all cases interactions may lead to long-term strategic partnerships.
- We must develop a clear strategy for increasing our visibility to industry. Interested companies should easily be able to discover what UMass Amherst has to offer, how specific research and innovation activities and experts can affect them, and how they can engage with us in projects and 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 commercialization projects with industry, we can become more "business-friendly" in terms of processes and capabilities that create mutual value.
- The campus should more effectively engage with business in research partnerships. Some departments may be interested in making connections with industry, but not know how to make the connection, or how to derive benefit from it. Others may not recognize their value to industry. The campus should foster a climate that embraces connections to industry, and encourages research that is connected to merging developments outside the academic world.
- Many business and industry partners value access to our graduates as a key benefit of engaging with us. At the same time, students and families want to see the advantage a UMass education offers in landing jobs. Many industry partnerships begin with the hiring of our students. By creating opportunities to supplement our academic programs with more business-focused content, the university can provide greater value to both students and industry partners. Engagement with industry can further the University's diversity goals through recruitment and placement of underrepresented students. Internships (and externships) should also be encouraged where appropriate. Examination of hiring patterns can suggest new channels for long-term strategic partnerships. In total, coordinating the development of student opportunities with research engagement efforts enhances the likelihood that companies will view UMass as a place to go for both students and research.

- 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 industry partners. 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.

International Research Funding.

Existing and emerging opportunities exist to increase internationally funded research. Several actions can be taken to more successfully compete:

- Inventory sources of international research funding, and assist faculty in identifying international partners to complement UMA research expertise.
- 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.
- Provide seed grant support for new international research collaborations.

Community-based Research and Engaged Scholarship.

Local governments, public schools, health-care and human service agencies, and other community-based organizations often have knowledge needs that university researchers could help to fill, and also have knowledge resources that could inform and guide university researchers. At the same time, federal agencies such as NSF and USDA are increasingly interested in connecting funded research to society's needs and broader public impacts. The campus should explore partnerships to pursue community-based research where appropriate, and to work with stakeholders to develop and bring resources to bear on questions of public importance. University seed funding should be considered when long-term financial sustainability seems likely.

3. Building Bridges: Interdisciplinarity

Increasingly, many of the most important research challenges occur at the boundaries between traditional academic disciplines. Increased impact thus relies on effective interdisciplinarity – creating bridges built on strong foundations in core disciplines (recognizing that these disciplines may span departments, schools and colleges). Our strategy to increase impact through innovation includes several measures to build interdisciplinary strength.

Promote the quality and focus of centers and institutes.

Research centers and institutes are important mechanisms for supporting cross-disciplinary research. Other potential contributions include collaboration and outreach, e.g., to local communities, schools, NGOs, industry, and other research networks and institutions. UMass Amherst has established many such entities over the years, and some have established leadership positions in important areas of inquiry. The campus should commit to continue and improve procedures for establishing centers quickly when there is a time-sensitive opportunity, but existing procedures to evaluate the efficacy of centers on a routine basis should be maintained.

- The campus should set clear expectations that centers and institutes are intended to be long-lived (5+ years), robust sources of interdisciplinary collaboration that bring prestige and resources to the university. While formation of such units when appropriate should not be unduly onerous, they should be monitored closely and evaluated in line with expectations. The criteria for creating and renewing centers and institutes should be reviewed and clarified to emphasize institutional expectations.

- The Provost and the Vice Chancellor for Research and Engagement, with the assistance of a distinguished group of faculty, are currently undertaking a comprehensive review of centers and institutes. Ongoing authorization will be limited to units that demonstrate clear value in supporting institutional goals. The process for ongoing oversight should be reviewed and strengthened.
- Alternative mechanisms should also be developed to support collaboration or demonstrate institutional commitment in cases when creating a center or institute is not appropriate.

Incubate interdisciplinary research.

Cutting-edge ideas often emerge from small exploratory collaborations. Currently, formal support for interdisciplinary ideas focuses on relatively well-developed ideas. "High-risk/high-reward" explorations are critical in the changing research landscape, and those demonstrating high potential should receive institutional support.

- The campus should explore flexible and nimble mechanisms to support nascent interdisciplinary research groups with specific short-term goals (e.g. external grant proposals, meetings among research groups, interdisciplinary publications, hosting conferences or workshops). One small-scale example: consider seeding interdisciplinary ideas via self-initiated, one-year seminar series that stimulate interdisciplinary problem solving. This could be supported on a competitive basis.
- There is a wealth of cutting edge interdisciplinary research on campus, but it can be difficult for researchers to find one another or industry and community partners. As the campus moves forward in developing tools to inventory faculty research interests in general it should make certain that interdisciplinary interests are easily accessed.

Encourage and facilitate interdisciplinary teaching.

Interdisciplinary teaching can provide a venue for bridging disciplines in creative, collaborative ways. Interdisciplinary teaching also benefits students by exposing them to perspectives and skills important to their future success. There are several relatively simple actions that could encourage teaching across departmental boundaries:

- Hold an annual competition for the development of interdisciplinary courses.
- Examine institutional policies and practices to reduce obstacles to interdisciplinary teaching, and publicize policies currently in place to credit faculty for teaching done outside their home departments. Include interdisciplinary courses in departmental teaching expectations and planning.

Strengthen Interdisciplinary Faculty Hiring.

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 produce a strong interdisciplinary group. We should evaluate the effectiveness of this process, and explore additional options:

- Invite highly productive departments to collaborate on future rounds of cluster hire proposals.
- Instead of two junior faculty, hire a single post-tenure faculty member with a split appointment in two departments.
- Hire a single senior faculty member to lead formation of a cluster by attracting a small number of junior faculty in subsequent years.
- Recruit an entire high-functioning research group from another institution (e.g., one senior faculty member and two junior faculty).

4. Effective and Efficient Support for Research, Scholarship and Creative Activity

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

Integrate faculty hiring and facilities planning.

The campus's current approach to providing facilities for newly hired faculty, especially in the STEM fields, needs fundamental reform. It is a complex issue, and improvement will require action on several fronts. A set of detailed recommendations to ensure that facilities are available for new faculty as and when needed appears in Section IV.

Develop a comprehensive IT plan that supports the research enterprise.

Computing hardware, software and technical support has become a basic building block for research. Providing IT support for research should be incorporated into broader institutional planning. Recommendations to that effect appear in Section IV.

Continue progress to improve pre- and post-award support.

A recent broadly based review of research administration, led by the Huron Group, recommended a series of improvements in the campus's research support services. Some of these recommendations have already been acted upon, and full implementation should continue.

- Prioritize implementation of Huron recommendations and move forward appropriately.
- Assess needs for award support and determine appropriate balance of centralized vs. departmental support.
- Establish appropriate metrics and conduct regular evaluations of OGCA and RBM performance.
- Improve efficiency in the approval process through coordination and communication among central offices and departmental staff, and ensure ensure that adequate support is provided.

Targeted support for research in the humanities and social sciences.

Many steps outlined here will benefit researchers and scholars across a wide range of disciplines, especially in STEM fields with significant sponsored activity. Improvements in research support can also increase the campus's impacts in fields in which opportunities for sponsored activity are more modest. In 2012-13, the campus launched two major new initiatives to support research in the humanities and social sciences.

The Interdisciplinary Studies Institute (ISI) receives support from the Provost, the Dean of Humanities and Fine Arts, and the Dean of Social and Behavioral Sciences. It expands the work of the Interdisciplinary Seminar in Humanities and Arts (ISHA), providing "a forum for faculty engagement across a wide range of fields and disciplines." Its seminars, residencies, and other activities bring together faculty from the humanities, social sciences, fine and performing arts, and other fields in examination of broad topics like public scholarship and engagement.

