Mission and Scope:

A Vision for Enrollment Management at the University of Minnesota

September 23, 2011

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Executive Summary

The University of Minnesota has made remarkable progress in improving all aspects of the undergraduate experience over the past decade. Part of this success has been the result of significant organizational changes, and the bringing together of the myriad central-level undergraduate units (including admissions, financial aid, classroom management, student One Stop, liberal education, university writing) under one Office of Undergraduate Education. This change has enabled the various areas to work together much more effectively. In addition, the remarkable work of the colleges in improving all aspects of student support (academic advising, curriculum redesign, and career counseling) has made an enormous difference. Strong support from the Office of Student Affairs in promoting student engagement and improving the overall student experience has supported student success and reinforced the importance of first-year retention and timely graduation.

These coordinated efforts have resulted in rapid improvements in retention rates (in particular our first-year retention is now at 90%) and graduation rates (our four-year rate is now over 50%). The Office of Admissions, in cooperation with the colleges, has focused on matriculating students who are prepared to succeed at the University and to graduate in four years. Our new freshmen are now in the top of their class, with an average high school rank of over 85% and an average ACT of 27.4. An additional factor has been the attention to undergraduate financial aid. Both the rapid growth in private scholarship giving and the creation of the Promise Scholarship program for low-income and middle-income students under President Bruininks have increased the financial aid base and helped to ensure access for Minnesota students from all income levels.

Moving forward will require continued innovation by all the units involved with undergraduate education. The committee has not recommended a significant increase in overall undergraduate enrollments, but rather a targeted increase in the STEM fields where the demand has been steady and significant. In particular, the committee makes specific recommendations on new enrollment targets for CSE and CBS. The committee believes that better coordination around transfer students between central and the colleges is needed, and that a ratio of 2:1 freshman to transfers is desirable. As part of a comprehensive enrollment management plan, the University must redouble its efforts to improve retention and graduation rates at all levels (including for transfer students) and to continue to flatten the achievement gap between white students and students of color. Finally, the University must continue to improve the overall experience for our undergraduates with better advising resources, enhanced housing opportunities, and increased co-curricular options for undergraduate research, service learning, study abroad, leadership, and student life in general.

At the graduate level the report is centrally focused on identifying, sustaining, and creating additional graduate programs of scholarly distinction. We believe that resource and other constraints will not allow the University of Minnesota to continue to offer such a wide variety of graduate programs to such large numbers of graduate students without suffering an across-the-board decline in quality. This would put at risk the signature high quality programs that we now have, and would make it nearly impossible to move our better programs into the ranks of the outstanding programs. To these ends, we have:

- Argued for the use of “multiple metrics”, including measures of program inputs, program operation, and program outputs in order to identify the highest quality programs and to pinpoint areas that need improvement in other programs.

- Assessed a large pool of potential metrics that can be used to accurately identify and assess the quality of existing graduate programs.
- Used the NRC and additional U of M data to provide a "proof of concept" analysis, showing that such metrics can be used successfully to assess across the board the quality of our graduate programs.
- Proposed the creation of an all-University Graduate School committee made up of distinguished scholars and others who would assess the scholarly quality of each graduate program and assign it to four potential categories: **outstanding, strong, good, and needs reassessment.**
- Proposed that programs designated as outstanding in their scholarship and graduate training be given supplemental funding and maximum flexibility.
- Proposed that desirable goals other than pure scholarly excellence be added to the "excellence" measures in making funding and sizing decisions at the collegiate level.

Enhancing quality is not merely a function of financial investment. While there are examples of additional resources leading directly to improved quality and enhanced reputation, there are also plenty of examples of investments that did not have the desired effects. One very important factor that needs to be considered is what we have identified as "internalized behavior patterns" that reflect "cultures of excellence." Among the subset of programs deemed to be in the "strong" category and that are potential candidates for investment, those that have a culture of cooperation and excellence, coupled with high quality academic leadership focused on quality, are the most likely to succeed. This means that they have already demonstrated that they will use their resources to maximize quality of scholarship and graduate education rather than some other set of values, that they can work together to achieve these goals, and that their investments have begun to have the intended effect. It also means that there is a widely shared ethos among program faculty that emphasizes scholarship. Even programs with strong leaders will fail unless there are also very high performing faculty scholars in the group. In short, at least four things are necessary for the kinds of improvements we are touting: additional resources; cooperation around the common goal of academic excellence; very strong academic program leadership; very strong across-the-board faculty research ethos and performance. To identify programs for additional investment, we recommend that the Graduate School conduct a study of the practices that led particular programs to be classified as outstanding.

Scale, Scope and Mission:
A Vision for Enrollment Management at the University of Minnesota

I. Introduction

Committee Background and Charge

In the summer of 2010, Provost Sullivan asked Robert McMaster, Vice Provost and Dean of Undergraduate Education, and Henning Schroeder, Vice Provost and Dean of Graduate Education, to co-chair a committee to take a comprehensive look at Twin Cities campus enrollments and develop proposals for comprehensively managing enrollments in the long term. (A copy of the committee charge letter is included as Appendix F.) The original charge stated:

> It is clear that as we move forward with our continued strategic planning efforts involving both the academic and administrative side of the University a careful plan for enrollment management is essential. The short- and long-term enrollment management will affect our budgets and fiscal health, the curriculum we deliver, faculty/student ratios, and access to the University.

The committee divided into undergraduate and graduate/professional subcommittees. The undergraduate subcommittee focused on four issues: the size and composition of the student body, retention and graduation, programs for special populations, and student support services, including housing.

The graduate committee focused primarily on developing a framework for assessing the quality and impact of individual graduate programs, in anticipation of the need to make difficult choices about program enrollments in the near future.

By nearly any measure, the University of Minnesota-Twin Cities is an outstanding university, providing over 30,000 undergraduates and 20,000 graduate and professional students with a world-class learning environment. Our university is one of the most comprehensive in the world, offering bachelor's, master's, Ph.D., and professional degrees in a wide range of areas—astrophysics, child psychology, forest resources, microbiology, and public health—to name just a few. We offer thousands of classes taught by award-winning faculty who are at the very cutting-edge of their discipline and are also excellent teachers and mentors.

As a world-class university, we are dedicated to teaching and scholarly research. This mission is demonstrated not only in our rankings, our faculty research publications, and our students' research and scholarship accomplishments but, most importantly, in the commitment we make to student learning. Our academic quality is evident to students in a range of learning experiences, whether working with a faculty member on a capstone senior project, conducting research in a laboratory side-by-side with a professor, connecting with a successful university alumnus in a mentoring relationship (the University has over 450,000 alumni), or interacting with faculty and other students in a freshman seminar or advanced graduate seminar.

The University of Minnesota student experience is distinctive due to its unique position in the world of public higher education:

- The University is the state's only **research (R1) university** and one of the very best research universities in the nation. It is one of the few research campuses nationally that has both an academic health center with a major medical school and agricultural programs with an extension service.
- We are the public **land grant** university for the State of Minnesota.
- We reside in the **state capital**, which provides many opportunities for internships and research opportunities with state agencies such as the Department of Natural Resources, Department of Transportation, and Department of Public Health.
- We reside in a thriving **metropolitan area**, with a stable economy, remarkable natural beauty, and a vibrant social and cultural environment. The Twin Cities is often ranked at the very top in terms of quality of life with a thriving business community, including the headquarters of 21 Fortune 500 corporations.

The Research University

Faculty and staff are often asked this question by prospective students, "What are the advantages of studying at a research university?" The answer is straightforward. Our faculty members are the creators of knowledge, and their teaching draws upon their latest research and creative activity. Our faculty write award-winning academic articles and books, develop and execute profound scientific experiments, dazzle the world with new engineering marvels, and create original works of art. At the same time, our faculty are achieving national and international recognition for their high quality teaching and mentoring of our outstanding graduate and undergraduate students. From such faculty a student can acquire not only understanding of the content of a discipline and the field's leading edge, but also the excitement of actively pushing the frontiers of knowledge.

Each year, over 600 undergraduate students work one-on-one with a faculty member on research projects, through our Undergraduate Research Opportunities Program (UROP). Such experiences build our students' writing, analytical, and organizational skills. We are <u>the</u> research university in the state, and education and research are inexorably linked on our campus. Excellence in research is required for outstanding graduate education, and excellent graduate students are necessary for faculty to maintain a first-rate research agenda.

The Land Grant Mission

As a land grant institution, we have a mission to serve the State of Minnesota and to apply our knowledge to societal problems. As such, we greatly value our students' opportunities for service learning, internships, and other learning experiences with public agencies, private companies, arts organizations, and other non-profit organizations. We have a remarkable number of these opportunities given our Twin Cities location, with multiple government agencies and many major companies that hire U of M students as interns or permanent employees after graduation.

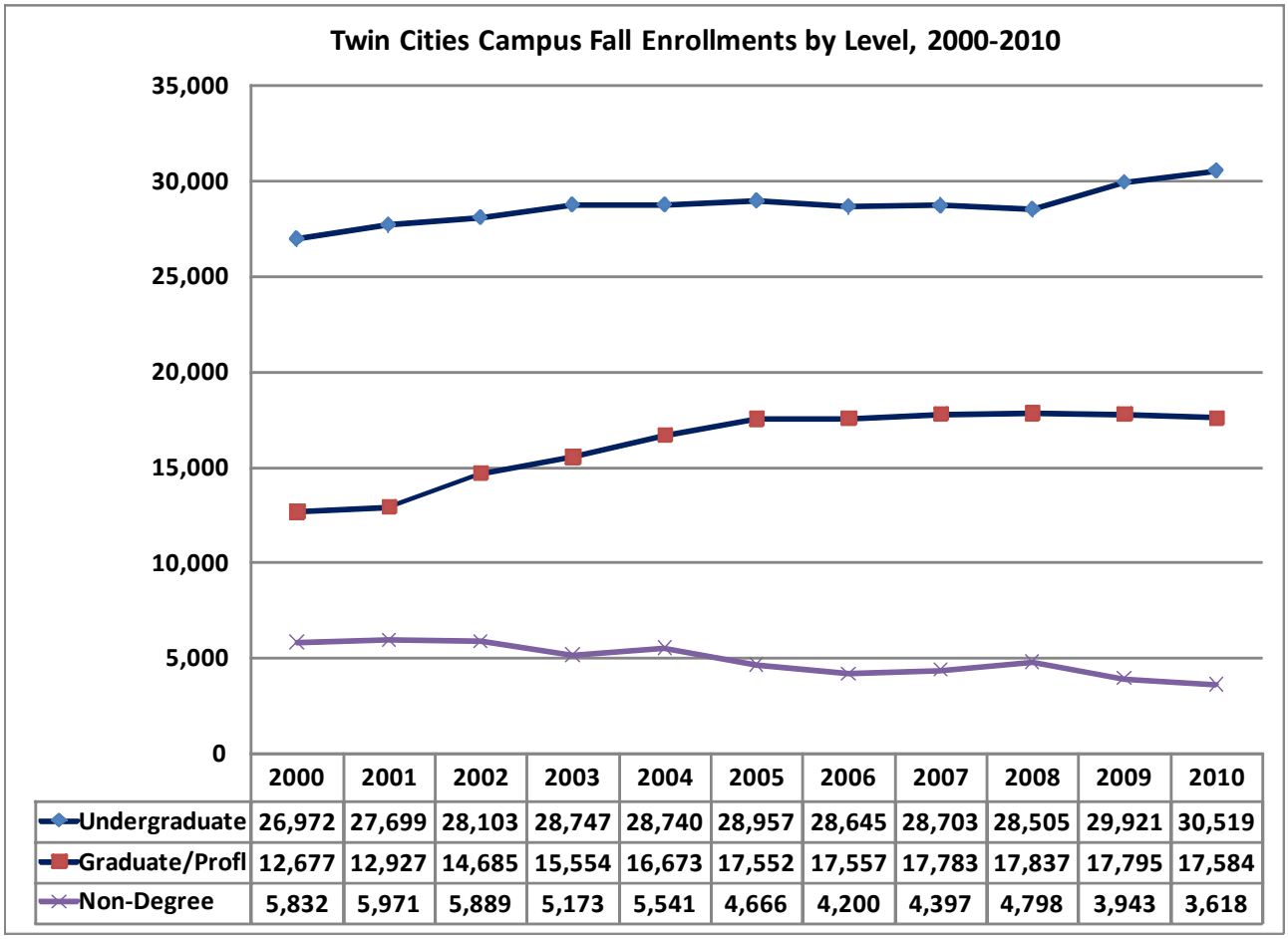
The Twin Cities Metropolitan Area and State Capital

The Twin Cities Metropolitan Region is a cultural, educational, and economic center in the upper Midwest. Noted for its diverse and thriving economic community with a strong business environment, the Twin Cities also is known as a nationally-renowned cultural center with many types of theatres (the university maintains a joint BFA program with the Guthrie Theatre), a range of museums, two major orchestras and a vibrant music scene, and a physical environment noted for

its many parks, lakes, bicycle paths, rivers and all-season set of activities. Given this rich environment, the Twin Cities is a very special place to study and live, whether you are a freshman studying art history, a Ph.D. student in chemical engineering, a business professional pursuing an MBA, or a medical student.

Enrollment at the University of Minnesota

The University of Minnesota, one of the largest U.S. universities in terms of total numbers of students, has seen steady growth over the past ten years. Since 2000, our undergraduate enrollment has grown from 26,972 to 30,519 (including both freshmen and transfer students); graduate enrollment has grown from 10,051 to 13,946; and professional education has grown from 2,626 to 3,638. From 2009 to 2010, graduate enrollments actually declined by 200 students and professional student enrollments by 9 students. Throughout this period, there has been no unified, university-wide enrollment management plan to guide and integrate decision-making within and across all three areas.



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Undergraduate	26,972	27,699	28,103	28,747	28,740	28,957	28,645	28,703	28,505	29,921	30,519
Graduate/Profl	12,677	12,927	14,685	15,554	16,673	17,552	17,557	17,783	17,837	17,795	17,584
Non-Degree	5,832	5,971	5,889	5,173	5,541	4,666	4,200	4,397	4,798	3,943	3,618

Figure 1. UMTC fall enrollment trends, 2000 to 2010

It is clear that as we move forward with our continued strategic planning efforts involving both the academic and administrative side of the university, a careful plan for enrollment management is essential. The short- and long-term enrollment management will affect our budgets and fiscal health, the curriculum we deliver, faculty/student ratios, and access to the university. We must determine answers to these questions: What is the appropriate balance is among undergraduate,

graduate, and professional students? What are our particular enrollment niches given our role as the state's primary research institution? What is our comparative advantage?

Enrollment Management Principles

The committee framed its work by developing a set of general principles that apply to all levels of students—undergraduate, graduate, and professional, and then developed specific principles that also apply to each of the three groups individually.

The committee discussed the definitions of undergraduate, graduate and professional as part of its work. In the official registration statistics for the University, these categories are defined as follows:

> **Undergraduate:** Students pursuing programs leading to associate or bachelor degrees.
>
> **Graduate:** Students pursuing a graduate level degree or certificate (masters, doctoral, or post-bachelor's certificate).
>
> **Professional:** Students seeking a post-bachelor degree or certificate in the Duluth School of Medicine and the Twin Cities Medical School, Law School, School of Dentistry, and Colleges of Pharmacy and Veterinary Medicine.

For purposes of this document, the committee used those definitions, and also considered as "professional" a number of masters degree programs that emphasize specific vocational preparation, even though they are outside of the "professional colleges" listed above. Some examples include the Master of Business Administration, Master in Dental Therapy, Master of Social Work, and Master of Geographic Information Science.

General Principles for All Levels of Students

1. Maintain affordability. The university must remain affordable to a broad cross-section of students from Minnesota, from across the United States, and from all parts of the world.

2. Admit for success. The university should admit to colleges and programs those students who will benefit from the curriculum and who have a strong probability of graduating in a timely manner. To do so, Admissions should conduct a holistic review of student records, using primary and secondary factors.

3. Provide a high-quality education and student experience. The university needs to adjust enrollments to its fiscal, intellectual, and physical resource capacity. Enrollments should be adjusted according to our ability to provide a very high quality education to our students.

4. Support student success. The university should direct resources to help ensure that students who are admitted to its colleges and programs are adequately supported to be able to complete the programs and graduate in a timely way.