The Institute for Social Science Research (ISSR) receives support from the Dean of Social and Behavioral Sciences, the Provost, the Vice Chancellor for Research and Engagement, and the Dean of the Graduate School. It expands the work of the Social and Demographic Research Institute (SADRI), providing support for "interdisciplinary social science research, research partnerships between social scientists and other scientists, and training and grants activity across campus." Activities and services that it provides include grant-writing mentoring groups, consultation on research methodology, short course workshops on various methods and software, and a Research in Progress seminar series.

- Both efforts represent new models for stimulating and supporting research and scholarship and laying a foundation for attracting external support in areas in which funding opportunities are challenging. These efforts should be carefully evaluated and adapted or scaled up as appropriate. ISI and ISSR both present potential development opportunities that should be explored through the *UMass Rising* campaign.

- The Graduate School has instituted a program of Doctoral Dissertation Research Grants to support research by students in the humanities and social sciences, as well as other fields. The Graduate School should consider partnering with ISI and ISSR as conduits for some of these funds to leverage greater impact.

Focus on the Libraries' capacity to support emerging research needs.

The University Libraries support the research enterprise in a number of ways. Two issues call for examination in light of shifting needs.

- Faculty and graduate students are placing increasing demands on support for data and citation management, and some granting agencies are imposing new expectations for data management plans. The Libraries should provide training, consultation and support services in this area.
- The UMass Amherst Libraries share the national dilemma of rapidly rising costs for journals, monographs and other information resources. The interlibrary loan system is a useful asset, but may be financially unsustainable. A long-term strategy to support library acquisitions should be developed.

5. Increasing Awareness of Campus Research and Scholarly Activities

Impact must be rooted in real value, but it may not always be evident or easily understood. The university has several existing resources to publicize faculty research and scholarship, but these need to be utilized more effectively, including improving communication between faculty, departments and the news office. The contributions and impact of our research can be more broadly communicated and our value better understood by improved publicity of faculty research news and achievements to citizens of the Commonwealth, legislators, and potential funders. Public awareness is similarly enhanced when our faculty share their research expertise via external news organizations. The campus's strategy to demonstrate impact should communicate the value of what we do. It should also emphasize third-party affirmations of our impact in the form of professional and disciplinary awards and fellowships. Faculty may be reticent to apply for awards, or fail to appreciate the benefit their recognition bestows on the institution.

- A number of campus offices promote our research results and achievements. Each focuses on particular audiences and uses varied media to "get the news out." Faculty are often unaware of these processes; they may also be reticent to promote their work. Faculty should be supported in publicizing their research success through publicity and media-training workshops, a systematic mechanism to gather news on faculty achievements, and improved coordination with the News Office via the faculty speakers bureau. While internal news gathering within the campus seems to be exemplary, we need to improve contact and access to external media that reach a broader audience.
- Increase awareness of "best practice" award processes in departments and colleges.
- Encourage nominations for awards (e.g., via departmental awards committees) and publicly celebrate awards internally and externally.
- Develop targeted communications to enhance industry awareness in selected areas of research significance.

6. Increase Impact through Excellence in Graduate Education

In 1974, UMass Amherst physics graduate student Russell Hulse and his thesis advisor Joseph Taylor discovered the first binary pulsar, a discovery that was honored with the Nobel Prize in Physics in 1993. In April 2013, UMass Amherst economics graduate student Thomas Herndon and professors Michael Ash and Robert Pollin published an article that has challenged standard views of the relationship between public debt and growth in GDP, earning Herndon an appearance on *The Colbert Report* and repeated mentions in Nobel laureate Paul Krugman's *NY Times* column and blog.

These two stories, separated by nearly four decades, illustrate something important about graduate education at UMass Amherst. Graduate students are more than just students. They do more than assist the faculty, though they often have titles like teaching assistant or research assistant. Graduate students are colleagues in pursuing excellence in research, teaching, and outreach. It follows, then, that much of our capacity for innovation and impact comes from the symbiotic relationship between faculty and graduate students.

Graduate education is also critically important in preparing students for employment and meeting the needs of the Commonwealth's innovation economy. Two of the most important segments of the Massachusetts economy — higher education and industrial research — rely on doctorally trained scholars and researchers. Our school systems and health care organizations need holders of doctorates and master's degrees. Business needs MBAs, and engineering firms need MS recipients. The Commonwealth's creative economy needs graduates with advanced degrees in the arts. The saying that "the master's degree is the new bachelor's" becomes truer each year, as job advancement and even entry-level positions require training beyond the baccalaureate.

Recipients of our advanced degrees are in some ways the most visible and ubiquitous evidence of our impact on society. Promoting excellence in graduate education therefore is an important element of our strategy.

A vision for graduate education at the University of Massachusetts Amherst.
No effort is needed to make this campus a destination of choice for graduate education; it already is one. We receive nearly 11,000 applications annually, with about half of them coming from abroad. Our doctoral programs are highly selective, with an overall acceptance rate under 20%. Rather, an appropriate vision and worthy goal for graduate education is to go the next step by making this campus known as the *resource of choice* for employers seeking holders of advanced degrees. All of our doctorate and master's recipients, regardless of field, should have a level of accomplishment and professional preparation that will make them highly attractive to colleges and universities hiring faculty, industries looking for scientists and engineers, businesses that need experts in management and finance, school systems needing teachers and administrators, government offices needing specialists in policy and economics, and so on.

Improving doctoral programs.
To be and to be known as the resource of choice, particularly at other institutions of higher education and research labs, we need to have excellent doctoral programs. The Doctoral Program Review has identified several areas where our doctoral programs need to be strengthened: our funding offers are comparatively low, so we lose many excellent applicants to universities that make more attractive offers; the time to degree completion in most of our programs is longer than average, and completion rates are low in some; student diversity is good overall, but there are areas where women or minorities are seriously underrepresented; and the enrollment in some programs is more reflective of the need for teaching assistants than of other factors such as external demand and placement.

- A concerted effort needs to be made to identify ways of increasing graduate fellowship funding. This will require participation from Development, the Deans of the schools and colleges, the Dean of the Graduate School, and the central administration, perhaps in the form of matching funds for endowed fellowships.

- We also lag in securing training grants, which provide funding for both graduate students and program innovation. The Doctoral Program Review Report recommends regularizing the provision of matching funds and other steps to make proposals from our campus more frequent and competitive.
- Because the Curriculum Fee charge reduces funds available to support students, growth in this charge needs to be carefully monitored.
- We need to confront the problems of completion rate and time to degree both locally and in the broader context of the national discussion of how the traditional model of doctoral education can be adapted to 21st century needs. A campus-wide conversation about the changing pedagogies of graduate education is overdue.
- To improve diversity, we should look to the programs innovated by the STEM Diversity Institute. Planning at the Graduate School and program levels should address issues of underrepresentation of women and minorities.
- The entire campus should engage in an exercise of right-sizing doctoral enrollments to reflect demand for admission, quality of applicants, placement of graduates, completion rate, number of research-active faculty, adequacy of laboratories and other facilities, available funding, optimal cohort size, and instructional and research needs that can only be met with graduate employees.

Improving master's programs.

The campus generally has strong master's programs in the professional schools and the arts, but master's programs in other fields mainly exist as adjuncts to the doctoral programs. We have begun the process of taking a more intentional approach to our master's programs, but we need to do more. As noted, employers increasingly need to hire graduates with master's-level training, and so to maximize our impact and impact in the Commonwealth we need a master's curriculum that is responsive to their needs. Moreover, master's and professional doctoral programs have revenue potential that PhD programs typically lack. Improvement can come in two areas.

First, we cannot maximize our impact unless we can deliver the right academic programs to the right learners at the right time. Current processes for program creation, management, and delivery have their roots in traditional residential face-to-face instruction, and from an era of long-term program stability. The challenge is much different today. We reach learners anytime, anywhere, and rapidly evolving student needs demand curricular innovation and nimble processes. Many process improvements have been made recently in such areas as certificates and accelerated Master's degrees, but work remains to streamline processes for both graduate and undergraduate programs:

- Approval processes for new academic programs are cumbersome and time-consuming. A new program undergoes two separate rounds of review within the University, and then must receive approval at the committee and board level of both the UMass Board of Trustees and the state Board of Higher Education. Meetings of the two boards are often not in synch, so approval can take many months. The real and perceived procedural barriers discourage program innovation. The campus should continue to review and improve its own processes, and work closely with the President's Office and BHE to streamline off-campus review where possible.
- UMass Amherst courses and programs have unitary approval; that is, an offering is reviewed and approved once, and thereafter can be delivered in any format. Program management and delivery, however, operate through two distinct channels, the residential "day" (state-supported) program and Continuing and Professional Education. This division has its origins in state statute prohibiting state subsidy of some CPE programs. The division complicates effective management of the curriculum, use of "on-load" teaching during the summer, and seamless instructional delivery to students. Some progress has been made in the form of workarounds, but the campus should develop a comprehensive strategy to remove unnecessary barriers.
- The challenge presented by fragmentation is especially clear with respect to branding and marketing. CPE offerings are marketed separately, but via the system-wide UMassOnline portal that levies a marketing tax on gross revenue. Marketing of state-supported programs is left to individual units. This has

implications for redundancy and lost opportunities, and especially for effective branding across delivery channels. The campus, in cooperation with UMassOnline, should undertake a fundamental review of marketing and branding practices to ensure effective outcomes and use of resources.
- For professionally oriented Master's programs we should move toward an integrated strategy for branding and marketing that supports seamless integration of all forms of learning: face-to-face, online, day, evening, summer, etc. The Graduate Dean should lead this effort.

Second, many master's and professional graduate programs have a revenue-generation component. As with undergraduate education there is sometimes a tension between the desire to recruit high-quality students and the desire to maximize revenue. In undergraduate education, tuition discounting in the form of merit aid is used selectively to balance these goals. At the graduate level a student receiving a teaching or research assistantship receives a full tuition and fee waiver, but there is no mechanism for partial or selective discounting. A related challenge is that the incentives for programs to manage quality vs. revenue are too weak. The campus introduced a revenue-sharing program that sends half of net revenue growth from graduate programs back to the schools and colleges, but in practice the waiver policy seriously undermines the incentive: a student recruited in one department may receive an appointment — and thus a waiver — from another. Because enrollment and waiver patterns shift from year to year, and because revenue sharing is distributed at the College level to enable planning and load-leveling, programs may not see an immediate one-to-one relationship between enrollment and revenue.

- The revenue and incentive process for graduate programs should be re-examined to see if it can be made more nuanced, more direct, and more timely. A recent experiment to encourage international graduate enrollment in certain areas may suggest a broader approach.
- A more radical solution would put academic units in the position of managing their own revenues and hence their discounts. This decentralized approach may be appropriate for graduate programs, which — unlike undergraduate programs — make their own local recruiting strategies and admissions decisions. The implications of such a system should be carefully explored.
- As suggested in Section II, the campus should make an effort to identify opportunities for the creation of accelerated ("4+1") master's programs that meet these two conditions: there is unused capacity in an existing graduate program, and there is demand from students at UMass Amherst and the four colleges of the Five College Consortium.

Professional and career development.

For our graduate programs to be known as the resource of choice, we need to do more to prepare graduate students for employment. The skills they learn in the classroom, the laboratory, and the library are no longer sufficient. The range of professional skills that academic and non-academic employers should expect of our graduates include writing, applying for fellowships and grants, presentations and public speaking, communicating with non-specialists, networking, entrepreneurship, negotiation, and leadership. More career counseling is needed, particularly for graduate students whose career path does not include the professoriate.

- The Graduate School should create an Office of Professional Development with responsibility for professional skills training, partnering wherever possible with the colleges, the departments, and other organizations across campus and elsewhere.
- The improvements in Career Services proposed in Section II should include a plan for meeting the career counseling and career preparation needs of graduate students.
- The graduate programs themselves need to continue (in some cases) or increase (in others) their engagement with these concerns. Creating mechanisms for more intentional advising of graduate students on career paths should be part of unit planning.

Graduate students as teachers and future faculty.

For this campus to be the destination of choice for undergraduates and the resource of choice for academic employment, we must be more systematic and intentional in our efforts to prepare our graduate students to be better teachers and advisers. This campus is moving in the direction of the Preparing Future Faculty movement. In addition to program-level TA training, the Center for Teaching and Faculty Development (CTFD) and the Graduate School have partnered to provide support for TAs and for doctoral students on the academic job market. The campus is also considering affiliating with the Center for the Integration of Research, Teaching, and Learning, which has the goal of improving undergraduate instruction by better preparation of graduate students.

- CTFD and the Graduate School should continue and expand their joint program, linking with CIRTL and other groups on campus concerned with improving undergraduate instruction.
- As noted in Section II, the goal of offering authentic research experiences to undergraduates is promoted if graduate students have a formal role in this process. In laboratories and potentially in other fields, graduate assistants can provide the day-to-day supervision that undergraduate researchers need.
- The campus should create opportunities to support teaching innovation on the part of graduate students. These might include development of new courses, introduction of new technologies, deeper integration of research and teaching, or other activities.

Graduate student housing.

Given UMass Amherst's location and surroundings, high-quality, affordable housing is essential for recruiting and retaining excellent graduate students. Housing is a particular challenge for international students, who currently make up 30% of the graduate population. The growing demand for undergraduate housing in the local market (due to increasing undergraduate enrollment) continues to erode the availability of housing for graduate students and their families. Unless better options are developed we will be at an increasing disadvantage in competing for high-quality graduate students.

Typically, universities facing this situation pursue a variety of public-private partnerships to expand housing stock for selected populations without placing the full financial burden and risk on the institution. Graduate students tend to be excellent tenants and good neighbors, so such arrangements are often attractive on campus and off. Current Massachusetts law, however, effectively prohibits this approach. The campus should work with the UMass system and local legislators to explore changes that could open the door to this strategy.

B. Community Engagement and Impact

As a public university our value extends beyond specific research or teaching transactions. We are woven into the fabric of the state and nation, created specifically to advance the general good of the community we serve. As a Land Grant institution we have a 150-year history of integrating the application of our research and learning with the needs of state and local agencies, organizations, citizens and other community partners to create impact through engagement. We fulfill our core mission of serving the people of Massachusetts as a catalyst for positive social change, addressing significant issues in Commonwealth communities.

Impact exists through engagement, an exchange of ideas and activities that produces a tangible benefit to society. It therefore represents another form of investment: of our focus and effort, and that of our community partners. And where our mission directs us, we want to be the investment of choice.

Community engagement can mean many things. A vision and framework for UMass Amherst community engagement should be created to foster development and interactions among the many on- and off-campus programs we have defined, such as UMass Extension, community service learning, K-12 and college outreach programs, CPE and workforce development programs, teacher development, global service, citizen engagement and social justice initiatives.

Recent progress confirms our capacity to produce community impact. In 2008 UMass Amherst earned designation by the Carnegie Foundation as one of fewer than two hundred "Community Engaged" colleges and universities. The campus is currently working to renew this designation.