5. Incorporate ethnic, social, economic, and geographic diversity. As a land grant university, the university is committed to enrolling and graduating a broad, diverse spectrum of students,

especially from Minnesota. The educational experience of all students is enhanced when they can interact with students from a variety of other states and countries. The university serves as a magnet for bringing talent into the state.

6. Emphasize signature strengths. The university needs to give highest priority to its strongest and most distinctive programs while at the same time striking a balance between existing and emergent disciplines. It needs to continually nurture new and promising programs.

7. Maintain adequate tuition revenues. The university should adjust enrollments, programs, and tuition to maintain revenue to adequately support student needs, academic priorities, and high program quality.

8. Give highest priority to degree-seeking students. While the university serves many different types of students, those pursuing undergraduate, graduate, and professional degrees are our highest priority. Enrollment of other students needs to be managed as an important, but secondary, priority.

9. Consider state, national, and global workforce needs. University enrollment planning must be attentive to the workforce needs of the future for the state, the nation, and the world.

Undergraduate Principles (in addition to 1 – 9)

10. Maintain opportunities for transfer students. Educating transfer students is an important and integral part of the university's mission. The university should enroll a balance of new high school students and transfer students who can benefit from completing a degree program at the University of Minnesota.

11. Partner with other state systems but retain our unique mission. The university should partner with other higher education systems to advance the state's common agenda, but maintain its distinctive mission within the state to provide its students with the opportunities and benefits of attending a world-class research institution.

Graduate Principles (in addition to 1 – 9)

12. Maintain strong support for our nationally-recognized graduate programs. This support should be both fiscal and academic.

13. Support graduate students adequately from initial enrollment through timely graduation. The university should admit only those graduate students for whom it can provide competitive support to take full advantage of its educational and professional development opportunities. Departments and colleges should re-examine their enrollment numbers annually to determine the ideal number of students that can be admitted to a program based upon student quality, current infrastructure, financial support, and excellence in reputation.

14. Maintain sufficient numbers of graduate students to support teaching and research within individual colleges and programs. Experience as a teaching or research assistant within the student’s field of study is an important part of professional development for many graduate students. Graduate student participation as teaching and research assistants is essential to the advancement of the university's mission and fostering a collegial environment between students

and faculty. The numbers of graduate students should be sufficient to support the university's teaching and research missions and the maintenance of excellence.

15. Provide doctoral students with sufficient stipends and benefits. The university should ensure that doctoral students have sufficient support to complete their studies as full-time students. Graduate student stipends should be on par with peer institutions and re-evaluated annually to ensure graduate students are not economically disadvantaged.

Professional School Principles (in addition to 1 - 9)

16. Maintain strong support for our nationally-recognized professional programs. This support should be both fiscal and academic.

17. Create new professional programs to meet workforce needs. The university needs to be aware of the needs of the state and national workforce for high level post-graduate professional preparation.

18. Ensure that new professional programs are consonant with existing academic programs and faculty. New professional programs should not detract or take necessary resources from existing, high-performing programs.

19. Require that new professional programs have business plans (tuition and other support) that will make them self-sustaining. New programs have to make their own way.

20. Ensure that professional education focuses on areas where the university can be a leader in the field. Both new and existing programs should be in areas where the university can provide an outstanding education.

21. Require that new professional programs have some tenure and tenure-track faculty (not all be taught by contract faculty or P&As). There needs to be an academic/research component in each professional program.

Enrollment Management Recommendations

Undergraduate Recommendations

1. Moderately increase undergraduate enrollments to 32,000 to 33,000.

2. Increase the number of students in the STEM (science, technology, engineering, and math) fields.

3. Maintain a 2 to 1 ratio of new freshmen to transfer students.

4. Continue to increase the numbers of students of color enrolled.

5. Maintain the proportion of new freshman undergraduate students from Minnesota at 60 to 65%, and increase the proportion from outside MN and the reciprocity states to 15 to 20%.

6. Continue to improve the academic profile of incoming students.

7. Meet the current University goals for retention and graduation of freshmen and set goals for transfer students.

8. Narrow the gap between the graduation rate of students of color and white students and increase the number of student of color graduates.

9. Create a stronger linkage between the Office of Undergraduate Education and the PSEO program.

10. Maintain the University Honors Program at 550-600 students per year, 2,400 total.

11. Expand opportunities for "fast track" entry into professional programs.

12. Restructure and expand the Access to Success (ATS) program.

13. Create additional on-campus housing for undergraduates.

14. Appoint a transfer student coordinator and establish a transfer assistance center.

Graduate Recommendations

1. Set goals for graduate student outcomes and track progress for all graduate programs.

2. Maintain the role of the graduate school in providing incentives for program improvement and in monitoring and promoting quality.

3. Provide programs with regular and systematic information concerning program performance that leads to high quality graduate programs.

4. Establish an internal review process for Ph.D. programs that guides fiscal investment and enrollment targets.

5. Provide financial augmentation and flexibility to Ph.D. programs deemed to be “Outstanding.”

6. Take action on programs deemed to “Need Reassessment.”

7. Evaluate impacts of graduate enrollment changes on academic units as part of the compact process.

8. Develop processes for evaluating professional masters and professional doctoral programs.

9. Develop processes for evaluating post-baccalaureate certificate programs.

II. Undergraduate Education

As the state's flagship public university, the University of Minnesota Twin Cities should enroll and graduate highly accomplished and highly motivated undergraduates who will be the state's future leaders and scholars. We should also attract the very best students from other states and countries to study in Minnesota and hopefully remain here after graduation. Our undergraduate student body should be commensurate with other flagship universities. In particular, our undergraduates should be equal in academic preparation to our peers, including the University of Michigan, University of Wisconsin, University of Washington, University of Illinois, and the University of Texas. Most importantly, the university should have retention and graduation rates equivalent to our peer institutions.

With this perspective in mind, and following the core principles of admitting for and supporting student success, this section of the report makes recommendations on the following issues:

- Size and composition of the undergraduate student body, including total numbers, proportion of new freshman and transfer students, academic preparation, and ethnic, socio-economic and geographic diversity.
- Appropriate retention, graduation, and placement outcomes.
- Appropriate sizes of programs for special groups of students, including the students in Access to Success (ATS) program.
- The undergraduate student mission and experience, including student housing and other student experience issues.

Size and Composition of the Undergraduate Student Body

Recommendation 1: Moderately increase undergraduate enrollments to 32,000 to 33,000.

For most of the past decade, the University of Minnesota has kept the size of the undergraduate student body on the Twin Cities Campus relatively constant, but has seen some growth mostly due to better retention. This enrollment management reflected both external understandings with the state legislature and other bodies, as well as internal understandings with Twin Cities colleges about resources available and the quality of the student experience. In the last two years, the overall number of undergraduates has risen, mainly because of an increase in transfer students and improved retention rates (See Figure 2 on next page).

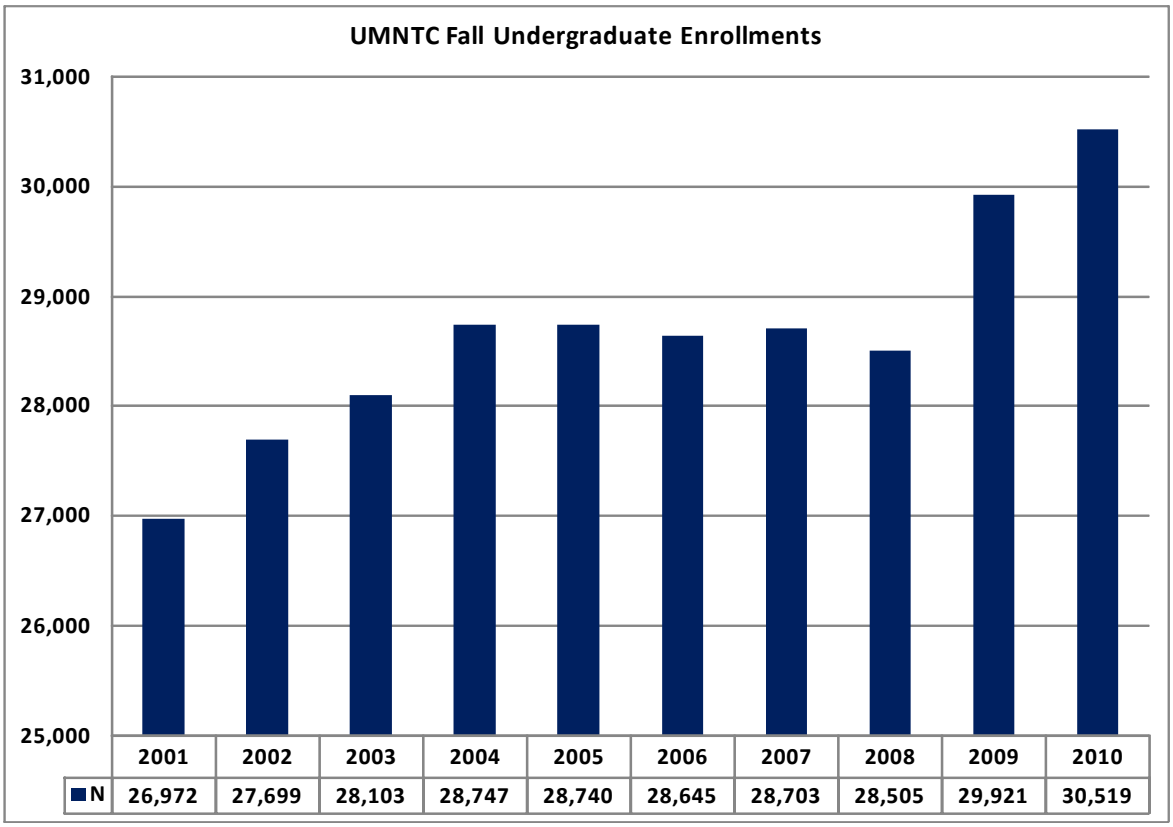


Figure 2. UMTC fall semester undergraduate enrollments, 2001-2010

Even with this increase, our 2009 enrollment puts us toward the bottom middle of our peer group of flagship universities in total undergraduate enrollment.

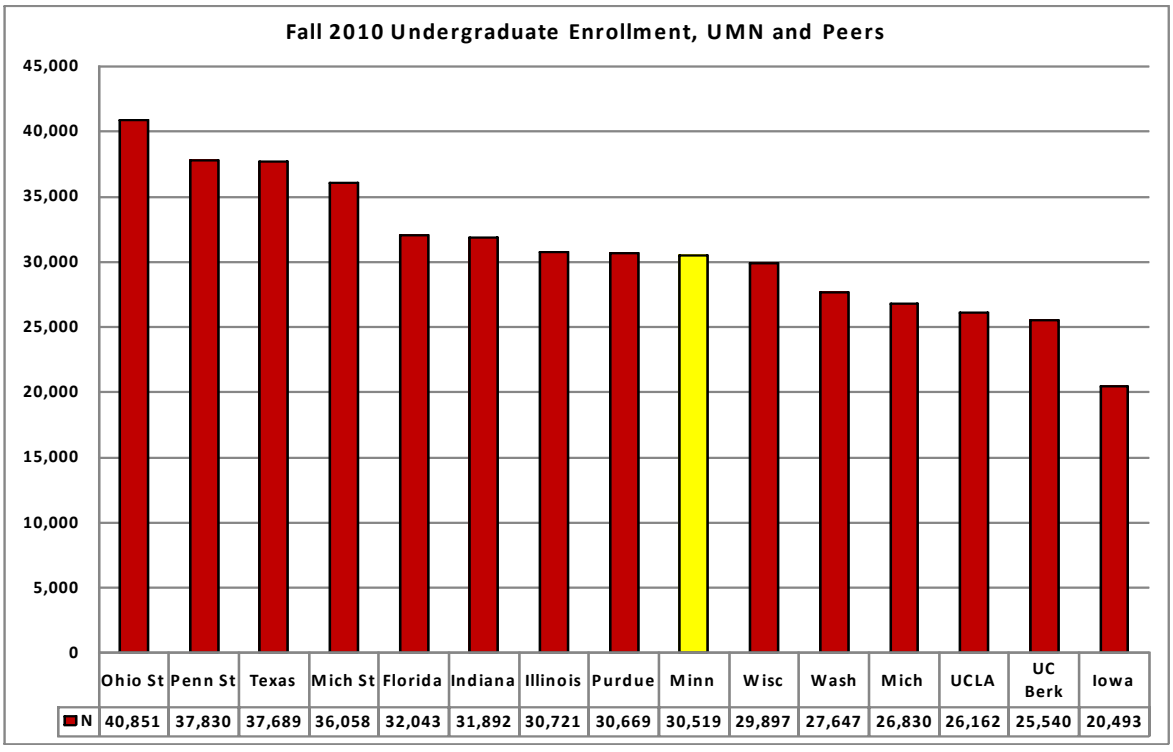


Figure 3. Undergraduate enrollments at peer institutions, fall 2010

The size of the undergraduate student body is linked closely to issues of university mission, distinction, and resources. We need to balance the principles of providing a high quality education and student experience with that of maintaining adequate tuition revenue. State universities throughout the country, including the University of Minnesota, are facing declining support from state governments and will increasingly need to rely on tuition revenue to fund the institution.

Should we then increase the size of our undergraduate population in order to maximize revenue? The question needs to be addressed within the context of what has happened to the undergraduate student experience in the last five years under the University's Student Strategic Positioning Initiative. While the number of freshmen has remained relatively constant, their academic preparedness has improved markedly. At the same time, the student experience has been greatly improved with smaller class sizes, better advising, Welcome Week and enhanced orientation, and a host of other improvements. Retention and graduation rates have improved steadily, and applications for the freshman class have soared (for the Fall 2011 Freshman class, the U of M received nearly 40,000 applications, up from 16,000 in the early 2000s). High-ability students no longer regard the "U" as just a back-up school but as a desirable destination. Some students and their families who previously thought of admission to the University of Minnesota as automatic are surprised at their denial letters.

It should also be noted that the University of Minnesota is different from other universities in that it admits undergraduates to one of seven colleges:

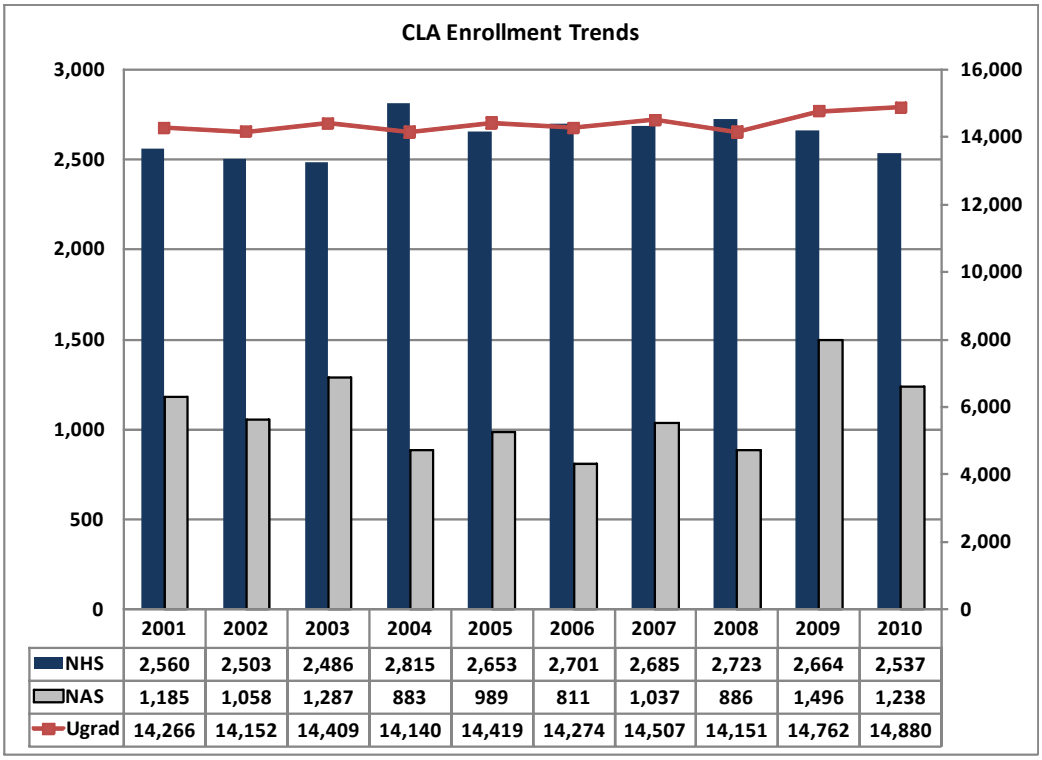
College of Science and Engineering (CSE)
College of Biological Science (CBS)
College of Liberal Arts (CLA)
College of Food, Agricultural, and Natural Resource Sciences (CFANS)
College of Design (CDes)
Carlson School of Management (CSOM)
College of Education and Human Development (CEHD)

Each of the seven freshman-admitting colleges makes a significant contribution to the University of Minnesota's undergraduate mission and each has a unique enrollment history. Figures 3-5 illustrates the annual trends for the College of Liberal Arts, the College of Science and Engineering, the College of Biological Sciences, and the Carlson School of Management.