1. Building and maintaining effective relationships

Effective and sustainable impact relies on a deep understanding of the needs and perspectives of those with whom we engage. Promoting that level of understanding begins with listening and effective dialog that points to action. Effective relationships have several characteristics:

- They are selective, focusing on well-defined needs and goals. High impact argues for careful targeting and concentration of resources vs. dissipation in many directions. The emphasis should be on areas in which UMass Amherst is especially well-equipped or qualified to make a difference.
- They are designed for the long haul, capable of deepening over time. The intersection of interests should be rich and susceptible to development over time. Resource requirements should be well understood and sustainable.
- They produce benefits of many kinds, including spillover effects in terms of recruiting students, motivating donors, stimulating new partnerships, and third-party affirmation of the campus's work, and of its value as a collaborator.
- They are reciprocal, with community involvement from the earliest stages of planning through to assessment, implementation and dissemination.

There are many institutions capable of advancing society's interests. We are organized in a way that makes certain kinds of contributions possible. An effective outreach strategy represents an effective match between our mission of teaching and research and the needs of the broader community.

- Outreach should be viewed as an opportunity, not an obligation. Effective partnerships work to the benefit of all parties. As with all other institutional activities, we must maintain a sharp focus on what we are doing and why we are doing it. Our priorities must be clear to ourselves and to others.
- The measure of success is our impact, as defined by the communities we serve. If our impact is not clear and clearly acknowledged, then we have reason to revisit our priorities.
- Given our mission and tradition, it is especially important that we maintain a strong emphasis on historically and currently underserved communities and collaborative partnerships that promote equity, access, and social justice.

<u>Promoting engagement through students.</u>

Our students are important ambassadors. Our success in preparing them for the workplace and civic life provides our stakeholders with an important indicator of our effectiveness, and the direct contributions of students through internships, community service learning, and other activities make a tangible difference in the life of the Commonwealth. As noted in Section II, community engagement provides important opportunities for active and applied learning. We can increase the impact of our students, and of the educational process, in several ways:

- Align the undergraduate curriculum and experience more effectively to prepare students for their careers and life beyond college. This is a key recommendation for curricular planning, and is detailed in Section II.

- Increase involvement of students in value-added outreach-related activities. Internships, co-ops, service learning, and applied research provide students with valuable opportunities and amplify institutional impact. Promoting these opportunities also recommended in Section II.
- Expand recognition and support for students involved in service-learning and engaged scholarly work.

2. Organizing for maximum impact

Effective engagement requires broad participation, articulation as an institutional priority, and appropriate leadership support. Since the dissolution of the formal University Outreach unit, the campus has pursued a decentralized model to identify, support and evaluate engagement efforts. While effective work continues in individual units, the absence of an institutional perspective complicates the task of identifying priorities, aligning those priorities with appropriate resources, and effectively tracking outreach activities. According to the Carnegie Foundation for the Advancement of Teaching, engaged universities demonstrate "a compelling alignment of mission, marketing, leadership, traditions, recognitions, budgetary support, infrastructure, faculty development, and strategic plans." In light of our sharpened and renewed focus on community engagement and impact, the campus should carefully consider the best approach to support engagement throughout the institution.

- The next step is to develop a strategic plan for community engagement, addressing organizational structure, directions and priorities, messages, and supports and incentives. That plan should address the leadership necessary to provide coordination and support campus-wide. Faculty development programs and seed grant opportunities are also needed to facilitate the incorporation of engaged scholarship using best practices and effective and innovative tools.
- One task that would benefit from clearer organization is the assembly and dissemination of the evidence of our outreach impact. To varying degrees our ability to tell our story relies on sporadic data collection and anecdotal evidence. More systematic and direct evidence would help the University demonstrate the extent and quality of our contributions, support improvement and the setting of priorities, and find and acknowledge partners.
- New opportunities for engaging with communities can occur if potential partners are aware of the possibilities of working together with UMass faculty, staff and students for joint impact. By increasing the promotion of our outreach and engagement successes, strategies, and significance, we can expand our visibility, foster new connections and leverage our impact.

3. Reviewing the reward structure for faculty outreach activities

Impact through engagement relies fundamentally on faculty effort. Yet the campus reward structure does not consistently recognize engaged scholarship. Often, junior faculty members are encouraged to stay away from engagement in their research and teaching, and other faculty who could be valuable contributors do not receive encouragement at the departmental level. This is a challenge both in terms of our policies and procedures regarding promotion, tenure, and merit, and in terms of the institutional culture that shapes our sense of what counts in the work of a faculty member. To make a compelling claim on the Commonwealth for investment of its resources in our growth and development, we need to define ourselves clearly as an institution working for the public good, and nowhere is this commitment more salient than in the criteria by which we retain and reward our faculty. The university must address both policies and culture, bringing administrators and the faculty into conversation about ways to put our commitment to engagement more solidly into the decisions we make about faculty advancement.

IV. Mobilizing for Success

The mission of the public research university is unique, but it comes with a high cost. The commitment to research roughly doubles the cost of instruction compared with non-research universities. The research enterprise carries substantial capital, infrastructure, technology, staffing and other costs that are only partially recovered through grant and contract payments. The immersive residential educational model is resource-intensive.

For much of the past half century this high-cost model was sustained from two major sources: state appropriations and expanding federal support for university research. But extraordinary pressure on discretionary spending at both the federal and state levels strongly suggests that the model that carried us to this point cannot carry us into the future. Future success will rely on mobilizing the campus around a new financial model adapted to new realities and capable of supporting investment for another generation of innovation.

A. Financial Strategies

1. Expanding Revenues

All public universities are adopting strategies to expand their revenue bases, and this campus has been creative and effective. By far the greatest growth, however, has come through increased revenue from undergraduate fees. These increases, while only partially offsetting losses in state tax support, erode affordability and create competitive challenges in attracting the highest quality students.

Renewed investment from the Commonwealth.
Our planning does not assume that state support will return to levels of decades past. We share with the Commonwealth, however, the goal of keeping quality higher education affordable. The Governor's endorsement of the principles of the "50-50" plan is evidence of our value to the state. From many perspectives it is difficult to imagine an investment with higher payback — both direct and indirect — in terms of stimulating economic activity, expanding employment, supporting key innovation sectors, and improving the quality of the Commonwealth's life. In that context we will continue to advocate for a balanced and sustainable cost sharing among the state and students to support general operations of the campus. The success of those efforts will rely in large part on our success in demonstrating continued value and effective stewardship.

It must be recognized, however, that one way or another a sustainable financial strategy for the campus must involve renewed investment by the state, either in the form of reliable increases in tax support, equivalent relief from campus-funded debt service, or both. Even with aggressive cost containment and revenue generation, rising costs and the magnitude of earlier losses of state support leaves the campus with no other option other than increasing the undergraduate cost of attendance.

Enrollment Management.
In the wake of prolonged and substantial state budget cuts UMass Amherst adopted targeted recruitment, yield and merit aid programs for non-resident students designed to increase net revenue. Since launching that strategy net revenue has grown by nearly $12 million, half of which has been used to meet rising campus costs and half of which has been returned to schools and colleges to support academic quality.

With three years of experience now behind us we can see both the potential and the limitations of an enrollment-based revenue strategy. Targeted enrollment growth continues to be a potential source of increased net revenue, but the growth curve will flatten for several reasons:
Many institutions are fishing in the same waters. The competition for non-resident students, especially in the northeast, is intense and intensifying.

1. We are on the downslope of a demographic decline in the pool of high school graduates most likely to enroll at an institution of our kind in our location.
2. Each year, attracting additional non-resident students requires increasing merit award levels to attract a new segment of the market, so net revenue per student, while positive, becomes more modest.
3. Enrollment growth increases both the direct costs of instruction and ancillary costs such as public safety, transit, maintenance and others needed to maintain high levels of service for students and faculty. These costs consume more and more of the additional revenue.

Our initial enrollment growth goals were set four years ago in a different environment and with relatively little experience to draw on. It is time to reflect on our experience, take advantage of more powerful analysis now available, and recalibrate our enrollment management plan. The following should guide that effort:

- No enrollment goal stands alone: revenue exists in a balance with quality, selectivity, diversity and capacity.
- The analyses currently used to project and model admissions, enrollment, financial aid and institutional revenue should be consolidated in a unified model that can ease scenario planning and informed goal setting.
- Promoting diversity is a key goal that presents a special challenge. The competition for highly qualified high school graduates from underrepresented groups is especially intense. In Massachusetts and the northeast in particular candidates are likely to receive multiple offers from excellent schools, and out-of-pocket cost may not be the determining factor. Competing successfully in the coming years will require attention to students' academic and career goals and other factors that may differentiate UMass Amherst. Close attention should also be paid to applicants who may not be in the conventional admissions pipeline.
- The enrollment plan produces annual targets, but requires a long-term perspective. Some strategies may unfold over a period of years.
- As detailed in Section II, the enrollment plan must be closely integrated with the instructional supply and demand plan. In particular, we need to ensure that our enrollment strategy supports the goal of making UMass Amherst the destination of choice for the kinds of students we seek.

Program-specific fees.

Most leading public research universities have some sort of differential tuition or fee schedule for selected programs. These differential fees may reflect unusual costs associated with specialized equipment or facilities, high instructional costs resulting from disciplinary accreditation standards, or market forces. UMass Amherst currently charges two such differential fees. The $320 Engineering fee was established in 1985 to offset the high cost of Engineering instruction. The $600 Commonwealth Honors College fee was established in 2010 to partially offset the elimination of the state line item appropriation for CHC.

Greater use of program-specific fees has been considered. In 2011, the Joint Task Force on Curriculum, Credits and Costs raised the issue, and later that year the Faculty Senate recommended adoption of formal procedures for implementing differential fees.

- The issue is complicated because it is connected to the broader student fee discussion. General concern about increasing student costs and specific discussions around the "50-50" plan argue for caution in expanding use of differential fees, especially if such fees result in a broad increase in charges.
- But if narrowly construed, differential fees in certain areas may have the potential to improve the student experience in ways that provide a direct return for the additional cost to the student.

Continuing and Professional Education.

With a strong educational product and extensive experience in online education, the campus has a strong presence in continuing and professional education. In FY13 CPE programs generated more than $20 million in net revenues for the campus. Several colleges make extensive use of CPE revenues to underwrite their core activities. Revenue growth has slowed as the online market has become more crowded. Opportunities for growth remain, however, and degree programs offered through CPE are positioned to meet the needs of many "post-traditional" students. The campus must build on its success to open new educational markets and increase net benefits for programs.

- The recent changes to the fee structure for UMassOnline are a very positive step, and will immediately improve net revenue.
- The campus must work closely with the new leadership of UMassOnline to find and penetrate new markets, and develop an integrated marketing strategy that draws on both UMOL and campus strengths to derive maximum value from shared marketing investments.
- Curricular innovation will be necessary in an increasingly competitive marketplace. The campus has employed several approaches to stimulate program development over the years, and should intensify those efforts. The Provost should conduct a comprehensive review of program development capacity and incentives for curricular innovation for both CPE and the state-supported program.
- The current fee and revenue-sharing structure for CPE was put in place several years ago to provide greater incentives for participating units. That structure should be evaluated in light of the experience we have gained and further refined as appropriate.

Increased private support.

This is a lynchpin of every university plan, and for good reason. UMass Amherst is launching its first fully formed major capital campaign. *UMass Rising* forms the primary basis of this aspect of the campus's plan, and is fully described elsewhere. Four points related to that effort deserve mention here.

First, the full financial effects of *UMass Rising* and successor campaigns will take time to be felt. Annual giving is expected to ramp up to a higher level, but many campaign gifts come in the form of bequests or other forms of deferred giving. Gifts to the endowment will produce lasting value, but the cash flows associated with these gifts cannot be relied on to solve current problems. This means that we must be more aggressive with the other elements of our financial plan.

Second, both shorter-term benefits (in the form of annual giving) and longer-term gifts are directly dependent on improvements in the student educational experience called for elsewhere in this plan. Investments in improving student success and building lasting relationships form a basis for increased alumni giving over the long term. In addition, some of these student-oriented initiatives may attract support immediately.

Third, we can hasten the benefits of private giving by improving the practical impact of gifts. Private giving tends to augment rather than replace general funds. But there are specific opportunities to use private dollars to better advance institutional priorities.

- One such opportunity is already part of our fundraising strategy. The institutional match for endowed chairs and professorships devotes central dollars earmarked for investment in faculty salaries to attracting private gifts. Chaired professorships are an invaluable for retaining our recruiting top faculty researchers. The institution supports salary, and the gift provides related support (and in some cases may top off a faculty salary). This approach of matching gifts to multiply the impact of institutional dollars should be explored broadly and applied as appropriate in other situations.

- Another opportunity may be changes in the way we solicit and manage student scholarships. Scholarships are one of the most common donor interests, and represent a significant fraction of private giving. We should explore a strategic approach to incorporating gift-based scholarships in meeting student financial need.

Fourth, the campus should make better use of partnerships to underwrite campus priorities.

- We have had some success in securing direct sponsorships in areas such as athletics and the Fine Arts Center, but we should pursue a more systematic approach to identifying and nurturing sponsorship relationships across a broad range of activities.
- The potential for expanding gifts-in-kind to help in the construction and outfitting of capital projects is discussed later in this document.

Stimulating innovation.

Individual units have shown great creativity in developing revenue-generating ideas, although these have tended to be of modest scale and often of short duration. The campus has periodically tried to be more intentional in supporting new revenue-generating ventures (for example, the Provost's 2009 program of seed-funding for new programs).

- The next step is to develop a systematic, sustainable "venture capital" strategy. The focus should be on procedures to support the more challenging opportunities that remain. This includes identifying capital, developing guidelines for creating and evaluating business plans, evaluating success, and recovering central investments where appropriate.
- Emphasis should be given to shared risk, by which central funds leverage unit investment.

2. Focusing Resources

Finding alternate revenue sources will remain important, but cannot be our chief strategy for responding to losses of state support and increasing costs. Public research universities find themselves in an "arms race" to launch new programs, new services, and new amenities, and to compete successfully requires learning how to achieve priorities more efficiently, which means spending fewer dollars on a given activity. Closely related — and often inseparable — is the need to spend resources more effectively, which means getting more value for the dollar spent.

Efficiency and Effectiveness ("E&E") Initiatives

The campus has aggressively pursued E&E initiatives over the past few years to offset the need for student fee increases. Major areas include procurement, utility savings, and technological improvements to administrative processes. The University system office has been effective in communicating many of these efforts to our stakeholders. That effort should become even more aggressive so that stakeholders recognize the extent to which efficiencies are being achieved, and to reinforce the value of investing in and partnering with us. The campus can contribute by developing its own regular and comprehensive analyses of efficiency savings.

Collaboration.

The campus has proven adept at collaborating to achieve value. At the institutional level, for more than fifty years the collaboration of local colleges formalized through Five Colleges, Incorporated has been a model of both effectiveness and efficiency. By sharing faculty, curriculum and services the members of the consortium have achieved innovation and excellence that would have been beyond their individual reaches. This powerful model has resulted in more than eighty joint faculty positions, coordinated library and other services, and a broad array of degree and certificate programs. Collaboration within Five Colleges, Inc. and with other institutions continues to expand, and points the way to future value.

Within the campus collaboration has also been an increasingly important strategy. From the interdisciplinary graduate programs in the life sciences to the growing array of collaborative dual master's degrees, knitting together value across areas of individual strength has become a hallmark of the campus. In terms of administrative and support services we have established a variety of cross-training and hybrid centralized/distributed approaches, and additional opportunities should be explored.

Simplification.