The College of Liberal Arts (Figure 4), with a total undergraduate class size of nearly 15,000 students (an all-time high), matriculates over 50% of the undergraduate students on the Twin Cities campus and also admits large numbers of transfer students. CLA fulfills the critical liberal arts role within the University, offering undergraduates a broad-based education in the visual and performing arts, in the humanities, and in the social sciences. The size of CLA's freshman class has averaged between 2,500 and 2,600 students. In addition to providing an excellent curriculum in all aspects of the liberal arts, CLA also plays a key role in the liberal education of all undergraduate students on campus, teaching classes in economics, history, psychology, philosophy, English, writing, music, in the classics, and many languages. The quality of CLA's undergraduate student body has risen quickly over the past five years.

The College of Science and Engineering (Figure 5) is somewhat unique in American higher education in that it brings together the basic sciences and mathematics with engineering departments. In most peer institutions, basic science (and biology) would be part of a large

"Arts/Letters and Sciences" College. CSE's freshman and total enrollments have been climbing where the college now has nearly 5,000 undergraduate students and over 900 freshmen. Over the past few years, the quality of CSE's freshman class has shifted from very good to outstanding, where the average ACT now exceeds 30. Additionally, the number of applications has risen exponentially, in large part due to market demands and workforce needs.



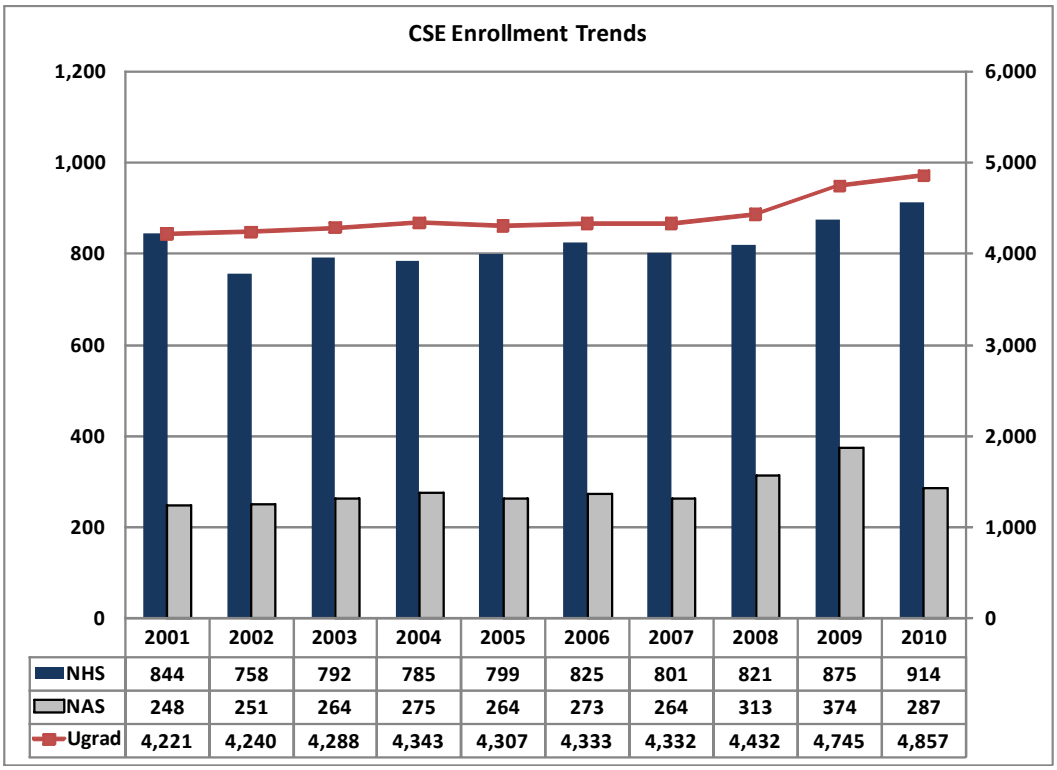
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
NHS	2,560	2,503	2,486	2,815	2,653	2,701	2,685	2,723	2,664	2,537
NAS	1,185	1,058	1,287	883	989	811	1,037	886	1,496	1,238
Ugrad	14,266	14,152	14,409	14,140	14,419	14,274	14,507	14,151	14,762	14,880

Figure 4. College of Liberal Arts Enrollment Trends, 2001-2010

As seen in Figure 6, the College of Biological Sciences overall enrollment has been slightly decreasing (due to a planned decrease in transfers) although the freshman class has increased from 327 to 416 students. CBS is another example where there has been a remarkable increase in the incoming metrics of the freshman class and increase in applications. Many of the CBS graduates continue on to professional schools (medicine, dentistry, veterinary science) or graduate school. Later in this report, the committee makes recommendations on the need for increasing freshman enrollment in CBS to accommodate this demand from high ability students.

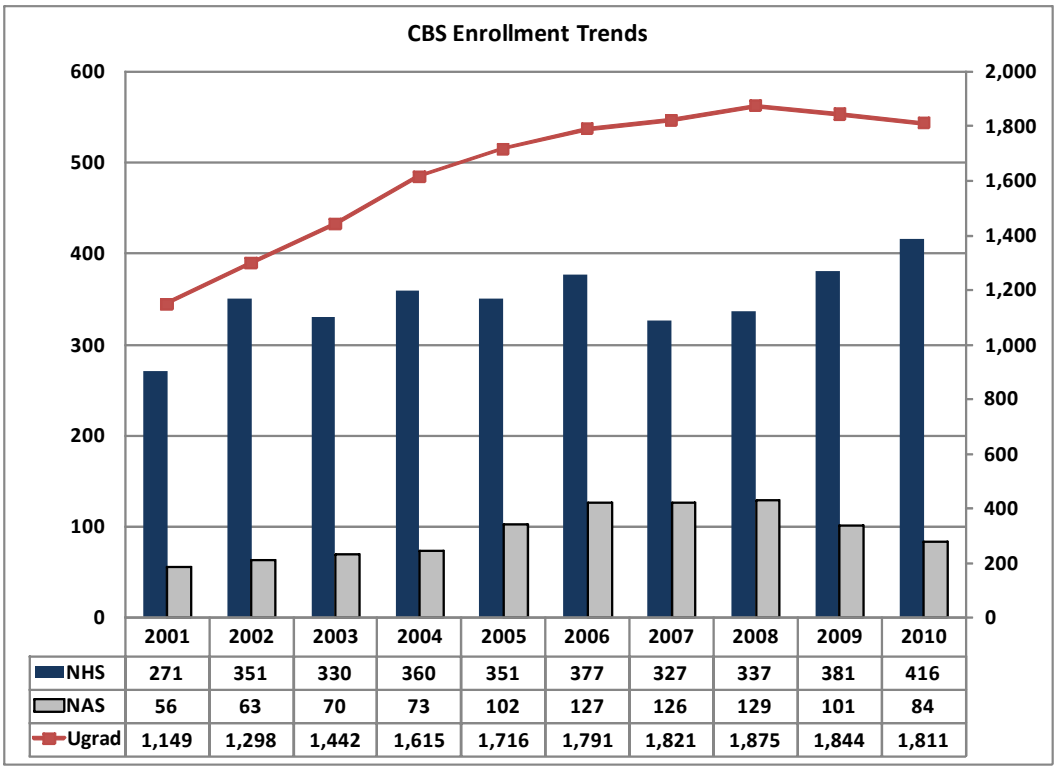
Three of the undergraduate colleges (College of Design, College of Education and Human Development, and College of Food, Agricultural, and Natural Resource Sciences) were restructured in 2007 and brought in their first full freshman classes in 2008. Thus their enrollment patterns have now stabilized with the freshman class of 2011 and their first four-year graduates will complete their degrees in May of 2012.

The Carlson School of Management (CSOM) has experienced a planned increase in freshman enrollment from 304 to 478 students based on the strong demand for business and the completion of the spectacular Hanson Hall, designed specifically for undergraduate business teaching. The Carlson students are very strong and have the highest first-year retention and four-year graduate rates at the University.



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
NHS	844	758	792	785	799	825	801	821	875	914
NAS	248	251	264	275	264	273	264	313	374	287
Ugrad	4,221	4,240	4,288	4,343	4,307	4,333	4,332	4,432	4,745	4,857

Figure 5. College of Science and Engineering Enrollment Trends, 2001-2010



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
NHS	271	351	330	360	351	377	327	337	381	416
NAS	56	63	70	73	102	127	126	129	101	84
Ugrad	1,149	1,298	1,442	1,615	1,716	1,791	1,821	1,875	1,844	1,811

Figure 6. College of Biological Science Enrollment Trends, 2001-2010

The committee spent considerable time discussing four scenarios for undergraduate enrollment stability or growth:

- **Scenario 1: No growth.** The first scenario assumes no growth in undergraduate enrollments. The underlying rationale is that the University is now exactly right-sized based on faculty/staff ratios, residence hall space, curriculum, capacity in the big majors, and many other metrics.
- **Scenario 2: Modest growth in STEM areas, with offsetting reductions in other areas.** The second scenario argues for overall steady state enrollment, with modest growth in the STEM disciplines and concomitant modest reductions in other areas.
- **Scenario 3: Modest growth in STEM area, and no changes in other areas**. The third scenario models modest growth in certain colleges (mostly the pure STEM colleges of CSE and CBS), assuming that both student demand and labor force considerations will necessitate additional capacity in these fields. This scenario assumes that the other undergraduate colleges (CLA, CFANS, CDes, CSOM, and CEHD) will retain their current enrollments, thus increasing the overall student body.
- **Scenario 4: Significant overall growth in undergraduate enrollments**. Such growth would require new capacity in the curriculum (including laboratories), additional faculty, growth in residence hall space, and other major accommodations.

After considerable discussion and analysis, the committee decided that Scenario 3 was the best option for the University at this time.

It is clear that a strong argument could be made for Scenario 4, a dramatic increase in undergraduate enrollment, based on fiscal considerations. Undergraduate tuition will increasingly become the most predictable and stable revenue stream for the University. The University also has a smaller undergraduate student body than many of our peers. However, increasing the freshman class by a large number—perhaps 1,000 students—would necessitate admitting students with lower—perhaps significantly lower—entrance qualifications. This would result in an immediate lowering of average ACT scores, high school rank (HSR), and the other metrics that the University has worked hard to improve. Perhaps more importantly, the University would need to increase/enhance classrooms, course sections, faculty, teaching assistants, residence halls, advisors, and other student support services. The committee felt that jeopardizing the remarkable improvement in student qualifications and success was not worth the fiscal benefits of significant growth. At some point in the future, this decision can be revisited.

Additional considerations arguing against significant growth include:

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- The number of high school graduates in Minnesota is projected to decline by 8.3% between 2010 and 2015. Similar declines will occur in nearby states: Wisconsin – 6.3%, Iowa -3.5%, North Dakota -12% and Illinois -5.9%.

- Compared to other states in our peer group, Minnesota has a relatively small number of high school graduates, and we enroll a relatively large percentage of them. It would be difficult to expand our enrollments in our primary market without significantly lowering the academic preparation of our students.

F2009 Market Share of In-State High School Graduates

	HS Grads	In-State Freshmen	Share of Grads
Indiana U	70,972	4,276	6.0%
U of Washington	69,519	4,156	6.0%
U of Iowa	38,155	2,126	5.6%
U of Minnesota	65,073	3,453	5.3%
Michigan State U	113,215	5,975	5.3%
Purdue U	70,972	3,739	5.3%
U of Wisconsin	68,921	3,500	5.1%
Ohio State U	134,595	5,192	3.9%
U of Illinois	146,084	5,539	3.8%
U of Michigan	113,715	3,855	3.4%
U of Florida	174,924	5,824	3.3%
Penn State U	146,604	4,273	2.9%
U of Texas	250,802	6,434	2.6%
UC Los Angeles	419,638	3,947	0.9%
UC Berkeley	419,638	2,948	0.7%
Average	153,522	4,349	4.0%

Table 1. Market share of in-state high school graduates for peer institutions

- With fewer qualified students, retention and graduation rates would likely decline, especially in engineering and the sciences where required competence in mathematics and science can't be compromised. We would have to erect stricter "second-tier" admissions requirements such as a minimum GPA as a sophomore in order to pursue a given major. We know that students who can't get into their preferred majors are likely to drop out. Lower retention rates partly undercut the revenue gains from larger enrollments because many students don't stay long enough to pay four years of tuition.

- We are prepared to teach and support our current number of students. As we have transformed the undergraduate experience at the university, we have decreased class sizes, improved course access, and enhanced student support services. We worry that significantly increasing the size of the student body could degrade these important gains because the additional revenue would likely not be enough to meet the increased demand for access to key courses, advising, and student services. Student demand is differential by field. Rather than going to fields that potentially have more capacity, students are likely to gravitate toward fields like economics, psychology, chemistry, and engineering that are already stressed. For example, the Department of Psychology just passed the 1,500 majors mark, in part bolstered by a newly-designed Bachelor of Science degree.

- We would make the University less attractive to high-ability students. Academically outstanding students look for colleges that offer challenges. When high-ability students see their lower-achieving friends get into a college, that college appears less challenging and less demanding. And when they and their parents hear of larger classes, less personal attention, and lower graduation rates, they further downgrade their opinions of the school. The large, easy-to-get-into state university becomes only a back-up option, resulting in lower expectations and aspirations.

In sum, we worry that significantly expanding undergraduate enrollments could trigger a spiral of decline: More students > larger classes and less service > lower student success > less interest from top students > less prestige > fewer applications > continued decline.

Scenario 3, adding STEM enrollments while maintaining enrollment in other areas, was the preferred option. Scenario 2, maintaining steady overall enrollment but shifting enrollments away from other areas such as the College of Liberal Arts, was not recommended. There is growing demand for the liberal arts fields, as evidenced by the number of applications, and the University is committed to the liberal arts. Scenario 3 allows for overall growth, in a targeted fashion.

Recommendation 2: Increase the number of students in the STEM fields.

The enrollment model that we are proposing would increase the number of freshmen by about 200 or 4%. Given the declining numbers of high school students in the region, it is reasonable to ask whether the university can make that increase without lowering academic preparation levels and graduation rates of our incoming students. We believe that the University can do so, provided that the increases are in fields that align well with central missions and have good prospects for growth. Possible areas include the STEM fields, public health and health sciences, and the environment. The best immediate prospects are in the STEM fields.

There are STEM-related disciplines in several colleges, including CFANS and CLA. However, most STEM students are in CSE and CBS, and these students have comparatively strong academic preparation levels and graduation rates (average ACT Comp of 30 and high school rank percentile of 90+). Enrolling more CBS and CSE students would not hinder progress toward our graduation rate goals.

Student interest in the STEM fields at the university has been growing. Between 2005 and 2011, applications to the College of Science and Engineering grew by 239% and applications to the College of Biological Sciences grew by 240% compared to 82% for the other colleges. As a consequence, the proportion of applicants to the university who were interested in CSE and CBS grew from 17% to 28%. Student interest has also been growing among prospective students. Data on the prospective fields of study chosen by Minnesota high school graduates taking the ACT from 2005-2010 indicates that the areas with the largest increases were engineering, math, and science.

Job prospects for STEM field graduates are positive. About 8.5% of jobs in the state of Minnesota currently are in STEM-related fields, and it is projected that about 12% of job growth between 2006 and 2016 will be in these fields (Minnesota Department of Employment and Economic Development, 2009).

Implementation of the STEM field recommendation

Increases in the numbers of STEM field students would not necessarily be confined to CSE and CBS. Selected STEM-related programs in other colleges might also be candidates for growth, including geographic information science, cognitive sciences, psychology, and speech-language-hearing sciences. However, it is clear that significant resources must be found or shifted to support the increases. It costs more to instruct a student in science or engineering than in many other disciplines. This cost differential is partly because of higher faculty salaries and larger start-up packages in science and engineering than in some other fields, and partly because of the increased cost of laboratory courses (with smaller student-to-instructor ratios; dedicated and specialized space, equipment, and supplies).

The proposal involves increasing the CSE freshman class from the current 925 students to 1000. The growth would be incremental, with increases to 950 in Fall 2012, 975 in Fall 2013, and 1000 in Fall 2014. Concomitant growth is planned for CBS, which currently matriculates 400 freshmen each fall. A growth to 500 CBS freshmen would also be incremental, with 25 additional students each year. After four years, the CSE and CBS changes would represent an increase of 200 new freshmen each fall.

Scenario 3 will require that the colleges admitting additional students have the necessary resources to support the additional faculty, advisors, equipment, and facilities to serve these students. New tuition dollars generated by additional students could be assigned to support additional faculty, graduate students, and student services. An example of a business plan for expansion of student enrollments in CSE is presented below. This example is illustrative and highly summarized, but the general concepts could apply to enrollment changes in any college on the Twin Cities campus.

The CSE Proposal: Rationale for Enrollment Increase

CSE is at a crossroads, experiencing unprecedented demand for its undergraduate programs while the quality of its undergraduates is substantially outpacing national norms.

Figure 4 below summarizes applicant numbers to CSE in the recent past. While the number of applications nationally has increased – attributed to less onerous online application processes – the demand is highly skewed toward science, technology, engineering, and mathematics, the so-called STEM disciplines. For instance, the Fall 2011 applicant pool to CSE was 35% higher than the preceding year. By contrast, applicants to the other six undergraduate-admitting colleges at the University of Minnesota for Fall 2011 showed a modest growth of 6.5%, down from 18.6% in the Fall of 2010.

Furthermore, composite ACT scores of the CSE incoming freshman class have substantially exceeded national trends. CSE is currently experiencing a 1-point increase in composite ACT scores approximately every two years in contrast to national averages, which indicate a 1-point increase every decade.

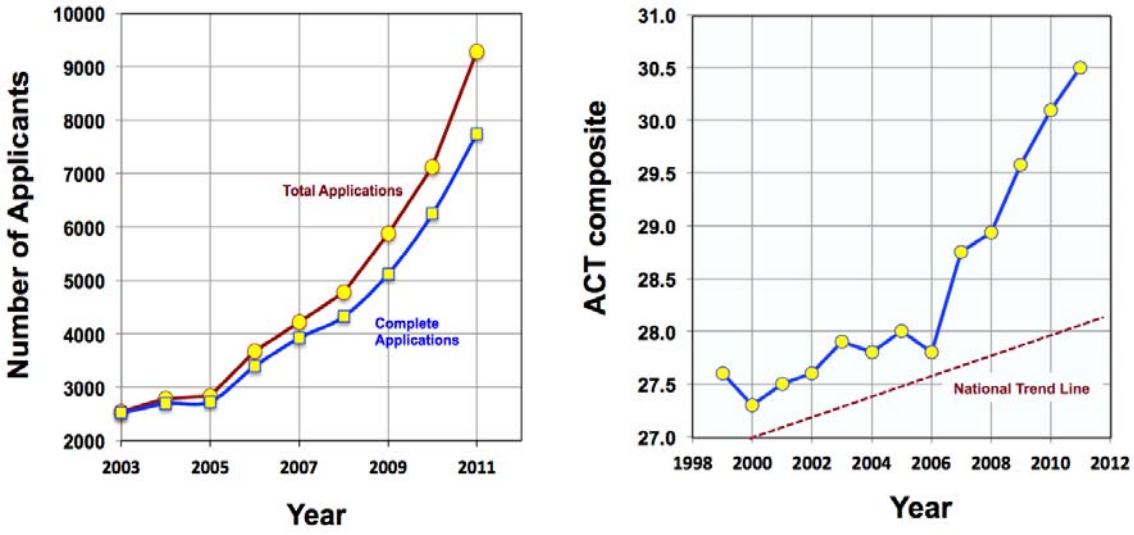


Figure 7. Growing number of applications and increase in ACT scores in CSE

In order to leverage the unique demand and high quality in CSE, we propose to expand undergraduate enrollment in CSE over a four-year period, to achieve a steady state increase of 500 undergraduate students four years from now. Such growth at the undergraduate level will require CSE to use the tuition revenue and collegiate fee revenue from the additional students to hire more faculty, staff, and teaching assistants to accommodate the increased teaching and student support service responsibilities associated with having a larger undergraduate population. The additional faculty would naturally produce an increase in sponsored research activity and in graduate student enrollment. The enrollment management plan envisages that the additional revenues connected to these activities will be used to support the expansion of the college.

A brief summary of undergraduate headcounts was conducted using the most recent retention and graduation rate data for CSE and a baseline for a student population in Fall 2010 of 4857 full-time undergraduate students.

The progression for growth is envisaged as follows, leading to a steady state increase of 500 undergraduates in CSE by f all F014:

CSE

FALL	NHS*	NAS**	Intercollege Transfers†	Total Undergrads	Net Increase over Fall 2010
2010	914	370	80	4857	
2011	925	400	80	4982	125
2012	950	410	80	5107	250
2013	975	425	80	5232	375
2014	1000	435	80	5357	500

*NHS: New High School matriculants
**NAS: New Transfer students from outside the UM Twin Cities campus
†Intercollege Transfers: Transfers from other colleges on the Twin Cities campus

Table 2. CSE Enrollment Plan

Modest growth of transfer students (NAS) principally from the regional community college pipeline has been included in the CSE model. As new retention and graduation rate data become available, balancing student headcount will necessarily require a judicious look at the NHS and NAS numbers to meet targets based on most recent student behavior. We do not anticipate significant changes in the numbers of students transferring into CSE from the other undergraduate colleges on the Twin Cities campus; we can monitor and model these appropriately.

A notable aspect of this enrollment expansion plan is that chemistry (and possibly physics) classes would need to be delivered on the St. Paul Campus because CSE would not otherwise have the laboratory capacity to handle the increased number of students. We anticipate that offerings of these classes in St. Paul would be well received by many students in CBS and CFANS.

The CSE Proposal: Financial Model

The CSE financial model outlines a business plan for enrollment growth. The principles in this example could be applied to other colleges as well as CSE. In order to implement an enrollment increase, agreements would be needed between the college and central administration to link new

resources to new enrollment initiatives. We believe the plan outlined below is viable, assuming that tuition, fees, and indirect cost recovery funds related to the increased student numbers are left in the college and assuming no unusual reductions are made to CSE's base budgets (beyond any "fair share" of University-wide reductions needed to help address prevailing budget challenges).

For purposes of this report, the information provided below is a summary of a more detailed analysis and modeling, which took into account demand for STEM degrees and courses in the STEM disciplines, CSE tuition revenue trends, fee revenues, enrollment patterns, course-taking behavior of students, student demographics, and faculty needs, as well as space and facility needs. The figures below use 2011-12 rates for all calculations.

Per undergraduate student, net new tuition revenue to CSE from incremental new undergraduate enrollments is modeled at **$6,171.** Tuition for an undergraduate student for the academic year is $11,650 for the resident rate (Minnesota and reciprocity) and $16,650 for non-resident (out-of-state, non-reciprocity). Approximately 18% of CSE undergraduates pay out-of-state tuition, so we used a weighted tuition per student figure of $12,550. CSE students take approximately 77% of their credit hours within CSE. Using the current tuition attribution method to UMTC colleges, CSE would receive (25% x $12,550) + (75% x $12,550 x 0.77) = $10,385 of incremental new revenue per CSE undergraduate. Minus the central cost pool charges per undergraduate student of $4,214, the net per student is $6,171.

New revenue from CSE collegiate fees is **$600 per student**. The $300 per semester fee applies to full-time CSE undergraduate students.

Adding undergraduate students to CSE would require hiring additional faculty and adding graduate students. Before estimating the new resources that could be applied to hiring additional faculty and graduate teaching assistants, we looked at the **graduate student tuition revenue** that would be generated. Resident graduate tuition for 2011-12 is $14,012. Assuming that CSE graduate students take all of their courses within CSE, the full $14,012 would be attributed to CSE. Minus the central cost pool charge of $3,168 per graduate student, the **net per student is $10,844**.

To approximate the number of faculty that could be funded by the additional tuition revenue, several assumptions were made concerning faculty salaries and workloads, and graduate teaching assistants and research assistants. We assumed that new faculty hires would be at the assistant professor level at a cost of $120,000 ($90,000 for salary and $30,000 for fringe). We also assumed that each additional faculty member in CSE would add three additional graduate students who would be supported by working with the faculty member on sponsored research, where the graduate assistant's salary and the associated fringe benefit that covers the tuition for the graduate student would be funded by the external research grants, thus bringing in the $10,844 per student in net tuition revenue. Finally, we estimated that to maintain current ratios of graduate Teaching Assistants in CSE, one additional new graduate TA be hired for each new faculty position, at a net annual cost of $23,000 per TA. (The calculation of net cost assumed a 50% 9-month appointment with CSE paying salary and fringe, including the tuition fringe, and CSE receiving the tuition for the student and CSE paying the cost pool charges.)

In summary, the **net cost to hire one new faculty member and provide the additional TA support would be $110,468**, namely:

$120,000 faculty + $23,000 grad TA = $143,000
minus new tuition revenue from 3 grad RAs funded externally $10,844 x 3 = $32,532

equals net cost per faculty member of $110,468

These estimates could suggest that approximately 18 additional undergraduate students are required to support one additional faculty position and the accompanying TA position in steady state, namely: $110,468 / $6,171 = 17.9

Increasing the CSE undergraduate student population by 500 additional students in steady state – a 10% increase over 2010 levels by Fall 2014 – would also require a concomitant 10% increase in resources to CSE Student Services (recruiting, admissions, student programs, academic advising, career counseling, graduation clearance, student events, and so on).

Combining the resources from the additional net tuition and the collegiate fee for 500 new undergraduate students, we propose that the additional revenue could be used to support the following:

- 27 assistant professors (@ $120,000; salary and fringe)
- 27 grad TAs (@ $23,000; salary, fringe, and cost pool charge)
- 3 professional staff in CSE Student Services, and associated student services activities, to total $300,000

This financial assessment for CSE demonstrates the type of enhanced resources that will be needed to ensure that instructional quality and academic success are maintained during the period of enrollment growth and thereafter.

The calculations above do not include the one-time costs of recruiting new faculty and providing startup packages, and do not include the one-time and ongoing costs for providing appropriate office and lab space for faculty and graduate students. Other factors to consider are the desire to increase residence hall capacity to accommodate more students, and the need to increase the instructional lab spaces.

CBS Enrollment Growth Proposed

We also recommend a growth in CBS enrollment to 500 students per year, where a similar cost projection has been developed that increases the necessary instructional support with a mixture of faculty, teaching assistants, educational specialists, and advising positions.

CBS

FALL	NHS*	NAS**	Intercollege Transfers†	Total Undergrads	Net Increase over Fall 2010
2011	400	84	78	1821	
2012	450	105	100	1935	56
2013	500	110	100	2040	111
2014	500	115	100	2011	161
2015	500	120	100	2095	216
2016	500	120	100	2100	221

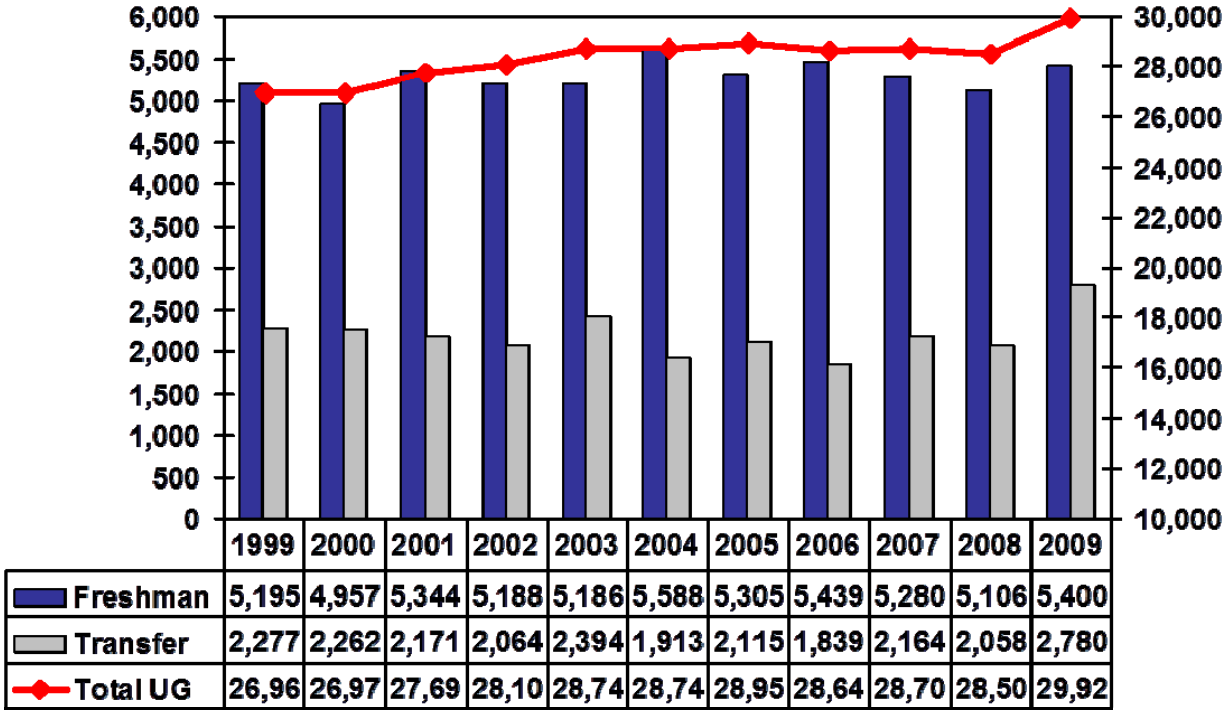
*NHS: New High School matriculants
**NAS: New Transfer students from outside the UM Twin Cities campus
†Intercollege Transfers: Transfers from other colleges on the Twin Cities campus

Table 3. CBS Enrollment Plan

Based on tuition of $12,550, cost pool charges of $4,214, and 32% tuition return, each student will generate $1,936 to CBS per year[1]. At a steady state, the revenue resulting from the projected increased student number is $1,936 X 220 = $425,920. Our collegiate fee increase, which we project to be just over $100,000, will be used to cover increased costs in technology, lab support staffing, supplies, and equipment.

Recommendation 3: Maintain a 2 to 1 ratio of new freshmen to transfer students.

To maintain our relatively stable undergraduate enrollment levels, we have enrolled an average of about 8,400 new students a year, including new freshmen (new high school or NHS), transfers from University of Minnesota coordinate campuses (intercampus transfers or ICT), and new external transfers (new advanced standing or NAS).



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Freshman	5,195	4,957	5,344	5,188	5,186	5,588	5,305	5,439	5,280	5,106	5,400
Transfer	2,277	2,262	2,171	2,064	2,394	1,913	2,115	1,839	2,164	2,058	2,780
Total UG	26,96	26,97	27,69	28,10	28,74	28,74	28,95	28,64	28,70	28,50	29,92

Figure 8. UMTC undergraduate enrollment trends, freshmen and transfer students, 1999-2009

Over the past several years, transfer numbers have been much more variable than freshman numbers. Considering both intercampus and external transfers for the academic year, the transfer percentage over the last decade has ranged from 32% in 2006-2007 to 41% in 2009-10.

Until 2009-10, the total number of new undergraduates varied only from 8,115 in 2000-01 to 8,438 in 2004-05. In 2009-2010, the total increased by nearly 1,000 to 9,359, driven by a transfer increase of over 700. This increase was not a deliberate policy change by the central administration, but rather the collective result of decisions by individual colleges.