Large organizations struggle with the complexity of systems and procedures for doing business, especially compliance procedures. Code compliance, financial accounting, human resource requirements, oversight reporting and more add layer upon layer of control mechanisms. Public research universities are by their nature engaged in a diverse set of business activities ranging from daycare to dining to handling radioactive isotopes, so their business environments are especially and increasingly complex and stringently regulated. In addition to institutional responsibility, universities confront an increasing expectation that they will be responsible for the actions of their faculty, staff and students. Exercising stewardship for public funds and assets adds yet another level of regulation and accountability. The net effect is a bewildering array of external and internal rules, regulations, policies and procedures.

Responsibility and accountability are essential. But the time and effort devoted to understanding and navigating the system of controls, while hard to quantify, is enormous. Costs are both direct — time spent on complying and checking compliance — but also indirect — lost opportunities and the deadening effect of investing effort in processes that may result in little added value.

We need to focus on controlling the costs of appropriate compliance and control through a deliberate and sustained program designed to:

- Apply sound risk management perspectives so as to balance risks with costs when establishing and evaluating controls. This includes fully costing risk avoidance when calculating the benefits of controls.
- Identify procedures with unintended consequences or questionable added value. This should engage the whole campus community, especially those who are in the front lines of control and compliance. High-level support to challenge assumptions, consider alternatives, and change established procedures where warranted will be necessary.
- Place greater emphasis on improved training and technology to enable end-users to complete initial transactions correctly, thereby reducing time-consuming follow-up.

Resource Allocation.

Maximizing value results from resource allocation that closely aligns expenditures with institutional priorities. Historically, at UMass Amherst budgets have been based primarily on past allocations. Section II details the implications of incremental budgeting for the instructional program, and recommends a shift to a more intentional and evidence-based approach. Those principles should apply to overall campus budgeting, as well.

More intentional budgeting implies that resources will move away from lower priorities and toward higher priorities over time. In practice this is difficult, especially when resources are generally constricted. Some institutions seek to avoid the contention and complications of central reallocation by adopting an "every tub on its own bottom" approach, or some variant of responsibility center management (RCM). Such systems have their own complications, however, and require years of preparation. For the immediate future, UMass Amherst will operate with a mixed model of unit-based decision-making within a central system that provides for some balancing across units. We can make that system more intentional in several ways:

- The "common good" must be clear and well defined, so that the value of reallocation is evident. This strategic planning process frames some issues, and should be followed up with careful prioritization and analyses of costs and benefits.
- It should be easily and immediately clear how the budget system rewards efforts that meet or exceed institutional goals.
- Decision-making should be informed and accountable. This argues for clear articulation of purposes, development of relevant metrics, and transparent evaluation of outcomes.
- Where possible, resource allocations should be indexed against industry standards or other benchmarks. Deviations are inevitable, but should be understood.
- For greatest effect, the process should have a multi-year focus, both in terms of when investments are made and when results are expected.
- Shared investment should be emphasized so that both the campus and individual units have a stake in outcomes.

Making the transition to more intentional resource allocation will take time and steady effort. A process that engages the whole institution will emerge well understood and credible. The resource allocation process is the complement to the planning process, and both will develop and be refined over time in tandem.

Invest in people.

Financial pressure increases the value of creativity and competence. We need talented and dedicated staff who can navigate complex transactions and provide high levels of customer service. Staff at all levels should be able to internalize institutional priorities and feel that their efforts are recognized and rewarded.

- Responsibilities must be clearly articulated and appropriately classified and compensated. The institution is reviewing its classification process. Resulting changes should improve timeliness and responsiveness, and assist units in competing for highly talented staff.
- Our structures sometimes make it difficult for a valuable employee to see a clear and rewarding career path. We should be creative in providing opportunities for advancement that can help retain valued staff.
- The broader effort to "simplify" should include effective training and support and engagement of staff in ongoing process improvement that taps their skills and expertise.
- More generally, opportunities for professional development promote individual growth and also strengthen the organization by expanding the knowledge and skills of staff, which in turn facilitates change through new ideas and strategies.
- Our commitment to diversity and inclusiveness should be reflected in openness to new ideas and different perspectives, and in more expansive models of customer service.
- In line with a more intentional, evidence-driven system of resource allocation, we should ensure that the organization and distribution of personnel throughout the campus effectively support the mission.

On a broader level, staffing patterns and assumptions that might have made sense at one time or in one context may need to be refreshed. We should examine how functions are organized and distributed and explore options that take advantage of technology, cross-training, and expert resources to shape a richer and more effective working environment.

B. Sustaining the Physical Campus

Despite all the changes we face, our mission and business model will remain deeply dependent on our physical assets. We will increasingly harness technology for teaching; we will build innovation partnerships that span the globe; we will project impact into communities around the state and nation. But the physical campus will remain the foundation on which all else is built. Without the immersive residential educational experience, and the communities of scholars we attract to create and teach, the mission of the public research university would change beyond recognition.

The dependence of our mission on physical assets presents a central dilemma. UMass Amherst — like many public research universities — was built in the post-War and Baby Boom eras with enormous taxpayer investment. In recent decades those buildings, steam lines, electrical systems, and other physical assets have come to the end of their useful lives, but the state has provided only a small fraction of the funding necessary to renew that vast infrastructure. At the same time, the campus has had to invest in new capacity for teaching, research and support services to remain competitive for faculty and students.

Major facilities projects are primarily funded through the sale of University of Massachusetts Building Authority bonds, and paying the debt service on these bonds is the sole responsibility of the campus. In 2007, general funds debt service payments totaled $23 million. By 2013 that had doubled, to $45 million, and with additional borrowing already authorized it will triple, to $68 million, by 2018. In addition, annual spending on smaller projects and required O&M set-asides totaled $14 million in 2013, and will continue to rise. All told, facilities and infrastructure spending represents the fastest-growing part of the campus budget, now accounting for ten cents out of every dollar we spend and climbing.

The facilities dilemma is exacerbated by other trends. The aging physical plant continues to accumulate deferred maintenance, now totaling some $1.5 billion. A recent Trustee policy caps campus borrowing at 8% of operating revenues, which may provide relief of one kind but will soon close the door on the only funding strategy the campus can implement on its own. Another Trustee policy requires an annual 5% O&M and depreciation set-aside for new capital projects. This will benefit future generations, but now compounds the capital drain on operating revenues.

This is the price of sound stewardship, but paying that price may not be sustainable. Our strategy calls for more carefully focusing our resources, but the reality is that campus resources are simply out of scale with the challenge we face. A sustainable facilities strategy — and in turn, a sustainable financial strategy — requires renewed state investment in our physical assets.

1. Expanding the Resource Base

Growing reliance on campus operating funds to support facilities and infrastructure defines our strategic challenge, so our first-order task is finding ways to moderate that trend.

Partnership with the state.

The state may not be in the position to invest at the level it did in the formative decades, but direct state capital investment remains essential. Recent renewal of state capital investment is encouraging. Some of the most important projects taking shape on the campus right now reflect renewed state investment in higher education infrastructure. The new academic and classroom building, the Life Sciences Laboratories, and the planned Physical Sciences Building represent the most significant state investments in half a century, and are pivotal to our ability to compete in the next generation. Critically important funding for deferred maintenance projects in Morrill, Lederle GRC and Machmer Hall has also been committed.

These investments reflect a deepening relationship with state officials and a shared understanding of the contributions UMass Amherst makes to the state's success. From the Governor to the Executive Office of Administration and Finance to the Division of Capital Asset Management, the Commonwealth is a partner in our long-term capital planning. The state helped underwrite and participated in the campus master planning process and the comprehensive science and engineering plan. The commitment to the new Physical Sciences building emerged directly from that involvement.