[1] Tuition revenue: (25% x $12,550) + (75% x $12,550 x 32%) = $6125;

	Fall			Spring			Academic Year					
	NHS	NAS	ICT	NHS	NAS	ICT	NHS	NAS	ICT	Transfers: NAS+ICT	Total	Trans %
2000-01	4,957	2,071	191	107	723	66	5,064	2,794	257	3,051	8,115	37.6%
2001-02	5,344	1,945	226	99	786	66	5,443	2,731	292	3,023	8,466	35.7%
2002-03	5,188	1,838	226	114	795	58	5,302	2,633	284	2,917	8,219	35.5%
2003-04	5,186	2,176	218	80	632	51	5,266	2,808	269	3,077	8,343	36.9%
2004-05	5,588	1,729	184	66	806	65	5,654	2,535	249	2,784	8,438	33.0%
2005-06	5,305	1,882	233	84	724	63	5,389	2,606	296	2,902	8,291	35.0%
2006-07	5,439	1,645	194	52	675	56	5,491	2,320	250	2,570	8,061	31.9%
2007-08	5,280	1,949	215	75	827	65	5,355	2,776	280	3,056	8,411	36.3%
2008-09	5,106	1,843	215	104	1,011	96	5,210	2,854	311	3,165	8,375	37.8%
2009-10	5,400	2,506	272	82	1,006	93	5,482	3,512	365	3,877	9,359	41.4%
2010-11	5,323	2,220	236	80	985	66	5,403	3,205	302	3,507	8,910	39.4%
Average	5,283	1,982	219	86	815	68	5,369	2,798	287	3,084	8,453	36.5%

NHS = New Freshmen, NAS = New External Transfer, ICT = Intercampus Transfer

Table 4. UMTC 10-year fall, spring, and total enrollment trends for New Freshman (NHS), New Advanced Standing (NAS), and Intercampus Transfers (ICT).

As affirmed in the committee's enrollment management principles, transfer students are an essential part of the university community. We do not believe that there should be large cuts in the number of transfer students, given the need to maintain access for students who have started their academic careers at other Minnesota institutions. However, we believe that the University of Minnesota should stabilize transfer enrollments at levels lower than we have seen in the last two years. Our rationale for this position is as follows:

The University enrolls more transfer students than do most of its peers. Using fall term data only, the percentage of external transfers among all new students is 29% compared with an average of 20% among 14 other peers. Only UCLA and UC Berkeley are higher, and their cases are different because of the uniqueness of the California higher education system that assumes a pipeline from the community colleges to the University of California system.

Transfer students generate less per capita tuition revenue across their years of enrollment and generate more expenses than do students who begin as freshmen. While freshmen stay longer and take lower division courses that are less expensive to provide, transfer students are here for a shorter time and take a higher proportion of more expensive upper division courses. A very approximate rule of thumb is that 1.4 transfer students are needed to generate the same revenue as one new freshman.

Transfer students have declared interests mainly in the College of Liberal Arts and the College of Science and Engineering. While transfer students can enter the university with as few as 10 credits, the average number of credits at matriculation historically has been about 50 credits. This places most pressure on the availability of upper-division courses, mainly at the 3xxx level. Transfer students as a group show spottier preparation, especially in science and math, and they present challenging advising issues.

We do not currently support transfer students as well as we do freshmen, and transfer students are less well integrated into campus life. Only a handful of transfers are able to live in residence halls; they participate less in campus activities, they receive less advising support, and our surveys show that transfers are less satisfied with their experiences at the university. Spring admission increases the adjustment problems of transfers. Students entering in the spring do not receive the same orientation and support services that fall entrants do, and may not have the ability to sequence courses in an optimal or timely fashion. While we can and should address the adjustment issues of transfer students (discussed later in this report) doing so will require resources that may not be forthcoming.

As we consider the proper ratio of transfers, the committee looks back to the 2004-05 academic year as a model, when the ratio of freshmen to transfers was 2 to 1. We also look to reduce the number of spring admits, so that our proposed admission distribution would be as follows:

Model: New Undergraduates by Year and Registration Status

	Fall			Spring			Academic Year					
	NHS	NAS	ICT	NHS	NAS	ICT	NHS	NAS	ICT	Transfers: NAS+ICT	Total	Tran %
2004-05	5,588	1,729	184	66	806	65	5,654	2,535	249	2,784	8,438	33.0%
Proposed	5,600	1,750	275	50	700	55	5,650	2,450	330	2,780	8,430	33.0%

NHS = New Freshmen, NAS = New External Transfer, ICT = Intercampus transfer

Table 5. A model transfer year with 33% NAS and ICT and 67% NHS

We believe that the 33% transfer percentage and lower spring numbers strike a good balance among educational needs, student support, market conditions, and revenue generation. We would expect that a move back toward this percentage would be gradual, and not happen all at once. It is also essential that transfer numbers be more tightly managed centrally, with clear agreements between the colleges and the Office of Undergraduate Education. In fact, it is essential that the Office of Undergraduate Education assumes a stronger leadership role for the admission and success of our thousands of transfer students.

Another piece of the transfer recommendation deals with University of Minnesota internal transfers (among colleges). As can be seen in Table 6, from 2008 to 2009, 1579 students transferred among colleges. The matrix illustrates the number of students transferring out from each college (rows) to other colleges (columns). As an example of net transfer, the College of Liberal Arts exported 918 students and imported 394 students for a new loss of 524. Alternatively, CFANS exported 94 students and imported 162, for a net gain of 68 students. The admissions process needs to consider internal transfers in the freshman allocation to the colleges. If, for instance, many students are transferring out of a college, then adjustments might need to be made in the entering class.

Movement Among Colleges for Undergraduates Enrolled Fall 2009 and Fall 2010													
	CAH	CBS	CCE	CDES	CFANS	CLA	CSE	CSOM	Dent	EHD	Med	Nurs	Total
2009 Enrollment	99	1,263	267	896	1,181	10,295	3,369	1,559	24	1,378	27	240	20,598
2010 Enrollment	116	1,226	356	933	1,268	9,681	3,400	1,621	30	1,616	33	318	20,598
Staying	96	1,123	261	814	1,086	9,339	3,235	1,528	24	1,252	27	236	19,021
% Staying	97.0%	88.9%	97.8%	90.8%	92.0%	90.7%	96.0%	98.0%	100.0%	90.9%	100.0%	98.3%	92.3%
Imported	20	103	95	119	182	342	165	93	6	364	6	82	1,577
Exported	3	140	6	82	95	956	134	31	0	126	0	4	1,577
Net Change	17	-37	89	37	87	-614	31	62	6	238	6	78	0

Table 6. Internal transfers among UMTC colleges, Fall 2009 and Fall 2010

Recommendation 4: Continue to increase the numbers of students of color enrolled.

A commitment to diversity is one of our important principles. It is made with the belief that the University plays a key role in educational access in the state, and that exposure to students with different backgrounds enhances the educational experience of all students. A commitment to diversity also stems from the principle of attending to workforce needs. Over the next decade, increasing numbers of Minnesota high school graduates will be students of color. To meet workforce needs we will need to educate more students of color.

Projected Minnesota Public and Private High School Graduates by Ethnicity--Minnesota Higher Education Services Office, 2010

	Am Ind	Asian/Pac	Chic/Latino	Af Am	White	SOC	Total	SOC%
2010	970	3,379	1,858	3,912	54,953	10,119	65,072	15.6%
2011	905	3,291	1,903	3,999	54,309	10,098	64,407	15.7%
2012	894	3,417	1,991	3,851	53,451	10,153	63,604	16.0%
2013	852	3,402	2,059	3,658	51,720	9,971	61,691	16.2%
2014	851	3,388	2,112	3,806	50,740	10,157	60,897	16.7%
2015	859	3,516	2,266	3,904	49,209	10,545	59,754	17.6%
2016	852	3,632	2,493	4,035	49,035	11,012	60,047	18.3%
2017	892	3,546	2,500	4,136	48,651	11,074	59,725	18.5%
2018	861	3,704	2,751	4,396	48,517	11,712	60,229	19.4%
2019	904	4,098	2,828	4,643	48,249	12,473	60,722	20.5%
2020	927	4,217	3,113	4,900	48,320	13,157	61,477	21.4%
2021	968	4,391	3,206	4,833	47,204	13,398	60,602	22.1%
2022	1,020	4,557	3,286	5,099	48,067	13,962	62,029	22.5%
2023	1,029	4,734	3,644	5,424	48,443	14,831	63,274	23.4%

Table 7. Projected Minnesota public and private high school graduates by ethnicity

When the General College was phased out and the Access to Success (ATS) program was instituted in 2006 there was concern that the University was stepping back from its commitment to ethnic diversity in the undergraduate student population. Enrollment and student performance data show that this concern was unfounded. From 2005 to 2010, the number of undergraduates of color grew

by 15%, while the number of white undergraduates declined by 2%. The 5% increase in the size of the student body was entirely accounted for by students of color and international students.

Fall Term Twin Cities Campus Undergraduate Enrollments by Ethnicity

	2005	2006	2007	2008	2009	2010	2010-05	% Diff
Am. Indian	234	261	274	280	339	369	135	58%
Asian	2,694	2,760	2,777	2,791	2,833	2,879	185	7%
Black	1,326	1,357	1,392	1,397	1,490	1,524	198	15%
Hawaiian	0	0	0	0	68	80	80	
Hispanic	612	589	615	645	690	760	148	24%
International	467	455	556	891	1,448	1,868	1,401	300%
White	22,922	22,581	22,400	21,768	22,437	22,497	-425	-2%
Unknown	702	642	689	733	616	542	-160	-23%
Total	28,957	28,645	28,703	28,505	29,921	30,519	1,562	5%
Students of Color	4,866	4,967	5,058	5,113	5,420	5,612	746	15%
SOC %	16.8%	17.3%	17.6%	17.9%	18.1%	18.4%		

Table 8. Twin Cities undergraduate enrollments by ethnicity

General College performed an access function by providing students with test scores and high school grades that were too low for admission to the university's other colleges a place to start their studies. General College students transferred to one of the other undergraduate colleges after their sophomore year. When it was replaced with freshman-only ATS, this function was attenuated, and the ATS program sought to admit students whose leadership and other co-curricular experiences indicated they could succeed at the university with a smaller level of remedial coursework. As a consequence, the number of students of color among new freshmen from academic year 2005/6 to 2010/11 declined by 1%. However, the number of student of color transfers increased by 52%. The total number of new (freshman and transfer) students of color increased by 15%, while the number of new white students increased by less than 1% (See Table 9 on next page).

New Undergraduates by Academic Year, Registration Status, and Ethnicity
By Academic Year: Fall and spring combined

Freshmen	2005/6	2006/7	2007/8	2008/9	2009/10	2010/11	AY10-AY05	% Diff
Am. Indian	57	59	65	68	72	59	2	4%
Asian/Pac	546	650	609	595	591	553	7	1%
Black	256	294	270	265	249	231	-25	-10%
Hispanic	128	111	130	123	129	139	11	9%
Intl	83	76	177	342	407	298	215	259%
White	4,231	4,233	4,041	3,774	4,056	4,184	-47	-1%
Unknown	68	68	63	43	28	31	-37	-54%
Total	5,369	5,491	5,355	5,210	5,532	5,495	126	2%
SOC	987	1,114	1,074	1,051	1,041	982	-5	-1%
SOC %	18.4%	20.3%	20.1%	20.2%	18.8%	17.9%		

All Transfers	2005/6	2006/7	2007/8	2008/9	2009/10	2010/11	AY10-AY05	% Diff
Am. Indian	42	34	24	38	59	67	25	60%
Asian/Pacific	158	143	157	203	236	230	72	46%
Black	138	130	144	170	224	209	71	51%
Hispanic	60	56	61	73	108	100	40	67%
Intl	70	97	108	248	382	419	349	499%

White	2,314	1,999	2,346	2,272	2,752	2,388	74	3%
Unknown	120	111	216	161	124	103	-17	-14%
Total	2,902	2,570	3,056	3,165	3,885	3,516	614	21%
SOC	398	363	386	484	627	606	208	52%
SOC %	13.7%	14.1%	12.6%	15.3%	16.1%	17.2%		

Total New	**2005/6**	**2006/7**	**2007/8**	**2008/9**	**2009/10**	**2010/11**	**AY10-AY05**	**% Diff**
Am. Indian	99	93	89	106	131	126	27	27%
Asian/Pacific	704	793	766	798	827	783	79	11%
Black	394	424	414	435	473	440	46	12%
Hispanic	188	167	191	196	237	239	51	27%
Intl	153	173	285	590	789	717	564	369%
White	6,545	6,232	6,387	6,046	6,808	6,572	27	0%
Unknown	188	179	279	204	152	134	-54	-29%
Total	8,271	8,061	8,411	8,375	9,417	9,011	740	9%
SOC	1,385	1,477	1,460	1,535	1,668	1,588	203	15%
SOC %	16.7%	18.3%	17.4%	18.3%	17.7%	17.6%		

Notes: External and inter-campus transfers have been combined in the "All Transfers" category.
Native Hawaiian students have been combined with the Asian students in the "Asian/Pacific category
Data are for the Fall and Spring combined

Table 9. New undergraduates by academic year, registration status, and ethnicity

Over the last five years, instead of duplicating the mission of community colleges in providing access to all students who desire higher education, the University has focused not only on admitting students who are well prepared to meet the challenges of a large, research-intensive university, but also on successfully retaining and graduating those students. To that end, the university has increased access primarily by admitting students who have already shown some success at community colleges. The advantage of providing access this way is that we are admitting transfer students who have proven they can do college work. If overall transfer student numbers are reduced somewhat, the university must be mindful of maintaining strong representation of students of color.

Although their enrolled numbers did not increase, the academic preparation of freshmen of color greatly improved. From 2005 to 2010, the average high school rank percentile for students of color increased by 8.5 points, compared with 3 points for white students. The average ACT Composite score for students of color rose by 2.7 points compared to 1.9 for white students.

Average Freshman High School Rank Percentiles and ACT Composite Scores by Ethnicity

		2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2010-05**
HS Rank	White	82.8	84.3	86.3	86.8	86.2	85.8	3.0
	Af Am	68.2	76.1	76.7	73.5	74.9	78.1	9.9
	Chic/Lat	70.9	75.7	79.0	78.3	80.1	82.5	11.5
	As/Pac	78.2	81.3	81.6	83.1	84.1	85.3	7.1
	Am Ind	70.5	78.4	76.6	72.6	76.2	79.8	9.3
	Intl	72.1	82.5	80.5	78.1	82.9	79.3	7.2
	Unkn	79.0	80.5	79.5	85.3	86.3	85.3	6.3
	Total	81.2	83.2	84.8	85.1	85.0	85.2	4.0
	SOC	74.4	79.4	79.8	79.5	80.9	83.0	8.5

ACT-C	White	25.9	26.1	26.8	27.1	27.3	27.8	1.9
	Af Am	19.5	19.7	20.4	20.5	21.5	22.0	2.5
	Chic/Lat	22.8	23.0	24.1	24.5	25.2	25.6	2.8
	As/Pac	22.4	22.6	23.2	23.8	24.5	25.2	2.7
	Am Ind	23.0	23.9	23.6	24.1	24.7	25.3	2.3
	Intl	22.7	24.4	23.1	24.2	24.3	26.4	3.7
	Unkn	25.0	24.7	25.9	24.4	25.6	27.3	2.3
	Total	25.1	25.2	25.9	26.2	26.6	27.2	2.0
	SOC	21.8	22.0	22.6	23.1	23.9	24.5	2.7

Table 10. Average freshman high school rank percentiles and ACT composite scores by ethnicity

While committing to continue to increase student of color enrollments, the University needs to be careful not to go back to admitting students with inadequate preparation. Within the state of Minnesota, we already enroll a higher percentage of students of color than in the college-bound pool. The percentage of students of color among Fall 2010 entering freshmen was 22.3%. This percentage exceeds the student of color percentage among all Minnesota high school graduates, and it considerably exceeds the percentage among four-year college bound students, as indicated by taking the ACT test.

Recommendation 5: Maintain the proportion of new freshman undergraduate students from Minnesota at 60 to 65%, and increase the proportion from outside MN and the reciprocity states to 15 to 20%.

Over the past five years, the proportion of the undergraduate student body from Minnesota has remained steady at about 70% (approximately 65% for freshmen), while the proportion of students from the reciprocity states (Wisconsin, North Dakota and South Dakota) has declined and the proportion from outside the region (other states and international) has increased from 7% to 13%.

	2006		2007		2008		2009		2010	
	N	%	N	%	N	%	N	%	N	%
TC Metro	15,247	53%	15,293	53%	15,158	53%	16,011	54%	16,268	53%
Greater MN	5,115	18%	5,119	18%	4,974	17%	5,059	17%	5,067	17%
MN Sutotal	20,362	71%	20,412	71%	20,132	71%	21,070	70%	21,335	70%
Wisconsin	5,337	19%	5,170	18%	4,907	17%	4,758	16%	4,551	15%
N Dakota	485	2%	488	2%	446	2%	419	1%	348	1%
S Dakota	511	2%	474	2%	397	1%	363	1%	324	1%
Reciprocity	6,333	22%	6,132	21%	5,750	20%	5,540	19%	5,223	17%
Foreign	470	2%	572	2%	908	3%	1,471	5%	1,897	6%
Other US	1,442	5%	1,534	5%	1,645	6%	1,759	6%	1,989	7%
Unknown	38	0%	53	0%	70	0%	81	0%	75	0%
Total	28,645	100%	28,703	100%	28,505	100%	29,921	100%	30,519	100%

* Note that home location is defined by student's address at application. The number of students with "foreign" home locations exceeds that of international students who are defined by student visa status.

Table 11. Home location of fall term UMTC undergraduates.

There are both educational and fiscal reasons for continuing the trend to enroll more students from outside the upper Midwest. Interacting with students with different backgrounds and cultural heritages is a benefit to Minnesota students. Our reputation as a university also relies to some extent on our ability to attract students from across the globe. We are also facing declining numbers of high school graduates in the upper Midwest states, as well as declining state allocations. The tuition revenue from increased numbers of out-of-region students paying higher tuition rates will be important.

However, there are limits on how many more out-of-state and international students we can and should recruit. As the state public land grant university, we are obligated to make sure that the majority of undergraduates are from Minnesota. The committee believes that an undergraduate Minnesota percentage below 60-65% would be difficult to justify.

The University also needs to be realistic about its position in the market for undergraduate students. We usually rank lower than Michigan and sometimes Wisconsin. While we can criticize the methods of *U.S. News and World Report* and other college rankings, we must acknowledge their influence. The University has to convince students from outside the upper Midwest to prefer the University over several other excellent state universities with ratings similar to ours. We benefit from the pull of this dynamic metropolitan region. We suffer from the image of a long, cold snowy winter.

Our current market position doesn't allow us to recruit well nationally without substantial tuition discounts. The heavily discounted R5000 tuition has been instrumental and essential to the recent growth in the number of out-of-region undergraduates. Recruiting such students also requires sustained, personalized marketing efforts in selected targeted areas, including personal visits by recruiters, working with high school counselors, and alumni events. The Office of Admissions has been successful in cultivating selected new markets in Illinois and Missouri, and will develop more such markets, but the percentage of new freshmen from outside Minnesota and the reciprocity states is unlikely to exceed 10%. In order to recruit more students from the State of California, which is increasingly a net exporter, the Admissions Office has just hired a regional recruiter who will focus on the Southern California area.

The prospects for enrollments of international students are similarly bounded both by educational and practical considerations. Applications to American universities from international students have soared over the last few years, driven primarily by Chinese students. The same trends have occurred at Minnesota. Over three-fourths of the University's international undergraduates come from just five Asian countries. In the past five years, the percentage of the University's international students who are from China went from 5.5% to 45.6%.

Fall Term UMNTC International Undergraduate Enrollments, Total and Top 5 Countries

	2006	2007	2008	2009	2010
China	25	79	258	574	851
S. Korea	86	124	195	288	355
Malaysia	76	50	68	127	137
India	33	36	46	67	76
Indonesia	20	19	26	29	28
Top 5	240	308	593	1,085	1,447
Other	215	248	298	363	421
Total	455	556	891	1448	1868

Top 5 %	52.7%	55.4%	66.6%	74.9%	77.5%
China %	5.5%	14.2%	29.0%	39.6%	45.6%

Table 12. Fall term UMTC international undergraduate enrollments, total and from top five countries.

If the goal of internationalization is to bring student perspectives from broad regions of the world, then we have been moving away from this goal, even as we have increased the total number of international undergraduates. On the other hand, establishing productive international student relationships and recruitment pipelines in other areas of the world would require a large investment of resources and, given other nations' competing emphasis on international recruitment, may not ultimately add significant geographic diversity to the university.

Further increasing the proportion of international students significantly would also present additional instructional costs. Specifically, many international students are drawn to majors and courses that already are in high demand. Also, subgroups of international students require additional first year writing instruction compared to domestic students, enrolling in both WRIT 1201 and 1301.

We also believe that attracting international students likely requires less tuition discounting than does attracting students from other regions of the U.S. Under the current tuition plan, the university has charged internationals the same discounted tuition as U.S. residents are charged. Other universities around the country and in the region (e.g., University of Iowa) have seen the same surge in Asian international enrollments as the U of M has, despite charging substantially higher tuition rates. The university should consider unhooking international student tuition from that of domestic non-residents. The interests of educational diversity might be better served by raising international tuition and discounting domestic non-resident still further.

Taken together, the geographic diversity considerations led the committee to recommend modest continued growth in undergraduate enrollments among students and consequent reductions in enrollments of students from the reciprocity states and Minnesota. We think that the university could raise the out-of-region percentage to 15% but no more than 20%. We do not want to specify the relative proportions of international versus U.S. students in this mix. Rather we expect that the proportional make-up of these students would vary from year and be determined by students' academic preparation and collegiate/program match.

Recommendation 6: Continue to improve the academic profile of incoming students.

Students who come to the University with a solid foundation of high school coursework and a record of achievement are more likely to be successful and to graduate in a timely manner. One of the reasons the university has had lower graduation rates than many of our peers is that University students had lower test scores and high school ranks than other schools. The correlations of academic performance with test scores (ACT or SAT) and high school ranks or grades are modest, and there are many other factors involved in academic success beyond a student's preparation.

Still, academic preparation is one of the most accessible points of intervention, and the university's gains in freshman retention and graduation rates have coincided with an increase in ACT scores and high school ranks. From 2005, we have raised the average freshman ACT composite score from 25.1 in 2005 to 27.2 in Fall 2010 and the average high school rank from 81.2 in 2005 to 85.2

in 2010. The university has made these gains both by increasing the number of top-performing students, and by reducing the numbers of poorly prepared students.

Despite our gains, the university still lags behind many Big 10 schools in the preparation of its high school students. The percentage of freshmen from the top 10% of their high school classes in Fall 2009 was 43%, compared to 92% for Michigan, 58% for Illinois, 57% for Wisconsin, and 49% for Ohio State. The middle 50% of ACT scores was 24-29 for Minnesota, compared with 27-31 for Michigan, 26-31 for Illinois, 26-30 for Wisconsin, and 25-30 for Ohio State.

The committee believes that the University should continue to improve its freshman preparation metrics until they are at least in the middle of our peer group. We need to take a gradual balanced approach, lifting both the ACT score and the high school rank percentile or GPA. An average ACT score of 28 and a top 10 percentage of 55% are appropriate aspirational goals. We also strongly endorse expanding the university's high school preparation requirements to include four years of mathematics, particularly as we place more emphasis on the STEM fields.

We also need to be cognizant of the academic preparation of transfer students. The primary metric for the qualification of transfer students is GPA at their previous college(s). In recent years, about 80% of external transfers have brought GPA's of 3.0 or better, and 35-40% have GPA's of 3.5 or higher. Particularly if transfer numbers are reduced, we believe the percentage with GPA's of 3.0 or higher should increase to at least 85% and percentage with GPA's of 3.5 or higher to 45%.

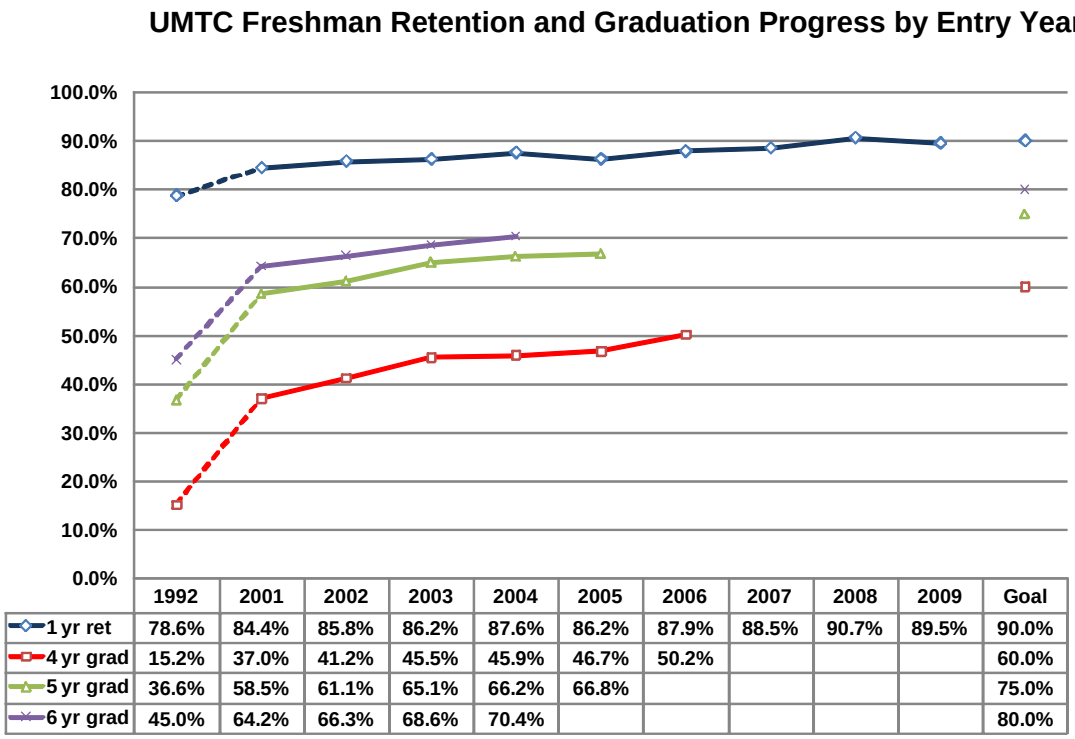
Many peer institutions also limit the number of transfer students who can enter with fewer than 30 credits or more than 90 credits. The rationale for doing so is that students who are quasi-freshmen enter without the full benefit of freshman services, and those who enter with three or more years of college do not get enough of the destination school's curriculum. For Fall 2010, 13% of U of M transfers had fewer than 30 credits, and 14% had more than 90. These numbers should be smaller.

The University should also seek to maintain and expand its enrollment agreements with other colleges. Foremost among these is the MNCAP program which guarantees admission to students from seven MN community colleges who have received an AA degree, have taken the Minnesota Transfer Curriculum, and meet college pre-requisites. The College of Science and Engineering also maintains agreements with a number of colleges to offer a Bachelors of Engineering degree in conjunction with the Bachelor of Arts earned at the other college. As the University receives less financial support from the state and raises its tuition, it will be increasingly important to provide access to less affluent students who need to enroll initially in less expensive colleges.

Student Retention and Graduation

Recommendation 7: Meet the current University goals for retention and graduation of freshmen and set goals for transfer students.

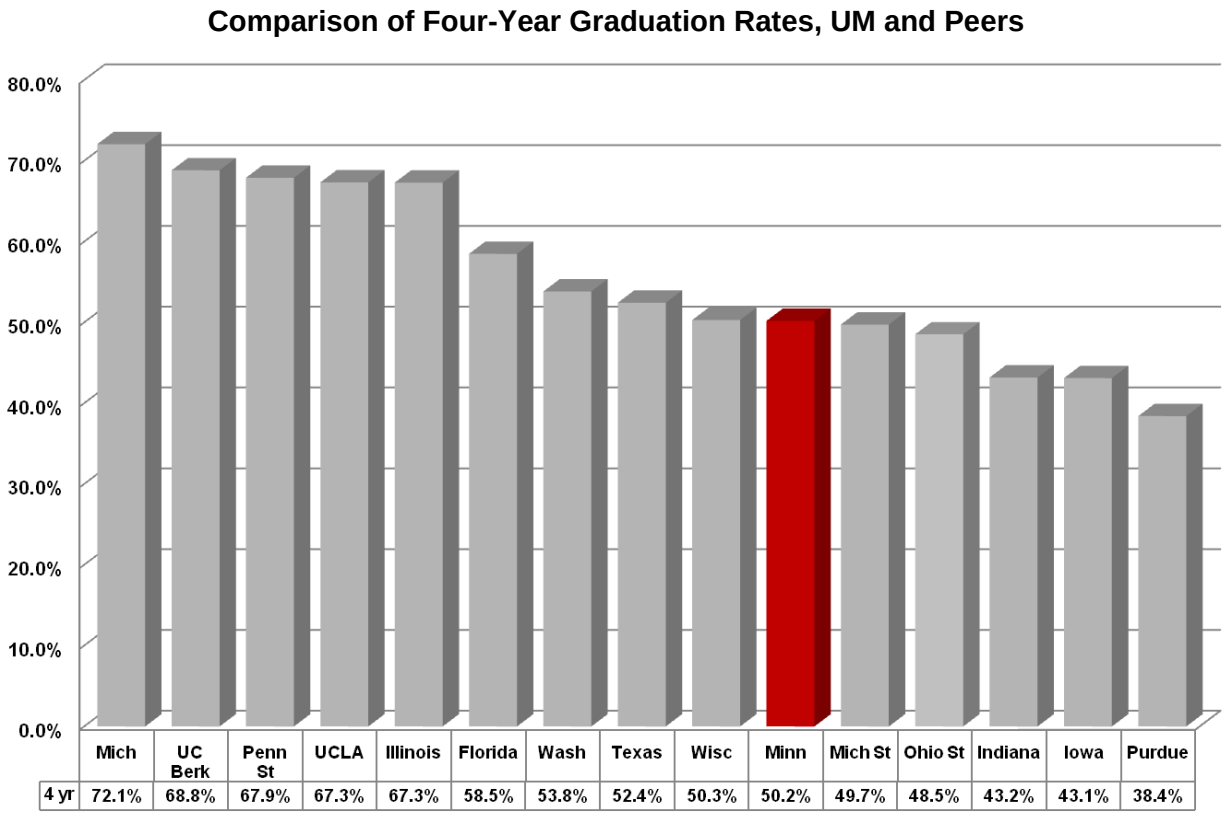
Admitting students who are prepared to succeed and able to benefit from our educational programs is the first step. Retaining those students and supporting them through graduation are the next steps. The retention and graduation rates of University of Minnesota freshmen have consistently lagged behind those of our peers. In 2005, the Strategic Positioning Initiative set ambitious goals for improvement, and the University has made substantial progress in meeting them.



	1992	2001	2002	2003	2004	2005	2006	2007	2008	2009	Goal
1 yr ret	78.6%	84.4%	85.8%	86.2%	87.6%	86.2%	87.9%	88.5%	90.7%	89.5%	90.0%
4 yr grad	15.2%	37.0%	41.2%	45.5%	45.9%	46.7%	50.2%				60.0%
5 yr grad	36.6%	58.5%	61.1%	65.1%	66.2%	66.8%					75.0%
6 yr grad	45.0%	64.2%	66.3%	68.6%	70.4%						80.0%

Figure 9. UMTC freshman retention and graduation progress by entry year

The Twin Cities undergraduate graduation rates continue to move closer to those of the comparison group.



	Mich	UC Berk	Penn St	UCLA	Illinois	Florida	Wash	Texas	Wisc	Minn	Mich St	Ohio St	Indiana	Iowa	Purdue
4 yr	72.1%	68.8%	67.9%	67.3%	67.3%	58.5%	53.8%	52.4%	50.3%	50.2%	49.7%	48.5%	43.2%	43.1%	38.4%

Figure 10. Comparison of UMTC four-year graduation rates with peers

The committee strongly endorses the freshman goals and urges continued strong efforts to meet or surpass them. The Office of Undergraduate Education has had a four-year graduation committee studying how to further improve student graduation rates, with a special emphasis on four-year rates. We believe that the emphasis on four-year, rather than five- or six-year rates, is well placed. A bachelor's degree should be a four-year degree. Extending the time beyond four years is costly to the student, including both the additional tuition costs and foregone earnings.