- In the short term, our facilities strategy targets known opportunities for continued state investment. The state, through the Massachusetts Life Sciences Corporation, earmarked $95 million for a life sciences complex to support Amherst campus programs and engage industry partners. We are working closely with MLSC to finalize a program and release the funding. The state higher education capital bond bill passed in 2008, which has already underwritten NACB, LSL, and PSB, still includes a pool of uncommitted borrowing capacity. The campus must work with state partners to target additional projects of mutual benefit.
- In the longer term, a sustainable facilities strategy relies fundamentally on significant, sustained and reliable increases in state capital funding. Other states are using capital investment to propel their public universities forward. The paybacks are clear in the form of jobs, tax revenues and quality of life. The campus must aggressively demonstrate the benefits of state investment. The new academic and classroom building will transform education for thousands of Massachusetts residents. The Life Science Laboratories and the Physical Science Building will bring research dollars to the state, advance the Commonwealth's standing as a global center of discovery, and spark innovation for Massachusetts companies. Communicating that impact should be prominent in the campus's messaging to legislative and executive branch decision makers and the general public.
- Following the model of the MLSC, the campus should explore and promote specific partnerships with key state industry sectors. Where possible, campus facilities dollars should leverage state investment and private sector participation.

Private giving.

The campus has had some success attracting donor support for selected facilities projects. Expansion of the Isenberg School of Management and completion of the George N. Parks Minuteman Marching Band Building would not have been possible without private gifts. Private giving is also pivotal in plans for a second addition to ISOM and the Champions Center. Our experience indicates that private giving is most likely when it combines with campus dollars to support projects of mutual benefit. Developing targeted matching opportunities is therefore the main focus of our strategy for private facilities support, and this is reflected in *UMass Rising* campaign goals.

- A specific opportunity comes in the form of gifts in kind, especially for major equipment needs. Many institutions attract support from equipment or materials suppliers in the form of below-market pricing that results in naming opportunities. While this presents a complicated set of procurement issues, resolving them could have a significant financial benefit.

2. Focusing Resources

Given the scale of likely facilities expenditures in coming years, controlling costs and deriving maximum value from the dollars we spend will be essential. Even small percentage efficiencies can translate into significant cash savings.

Value principles.

Given our situation, two broad principles have emerged to guide investment decisions.

- First, we should approach our deferred maintenance challenge as strategically as possible. The design of a classroom or science building seventy years ago had little in common with contemporary and emerging needs. The trade-off between renewal and new construction requires a strategic decision: fix a building or replace it. We should increasingly think about value in terms of creating capacity, in effect "constructing our way" out of deferred maintenance where appropriate. That principle should be widely discussed with stakeholders.
- Second, we should reinforce a commitment to achieving value through quality. Faced with tight resources the option of reducing scope, deferring capacity, or adopting more modest performance standards can seem attractive in the short term, but we live with the consequences of those decisions for decades. For mission-critical projects with long expected use, planning should emphasize building value in from the beginning. Initial investment should be evaluated in the context of long-term value.

Integrating programmatic and facilities planning.

Linking mission-based program planning — emerging from academic, student life, and other strategic goals — and facilities planning is essential in achieving high value for institutional investment. A natural tension between facilities and program planning should be acknowledged and respected. From the perspective of facilities design and construction, the premium is on specifying a program, giving clear direction to designers, and minimizing changes once design and construction are under way. From this perspective, the nature of the funding and design processes tends to enforce a "project" perspective. From the programmatic planning perspective the future is volatile, so the premium is on flexibility and interdependencies across projects. Both perspectives are valid, and both can be accommodated by promoting effective integration of planning at all levels.

- Annual faculty hiring. Synchronizing construction and renovation of facilities with the hiring of faculty members — especially in the sciences and engineering — is a growing challenge as needs become more complex and renovation more difficult. The Provost's Office and Facilities Planning cooperate to identify faculty searches with unusual facilities demands, work with hiring departments to specify needs as early as possible, and coordinate throughout the stages of the hiring process. This is very useful, but synchronization must become even tighter to avoid delays for new faculty in establishing research programs and working toward tenure. Integrating facilities capacity with hiring priorities is essential because we cannot make open-ended commitments to accommodating facilities needs.
  - The hiring coordination process should be strengthened to yield information about candidate needs as exhaustively and as early as possible.
  - While all necessary work may not be completed at the time of arrival, the Provost's Office should not authorize an offer unless an acceptable plan addressing scope and timing of work, availability of space, funding responsibility, and transitional accommodation, if needed, is in place.
  - The Provost's Office is implementing a two-year planning cycle for faculty hiring, and these plans should be fully coordinated with facilities planning.
  - Where appropriate, consideration should be given to deferring a search or increasing the time between selecting a faculty member and the start of the individual's actual employment. In such cases provision must be made for carryover of funding and related issues.
  - The costs and benefits of maintaining swing lab space for transitional use should be evaluated.

- Faculty hiring: the longer view. Procedural improvements should not mask the urgent need for a sustainable plan for the longer term. Currently allocated funding for the next five years of faculty hiring renovations will be expended in less than half that time. It is clear that the campus's ambitions for faculty hiring involve costs that far exceed what is available within current capital priorities.

This imbalance has been developing for years and demands a comprehensive solution. The campus must revisit its assumptions about how to physically accommodate new faculty in the lab sciences. A broader context is needed to plan for future needs.

- First, the utility of hiring faculty and then hoping to satisfy their physical needs has been exhausted. Increasingly, facilities dictate the kind of faculty who can be hired, and we need to think more in terms of allocating facilities to the hiring process. This requires in-depth assessment of the campus's physical capacity to support laboratory science, to form the backdrop against which faculty hiring is considered.
- Second, the capacity of new facilities like ISB, LSL, PSB and a potential life sciences complex should be integrated into planning for faculty hiring. New space cannot always be used in this way, but renovation and new construction capacity should be combined in a common analysis.

- Creating a broader planning context. Challenges associated with new faculty hiring illustrate a larger issue. Facilities discussions require a broader context that can produce higher value. One example is the renovation of vacated laboratory space. Often, when a lab becomes available it is in an older building, and reuse requires significant upgrades to building systems, code compliance, adaptation, and other work. In the absence of a broader plan this often results in spot renovations that make neither financial nor programmatic sense.

  Another example can be seen in planning for facilities to replace Hills House and Bartlett Hall, both slated for demolition. These projects are intertwined with larger questions regarding classroom supply and demand, academic program emphases, and enrollment planning. They are related to each other — and to other projects — in that some program elements make better financial and programmatic sense in some scenarios than others. But the competition for planning resources and the project perspective present significant obstacles to broader planning that can bring greater return on investment.

  - Adequate planning resources must be identified and dedicated to the larger planning task. This task will have both an immediate component — for example, catching up with backfill from existing projects — and a longer-term focus, creating permanent capacity for multi-year planning that can incorporate retirement and succession planning, future capital projects, and planned large-scale building renovations.
  - It is essential that this planning process occur at the enterprise rather than the project level, and that it be fully integrated with academic program planning. The Provost's Office should be fully involved in all stages of planning, as should the Office of the Vice Chancellor for Research and Engagement where appropriate.
  - To the maximum extent possible, short-term planning should anticipate and advance the larger strategy. A recent proposal from the Biology Department demonstrates that larger projects can accommodate immediate needs, add future value, and save money when compared with spot renovation. This model should be encouraged. Doing so, however, will require a more flexible approach to funding strategies so that projects can be evaluated in the context of overall institutional value, regardless of funding source.

- Contextualizing the master planning process. The campus recently adopted its first comprehensive campus master plan in decades. It analyzed capacity, land use, and campus systems, and laid the foundation for informed discussion of growth and development. It opened one door to a broad discussion of how the campus will express its mission in the years ahead. Bringing the plan to the next step requires integrating it with mission-based planning for research, teaching, and student life, so that the campus can imagine its future in a complete context. Success relies on symbiosis: mission-based planning must be rooted in the physical character and capacities of the campus, and master planning must respond to the aspirations of academic and other units. Defining and forging that relationship should be the next step in the master planning process.