Much of the progress made in retention in the past few years has been made through centralized policy initiatives, particularly the requirement to take 13 credits and the improved academic profile of incoming freshmen. Further progress is likely to be made not through policy initiatives but through the development of better ways for advisers and faculty to identify individual students who are falling behind or on the verge of dropping out, and then tailoring interventions to help that student. The recent roll-out of the CLA-developed APLUS advising alert system, the addition of the Center for Academic Planning and Exploration (CAPE) to assist undecided students, the integration of DARS academic progress data with PeopleSoft academic data, and the campus purchase of the Sales Force customer relation management system (CRM) all will help provide the information infrastructure that will allow timely and tailored retention interventions.

We also believe that there should be graduation rate goals for transfer students. Transfer graduation rates do not "count" in college rankings, but transfer students' progress is just as important as that of freshmen. Because transfer students come in with varying numbers of previous credits, and also may not have all their credits apply to their U of M degree programs, the committee proposes that the three-year graduation rate as the key metric, just as the four-year rate is the key freshman metric. Using the most recent data for external transfers, the committee proposes the following goals:

Retention and Graduation Rates for External Transfers

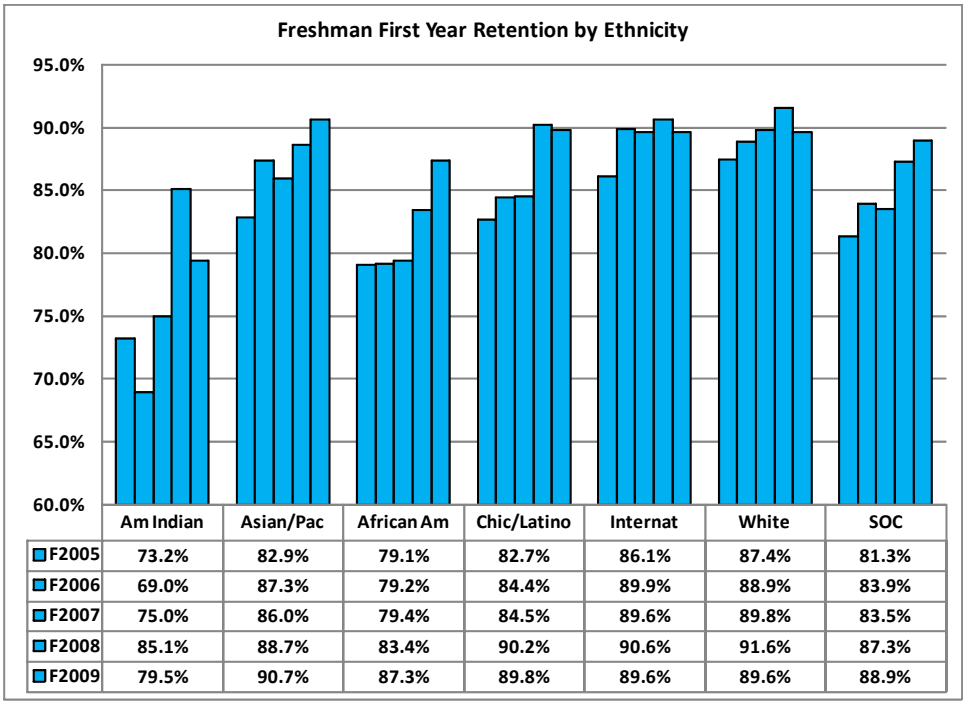
	Most Recent	Proposed Goal
1st year retention	87.8%	90%
3-yr graduation	55.7%	65%
4-yr graduation rate	71.7%	75%

Table 13. Recent and proposed retention and graduation rates for UMTC external transfer students

The biggest "stretch" from current rates is the 3-year rate, but we believe the 65% goal places an appropriate emphasis on timely graduation.

Recommendation 8: Narrow the gap between the graduation rate of students of color and white students and increase the number of student of color graduates.

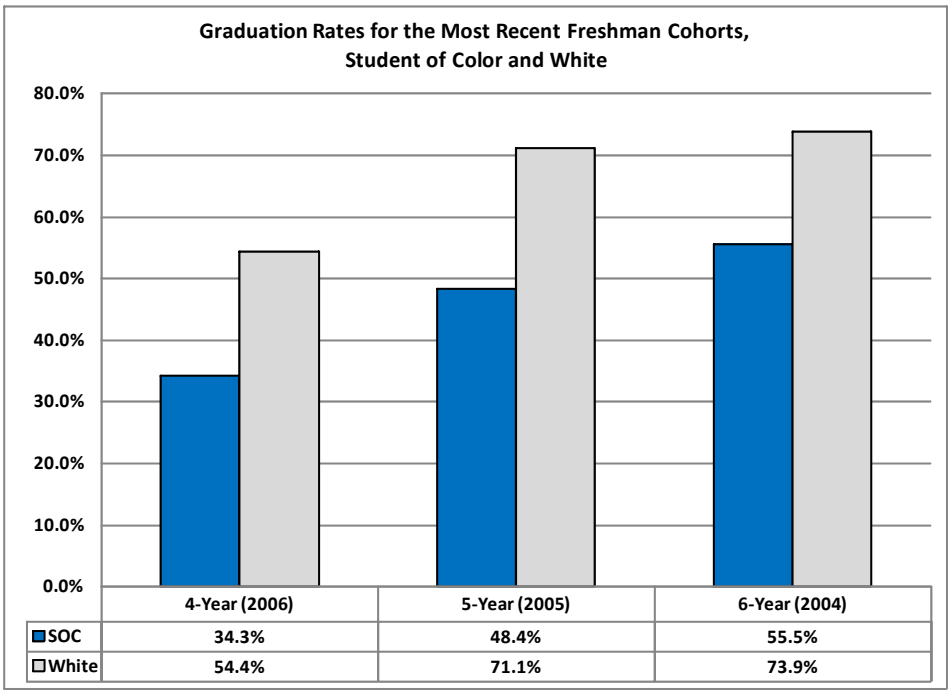
For too long, the gap between students of color and white students in retention and graduation has been unacceptably large. However, the university has made considerable progress in the last five years in retaining students of color. From 2005 to 2010, the first-year retention rate for students of color increased by nearly eight points from 81.3% to 88.9%. The rate for white students increased by just over two points from 87.4% to 89.6%.



	Am Indian	Asian/Pac	African Am	Chic/Latino	Internat	White	SOC
F2005	73.2%	82.9%	79.1%	82.7%	86.1%	87.4%	81.3%
F2006	69.0%	87.3%	79.2%	84.4%	89.9%	88.9%	83.9%
F2007	75.0%	86.0%	79.4%	84.5%	89.6%	89.8%	83.5%
F2008	85.1%	88.7%	83.4%	90.2%	90.6%	91.6%	87.3%
F2009	79.5%	90.7%	87.3%	89.8%	89.6%	89.6%	88.9%

Figure 11. Freshman first-year retention by ethnicity

Four-, five-, and six-year graduation rates are not yet available for the recent cohorts of freshmen of color who have stronger academic backgrounds and first-year retention rates than previous cohorts. Consequently, the graduation gap between students of color and whites remains large. Over the next few years, we should see improvements in graduation rate of the same magnitude as the improvements in first-year retention.



	4-Year (2006)	5-Year (2005)	6-Year (2004)
SOC	34.3%	48.4%	55.5%
White	54.4%	71.1%	73.9%

Figure 12. Graduation rates for the most recent freshman cohorts, students of color and white students

Importantly, we are already seeing the effects of greater numbers of enrolled students of color and higher retention rates in the number of student of color graduates. Since 2005, the number of bachelor degree recipients of color has increased by 42%, compared with an increase of 10% among white students.

Degrees by Ethnicity (Academic Year)								
	2005	2006	2007	2008	2009	2010	2010-05	%Diff
Am. Indian	28	28	33	39	40	55	27	96%
Asian/Pacific	445	493	553	594	545	568	123	28%
African American	154	206	203	238	236	293	139	90%
Chicano/Latino	107	120	128	130	127	134	27	25%
International	174	130	147	108	101	151	-23	-13%
White/Other	5,178	5,340	5,554	5,541	5,637	5,741	563	11%
Total	6,086	6,317	6,618	6,650	6,686	6,942	856	14%
Students of Color	734	847	917	1,001	948	1,050	316	43%

Table 14. UMTC bachelor degree recipients by ethnicity by academic year

Programs for Undergraduate Student Subgroups

Recommendation 9: Create a stronger linkage between the Office of Undergraduate Education and the PSEO program.

The Post-Secondary Enrollment Options (PSEO) Act, which passed in 1985, was ground-breaking legislation. Minnesota was the first state to offer such an option for high school students. The program allows juniors and seniors in Minnesota high schools to register concurrently for high school and post-secondary coursework. Students can complete their high school graduation requirements and earn college credit at the same time.

High school students in the PSEO Program account for about 600 students per year on the Twin Cities campus. The program is managed within the College of Continuing Education, Division of Advanced High School Student Services (CCE-AHS3), which currently sets a target of admitting 500 students each year. Some students begin the program in their junior year of high school and about 100 of them continue into a second year of PSEO, bringing the total headcount in the program to 600.

Admission to the PSEO program is highly competitive and applications are required. About 900 students apply annually for 500 slots, with applications due April 1 and decisions to students at the end of May. Admission is based upon primary criteria of high school GPA, the rigor of coursework competed, and review of a required writing sample. Secondary criteria include grade trends, standardized scores, and readiness for college. To remain in the PSEO program, students are required to maintain a 2.5 GPA and a B- or higher in all courses. PSEO students are allowed to change their registration only through an academic adviser. Most freshman-level classes are available to PSEO students, as well as certain advanced courses for which students have met the prerequisites. PSEO students may be part-time (1-11 credits, also taking classes at high school) or full-time (12+ credits, not taking classes at high school).

The data on PSEO students are very positive:

- The proportion of PSEO students who go on to become freshmen here is 41%, compared with a 37% yield for all freshmen from Minnesota.
- The PSEO students who do enroll as freshmen have higher average ACT's and high school ranks than other new freshmen (27.2 ACT for PSEO alumni vs. 26.6 for others; 88.0 HSR for PSEO alumni vs. 84.9 for others).
- PSEO freshman enrollees have higher first year retention rates (94% vs. 91%) and markedly higher 4-year graduation rates (62% vs. 46%) than do other freshmen.
- The PSEO students who become freshmen are disproportionately students of color, with 36% being students of color.
- The PSEO program is a source of urban students. Over the last five years, three of the five leading schools for U of M PSEO enrollments were Minneapolis public schools. Minneapolis South is the high school sending the most PSEO students, with Edison and Washburn also in the top five.

In short, PSEO is an important provider of high-ability, diverse and urban students who do well at the university. PSEO students do, however, compete with our current degree-seeking students for classes. There is a large overlap between the most popular classes for PSEO students and new freshmen. PSEO student credit loads are also increasing, with the average now being 10.4, with 38% enrolling for 13 or more credits.

In addition to the resource constraints of providing enough seats in high-demand courses for PSEO, freshmen, and other students, there is a revenue implication of PSEO enrollments. The State of Minnesota officially subsidizes PSEO tuition and textbook costs, but the amount the University of Minnesota receives is lower than the tuition rate for undergraduate students. For PSEO students in 2009-10, the tuition paid to the U of M – Twin Cities was $139 per credit, or about $1.6 million. In addition, PSEO students do not pay the University Fee, which is a separate component of tuition charged to all undergraduate students. For degree-seeking freshman students in 2009-10, the average revenue per credit was about $325 (tuition + U Fee). In effect, the PSEO students receive the same instruction for less than half of what other students typically pay. If the State of Minnesota had paid the same tuition for PSEO as other students, the additional revenue would have been about $2.1 million for 2009-10.

Since about 40% of PSEO students later become freshmen at the U of M, it may be useful to think of PSEO as “pre-freshmen”. It is not clear how many of these high-ability students would enroll as freshmen if they were not in PSEO, but it is likely that a sizeable number would not. If we did not enroll PSEO students and replaced them with more new freshmen, the freshman replacements would likely have a much lower academic profile and would be more likely to drop out or take an extended time to graduate. We think that the recruiting, public relations, and retention benefits of enrolling PSEO students at their current numbers is worth the trade-off in revenue.

Because of the PSEO program's importance as a recruiting tool for high-ability students and students of color and the program's impact on course access and revenues, we believe that the program should be integrated better into the Office of Undergraduate Education. Admission, orientation, housing, and advising of PSEO students should be integrated into the programs for other undergraduate students. In that way, students in the program will receive the full benefit of the specialized expertise of staff in these areas, and will receive a continuum of service should they decide to continue at the University for their undergraduate studies.

Recommendation 10: Maintain the University Honors Program at 550-600 students per year, 2,400 total.

The University Honors Program (UHP), created through the Strategic Positioning Initiative, accepted its first freshman class in 2008. Since then, three additional classes have been admitted. The students in UHP are exceptional, with an average ACT for the Fall 2011 class of 32.2 out of 36. These are students who are highly competitive, and have chosen the University of Minnesota over some of the very best universities in this nation. The UHP project has involved developing an admissions process and criteria, an Honors curriculum, an advising structure that focuses on an interdisciplinary model, and a student community.

The success of this program is illustrated in the table below, where the average Honors ACT scores are compared to other top universities. For instance, in looking at the ACT scores in CSE and CBS (33.5), our students are competitive with Caltech, MIT, Cornell engineering, and Carnegie Mellon. Using the ACT scores for all Honors students (31.6 in 2010), our students are competitive with Amherst, Carleton, Williams, and Grinnell. The University Honors Program essentially represents an elite college within a major public university. It is hindered by its small budget (compared to other well-endowed Honors programs) of 1.4 million per year.

Honors program median ACT composite comparisons of first-year students, Fall 2010

Comparison with top Liberal Arts Colleges		Comparison with top STEM Universities		Comparison with top Ranked Universities	
Twin Cities Campus Honors Program	**32.0**	**TC Campus Honors Program (STEM Students)**	**34.0**	**Twin Cities Campus Honors Program**	**32.0**
Amherst Col.	31.5	California Inst. of Tech.	34.0	Stanford U.	32.0
Carleton Col.	31.0	Massachusetts Inst. of Tech.	33.5	Northwestern U.	32.0
Williams Col.	31.0	Cornell U. (Engineering)	33.0	Duke U.	31.5
Grinnell Col.	30.5	Carnegie Mellon U. (CIT)	32.5	U. of Chicago	30.5
Vassar Col.	30.5	Georgia Inst. of Tech.	30.0	Georgetown U.	30.0

Table 15. Comparison of UMTC honors students with other top universities

Recommendation 11: Expand opportunities for "fast track" entry into professional programs.

Minnesota has taken a different approach to freshman enrollments from many other institutions. Many universities admit all freshmen into the same "university" or "general" college and don't enroll a student into specific colleges like business, or agriculture until a year or two after entry. Minnesota admits most students directly into the college that houses their majors. We believe this policy has been beneficial to both students and the university. Students are able to study what they want sooner, and we attract good students who otherwise might not have gone here. When the university offered admission directly to the Carlson School of Management and the College of Biological Sciences, there was an increase in the number of high-ability students enrolling.

Recommendation 12: Restructure and expand the Access to Success (ATS) program.

The Access-to-Success (ATS) program, designed to accommodate students formerly admitted to the General College, matriculates approximately 475 students each year in three colleges, the College of Liberal Arts, the College of Food, Agricultural, and Natural Resource Sciences, and the College of Education and Human Development. The program has been successful in improving first-year retention rates (given that it started in Fall 2008, there is not a four-year graduation rate yet), and in designing innovative academic programs. Each of the three colleges has different student support programs. A Provost's committee on the ATS Program recommends that ATS be expanded to all freshman-admitting colleges and become a four-year academic support program. The committee supports this approach. The University of Michigan has had a similar 4-year program for several years, which appears to have been quite successful.

Some of the specific recommendations for the ATS program from the Provost's committee include:

- Evaluate other university models for ATS-like programs
- Create an appropriate all-university curriculum
- Consider the admissions process for ATS students
- Provide a model of student support building from Multicultural Center for Academic Excellence (MCAE) and ATS advising
- Enhance financial aid support beyond the U of M Promise
- Enhance retention and graduate rates for ATS students
- Better engage faculty in the development of the ATS Program
- Consider a one-week summer bridge program
- Create a series of co-curricular activities and workshops
- Establish a sustainable budget model
- Establish an evaluation process

Student Support Programs

Recommendation 13: Create additional on-campus housing for undergraduates.

Another area where the University will need to make adjustments for increased undergraduate enrollments is in housing. First-year students living on campus have better retention and

graduation rates, and have an overall better experience at the University. The Housing Office has made some estimates on the need for additional housing based on a growth of freshmen to approximately 5,500 students each year.