Setting capital priorities.

The complexity of our facilities choices and funding situation make the process of exploring, establishing and evolving our capital priorities particularly challenging. It involves bringing together program priorities, different financial scenarios, and consideration of external expectations and opportunities, and draws on many institutional perspectives. The current set of capital priorities largely reflects discussions leading up to the most recent set of long-term borrowing decisions. Moving forward, the campus must examine its prospects for additional borrowing, refine its state capital funding strategy, and assimilate the programmatic directions emerging from this planning process. All of this calls for revisiting the mechanisms by which capital priorities are considered and ensuring that an effective process is in place.

- The first step is to establish performance standards for an effective capital planning and prioritization process. These standards should address how needs are established, how assets are evaluated, how options are developed, and how decisions are made. They should also address how various segments of the campus should be involved in different process elements.
- The process should be mission-based and flow from broader strategic planning. It should engage different parts of the campus but culminate in a clear statement of priorities from the Chancellor, Provost and other senior leadership. It should tap into both campus-based and external expertise, where appropriate, to frame issues and present options.

Seeking cost relief.

One important factor complicating effective capital planning is the high cost of construction and renovation work. As a public entity we are subject to many state regulations and requirements that increase the cost of doing business or limit the effective use of money. State procedures are directed to important and legitimate purposes, but they may have unintended consequences or disproportionate costs. The scope of capital spending suggests that even small improvements in the cost structure could yield substantial dollar savings.

- An effort to identify the most significant state requirements was undertaken several years ago. That work should be revisited and bolstered with specific comparative analyses of costs at the different stages of the design and construction process. Specific topics to be explored include:
  - Greater freedom for the University to enter into public-private partnerships that can reduce costs and share risks.
  - Relief from certain provisions of Chapter 149, and approval of alternative procurement methods in capital construction.
  - Greater delegation of projects to the campus, and higher trigger thresholds for external management.
  - Cooperation with the UMass system office and other public institutions to seek common strategies.
- A related inquiry should be made into costs of locally managed projects, which in many cases seem out of scale with the nature of the work performed, wage scales, or other explanatory variables.

Maximizing effective use of assets.

As with all other campus resources we are challenged to get as much value as possible from our physical assets. Three strategies have strong potential moving forward.

- Adaptive reuse. Many campus facilities were designed long ago to support functions that have evolved or disappeared. Yet these physical assets remain, often in important locations. Some of these facilities have historical significance in addition to practical potential. For key "legacy" buildings, the task is finding a contemporary use that can compete for resources sufficient to secure their ongoing role in the institution. One of the most effective strategies is to incorporate legacy buildings into new projects where appropriate. Other assets occupy key locations that argue for vibrant use. For example, the Library tower stands at the center of campus and is our most visible icon. As library use has shifted from physical to digital resources new opportunities have arisen. An important example is the Learning Commons, some of which occupies the site of the old card catalog, and recent studies suggest other possible adaptations. Other examples exist throughout the campus.

We will invest millions of dollars in the maintenance, operation and renewal of some of these assets whatever their use. Typically, renovation of existing space is half the cost of new construction. The campus should adopt a deliberate strategy of matching compatible uses with existing assets when it can result in cost savings or increased value to the institution.

- <u>Space utilization and planning</u>. Managing 11 million square feet of space across so wide an array of purposes and conditions is challenging. Like other resources, current space allocation practices are primarily decentralized and incremental. One notable exception is the campus's policy to reclaim for central allocation space vacated when occupants move to a new building. These recovered spaces tend to be scattered, however, contributing to the difficulty of effective backfill planning. The campus is now fully implementing a new computer-aided facilities management (CAFM) enterprise system, which for the first time will bring together data on occupancy, use, and characteristics of physical facilities. This creates an opportunity for space planning at a much higher level of sophistication and effectiveness. That new capacity suggests several related improvements:
    - Campus space request and allocation procedures should be revisited in the context of CAFM.
    - Policies should be reviewed and modified to promote space as a strategic resource rather than a distributed asset. This should include development of new analytic tools (again, in the context of CAFM) and performance standards.
    - Space assignment and planning should be more closely integrated with academic planning and the larger discussion of strategic resource allocation.

- <u>Environmental performance</u>. Energy use and environmental impact are important aspects of stewardship. Even with an aging infrastructure we are committed to continuous improvement in resource use. This kind of efficiency has many payoffs, including very substantial cost savings. The progress to date is impressive. Between 2004 and 2010, despite enrollment growth and commissioning of several new buildings, carbon emissions were reduced by 30%, campus electrical consumption fell by 12%, steam consumption by 24%, and water consumption by 45%. With the opening of the new Central Heating Plant we are generating more than 70% of our own electricity, much of it using lower-carbon natural gas.
    - Aggressive environmental performance improvements should continue, including projects to retrofit older buildings.
    - The Campus Sustainability Initiative and the Chancellor's Sustainability Committee draw together relevant administrative units, faculty and students to both inform campus decisions and integrate sustainability into the academic program.
    - New construction and renovation projects will reflect the same ambitious goals. The campus has opened its first two LEED Gold buildings (the new Police Station and the George N. Parks Minuteman Marching Band Building), and has developed green building design guidelines for future projects.

<u>Leveraging Information Technology.</u>

The vast and growing array of systems, tools and processes we call "information technology" becomes more central to strategic planning and resource utilization every day. In terms of instruction, the buzzwords of technologically related innovation abound: "flipped classes," "hybrid courses," "blended learning," "team-based learning," and, most recently, "MOOCs." Developing and adopting instructional innovation requires a much different toolset and support structure: tools to enable, for example video, multi-media, and other pre-class material preparation, as well as the ability to distribute these materials to large numbers of students. Similarly, much greater use of interactive tools such as enhanced personal response systems, the team-based learning technology, and adaptive textbooks can be anticipated. Tools to support the instructional experience, such as "learning analytics," success predictors, and client relationship management (CRM) can be applied to issues of student retention and graduation and improved student advising.

Computing hardware, software and technical support have become basic building blocks for research, as well. The evolution of services for academic research computing support at UMass Amherst has been decentralized, and responsibility remains primarily at the department or College level. As demands and costs increase, the decentralized funding model may not be able to keep pace. One approach with promise is emphasis on larger-scale, shared capacity. For example, UMass participation in the Massachusetts Green High Performance Computing Center (MGHPCC) offers an off-campus facility for housing individual academic research computing infrastructure, as well as access to a UMass-system-wide shared computing cluster.

Information technology to support businesses processes is also critical, both to reduce costs and improve customer service. Our large enterprise systems for finance, human resources and student records reflect enormous initial investment and ongoing expense, yet supplemental and "shadow" proliferate, adding cost and complexity. Individual units seeking to employ technology to improve local processes confront uncertainty over the best way to proceed.

- A search is underway for a new Chief Information Officer, and that individual will have the opportunity to assess issues and strategies across the institution and engage different stakeholders. Some of the issues to be considered:
    - Technology requires ongoing investment to operate and maintain existing capacity and introduce new capacity. While no single model for funding may be possible or appropriate, expectations for funding responsibility should be clear and aligned with institutional goals.
    - Shared investment may often be appropriate.
    - Calculation of return on investment should take into account potential savings, potential service or process improvement, and likelihood that conditions for success are in place (e.g., effective use of technology often requires changes in business practices or willingness to make full use of capabilities).
    - Information technology decisions with broad impact should be made in a transparent environment that includes key stakeholders and incorporates the perspectives of both early and late adopters.
    - Technology improvement should be an intentional driver of business process reengineering, organized and supported accordingly.