Year	Freshman Enrollment Target	Projected Freshman in Housing (*84.64% of 1st yr. Class)
Fall 2011	***5280***	***4469***
Fall 2012	5330	4511
Fall 2013	5380	4554
Fall 2014	5430	4596
Fall 2015	5480	4638
Total 4-year Increase	**200**	**169**

Table 16. Projected freshmen in housing

Some of the important assumptions for this estimate include:

- The Office of Housing and Residential Life (HRL) assumes housing on campus approximately 84.7% (the 3-year average for Fall 2008, 2009 and 2010) of first-year students each of the next 4 years (2012-2015) as noted above.
- HRL will continue its current practice of guaranteeing all first-year student on-campus housing if they meet the May 1st housing guarantee (applied for housing and confirmed with the University by May 1st). Additionally, HRL will attempt to provide on-campus housing to all first-year students, even if the student does not meet the May 1st guarantee.
- HRL expects to continue housing between 83% and 86% of the first-year class for the next 5 years.

Certain actions will need to be taken to accommodate the projected increases in the first-year class. These include continuing to utilize approximately 250-300 expanded housing spaces to meet the May 1 housing guarantee for first-year students and limiting the number of students allowed to reapply for Fall 2012 housing. One of the solutions in the planning stage is the proposed 4th Street Housing Facility, which is planned to be completed by Fall 2013.

- HRL assumes that when the 4th Street Housing facility opens, the on-campus housing capacity will be increased by approximately 600 beds. The primary purpose for increasing the on-campus housing capacity was 1) to reduce the number of first-year student expanded housing spaces by 200-250, and 2) to guarantee approximately 300 transfer students on-campus housing. In addition, the University started working with Greek Life on campus, and up to 200 spaces in the 4th Street housing facility may be reserved for fraternity/sorority students.
- In order to accommodate the increase in first-year student enrollment in on-campus housing, it's likely that HRL will need to:
    - Consider limiting the number of students allowed to reapply for on-campus housing (and possibly reduce the number further from the original reduction made in Fall 2012).
    - Continue to utilize approximately 175-225 expanded housing spaces for first-year students.
    - Reduce the number of transfer student housing guarantees by 100 or more.

HRL's primary objective is to reduce the number of first-year student living in expanded housing spaces, and will most likely need to take a number of the actions outlined above in order to effectively reduce expanded housing and accommodate an increase in first-year student enrollment.

Recommendation 14: Appoint a transfer student coordinator and establish a transfer assistance center.

Transfer students are less satisfied with their experiences at the university than are freshmen. Transfer students experience problems with housing, advising, course access, and integration into the community. A Provost's committee has been examining the transfer student population and has made several recommendations, which we endorse. It is clear that improving the transfer experience requires a coordinated effort among the Office of Undergraduate Education and collegiate offices.

Among the recommendations of the transfer committee is to appoint a transfer student coordinator who will be responsible for coordinating efforts to improve the transfer student experience from admission through graduation. Also proposed is a "one-stop" transfer assistance center where transfer students could receive assistance with academic questions and concerns during their first year, as well as advising related to the evaluation/petition of transfer credits. Where this center will be housed (e.g., the Center for Academic Planning and Exploration) and who would staff it (e.g., collegiate staff assigned part-time to this center and staff from the Office of Admissions) would need to be decided.

We should aspire to give transfer students the same level of service that new freshmen receive in terms of orientation, housing, advising, and access to the curriculum.

Summary for undergraduate education

The University of Minnesota has made remarkable progress in improving all aspects of the undergraduate experience over the past decade. Part of this success has been the result of significant organizational changes, and the bringing together of the myriad central-level undergraduate units (including admissions, financial aid, classroom management, student One Stop, liberal education, university writing) under one Office of Undergraduate Education. This change has enabled the various areas to work together much more effectively. In addition, the remarkable work of the colleges in improving all aspects of student support (academic advising, curriculum redesign, and career counseling) has made an enormous difference. Strong support from the Office of Student Affairs in promoting student engagement and improving the overall student experience has supported student success and reinforced the importance of first-year retention and timely graduation.

These coordinated efforts have resulted in rapid improvements in retention rates (in particular our first-year retention is now at 90%) and graduation rates (our four-year rate is now over 50%). The Office of Admissions, in cooperation with the colleges, has focused on matriculating students who are prepared to succeed at the University and to graduate in four years. Our new freshmen are now in the top of their class, with an average high school rank of over 85% and an average ACT of 27.4. An additional factor has been the attention to undergraduate financial aid. Both the rapid growth in private scholarship giving and the creation of the Promise Scholarship program for low-income and

middle-income students under President Bruininks have increased the financial aid base and helped to ensure access for Minnesota students from all income levels.

Moving forward will require continued innovation by all the units involved with undergraduate education. The committee has not recommended a significant increase in overall undergraduate enrollments, but rather a targeted increase in the STEM fields where the demand has been steady and significant. In particular, the committee makes specific recommendations on new enrollment targets for CSE and CBS. The committee believes that better coordination around transfer students between central and the colleges is needed, and that a ratio of 2:1 freshman to transfers is desirable. As part of a comprehensive enrollment management plan, the University must redouble its efforts to improve retention and graduation rates at all levels (including for transfer students) and to continue to flatten the achievement gap between white students and students of color. Finally, the University must continue to improve the overall experience for our undergraduates with better advising resources, enhanced housing opportunities, and increased co-curricular options for undergraduate research, service learning, study abroad, leadership, and student life in general.

III. Graduate Education

A hallmark of a great research university is the strength of its graduate programs, particularly its Ph.D. programs. The University of Minnesota has distinctive post-baccalaureate programs in many disciplines that are signature strengths and contribute to its critical advantages. Excellence in research and in training of Ph.D. students is synergistic. Our best Ph.D. programs attract high caliber students because their faculty are carrying out important research in their fields. Attracting the best graduate students helps faculty conceive and conduct leading research in a wide variety of academic fields. Moreover, in many fields, graduate students make critical contributions to undergraduate teaching.

The graduate education section of the report is necessarily presented in a different format than the undergraduate section. Undergraduate education is highly centralized with admissions, financial aid, the core curriculum and, writing requirements all handled by the Office of Undergraduate Education. Much of student service support is handled at the collegiate level. Graduate education is much more a disciplinary activity with the local academic units having great authority.

Over the past decade the University of Minnesota has seen a steady increase in total enrollment in post-baccalaureate programs. While this has been a common trend among public universities, we currently rank at or near the top of our peer group in graduate and professional enrollment, as well as in the proportion of graduate and professional students compared to undergraduate students. A detailed look at trends shows that enrollment patterns and measures of program quality and student success are variable among programs.

Unlike the situation for undergraduate enrollment, the University has not set comprehensive goals for enrollment for graduate and professional programs. Instead, post-baccalaureate enrollment patterns result from a complex composite of decisions made largely at program and college levels. Especially for Ph.D. programs, the local control of admissions criteria and decisions is due to the close, program-specific relationships between graduate training and units' missions in research and undergraduate teaching.

While local decision-making about enrollment in advanced-degree programs is appropriate, these decisions have broader implications that need to be considered. For example, post-baccalaureate enrollment decisions affect the university's overall ability to address needs of the state, the nation and the world through our programs. Enrollment decisions affect student outcomes and, by implication, institutional reputation. Enrollment patterns also shape the institution's academic priorities, its use of facilities, and its resource allocation. It is especially difficult to gain an integrated view of these factors for interdisciplinary programs that cross college boundaries. At present, the institution lacks a mechanism for considering the cumulative impact of enrollment in graduate and professional programs.

Our objective in this report is to develop strategies to guide enrollment targets that enhance the overall strength and reputation of the university in a challenging fiscal environment. Our current effort has emphasized Ph.D. programs. Preliminary evaluation indicates that Ph.D. programs at the University of Minnesota range from a select number that are outstanding to a small number that are at risk. A good number of programs are strong, and have the potential to move into the 'outstanding' category. We expect that taking targeted action to optimize size and maximize excellence in quality rather than quantity of programs can prevent the decline of our best programs,

incentivize other programs to improve, and benefit both student success and institutional reputation. In a context of new economic reality, the University will need to reduce the numbers of programs and/or the total numbers of students in post-baccalaureate programs. The institution will need to do so strategically in order to retain programs of distinction and excellence.

In this report, we propose procedures for enrollment management of graduate programs. Our specific recommendations are:

1. Set goals for graduate student outcomes and track progress for all graduate programs.
2. Maintain the role of the graduate school in providing incentives for program improvement and in monitoring and promoting quality.
3. Provide programs with regular and systematic information concerning program performance that leads to high quality graduate programs.
4. Establish an internal review process for Ph.D. programs that guides fiscal investment and enrollment targets.
5. Provide financial augmentation and flexibility to Ph.D. programs deemed to be "Outstanding."
6. Take action on programs deemed to "Need Reassessment."
7. Evaluate impacts of graduate enrollment changes on academic units as part of the compact process.
8. Develop processes for evaluating professional masters and professional doctoral programs.
9. Develop processes for evaluating post-baccalaureate certificate programs.

Below, we will summarize the size, scope and enrollment trends of our graduate and professional programs. We will describe how decisions about admissions to Ph.D. programs are currently made and what we have learned about the factors that influence those decisions. We will then outline a process for determining the optimal size of graduate programs for improving student and institutional outcomes. We will consider the applicability of this approach for other doctoral, masters and professional programs. Finally, we will briefly consider the implications of graduate programs for the size and scope of academic units.

Size, Scope, and Enrollment Trends of Post-Baccalaureate Programs at the University of Minnesota

Compared to peer institutions[2], the University of Minnesota-Twin Cities Campus is at or near the top of the range of numbers of students enrolled in graduate and professional programs (see Table A1 in Appendix A for data by year). Based on data from the Integrated Post-secondary Education Data System (IPEDS) of the U.S. Department of Education, Minnesota has the highest enrollment of graduate and professional students within the peer group. We noted that IPEDS enrollment data for the University of Minnesota also includes students who are enrolled

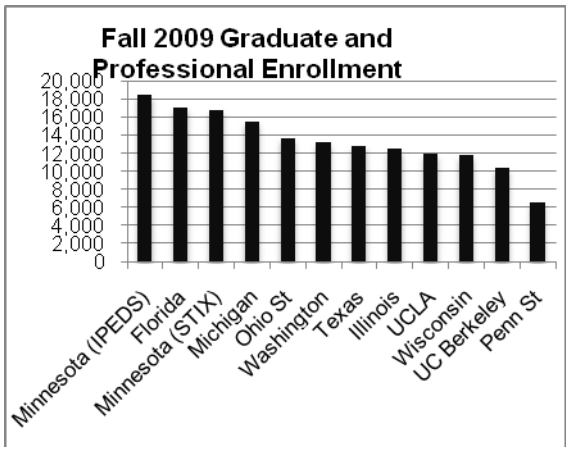


Figure 13. Peer group comparison of graduate and professional enrollment, Fall 2009

[2] For purposes of this discussion, the University's peer group is considered to be the Big 10 institutions University of Michigan, The Ohio State University, University of Illinois, the University of Wisconsin, and Pennsylvania State University, plus UCLA, UC-Berkeley, University of Texas at Austin, University of Washington, and University of Florida. Among the latter, Florida is most like the University in scope, whereas the other four were chosen for academic strengths we would like to emulate.

for zero credits (inactive students)[3]. Because we consider that the number of active students is a more accurate representation of enrollment, we have also used our institutional data (STIX data base) to obtain enrollment totals for students who are not enrolled in the zero-credit option. Including only active students places Minnesota second in total graduate and professional enrollment, just behind the University of Florida and ahead of the University of Michigan. The relative position of these three universities has been maintained over most of the past decade (See Table A1). Minnesota is near the top of our peer group (35.7%) in the proportion of the student body made up of graduate plus professional students, according to the data (see Table A2 for data by year). Omitting students in the zero credit option indicates that graduate and professional students make up of 33.8% of the student body.

Many public institutions have had increasing graduate and professional enrollment in recent years, and this trend is prominent at Minnesota. According to IPEDS data, among peer institutions between 2000 and 2009 the sum of graduate and professional enrollment experienced highest growth rates at Florida (over 37%) and Minnesota (about 35%) (Table A1). When considering only active students, Minnesota experienced a more moderate rate of growth in graduate and professional enrollment (about 23%), which would put us at fourth place in our peer group.

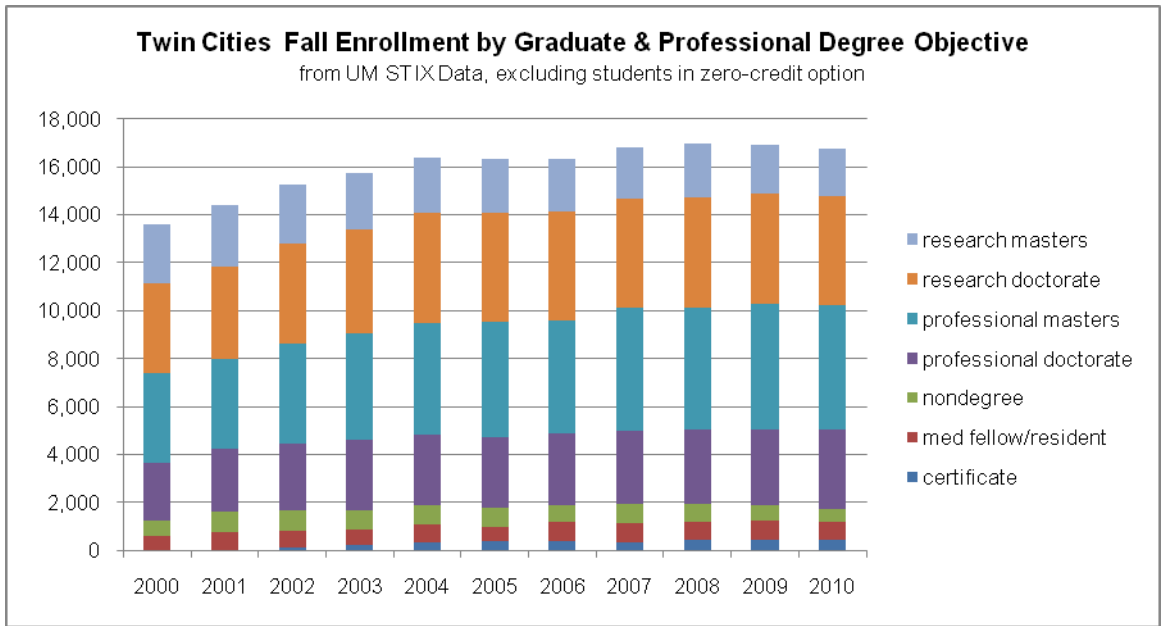


Figure 14. UMTC enrollment by graduate and professional degree objective, 2000-2010

To obtain a more detailed view of University enrollment trends among graduate and professional programs at Minnesota, we evaluated University enrollment data by degree-objective category. To classify doctorate programs by degree objective, we used the current IPEDS practice of dividing programs into Research/Scholarly Doctorates (Ph.D. and Ed.D. programs) and Professional Practice Doctorates (M.D., D.D.S., D.V.M., Pharm.D., J.D., D.M.A, D.P.T, Au.D., and D.N.P. programs).[4,5] Similarly, we clustered M.A. and M.S. programs together under Research Masters,

[3] At the University of Minnesota, zero-credit registration status began at in 2003 as a means for inactive students to remain on the rolls so they do not have to reapply when resuming active study.
[4] Note that at the University of Minnesota, the D.M.A., D.P.T., Au.D. and D.N.P. were previously awarded through the graduate school and have been considered graduate degrees by UM.
[5] Classification of University of Minnesota graduate and professional programs by degree-objective category is listed at: Hhttp://www.grad.umn.edu/programs/UMTC_Grad_and_Profl_programs.xlsx

while Professional Masters degrees were considered to be all other masters programs, because many of these programs offer professional credentials. The greatest enrollment increases have occurred in professional masters (1,439), professional doctorate (884) and research doctorate (825 students) programs, based on University enrollment data. The growth in enrollment in research doctorate programs occurred between 2000 and 2004, while the growth in professional masters and professional doctorate programs has continued through the decade. In terms of % growth, the strongest increase occurred in certificate programs (>45-fold growth). The only category of degree program to demonstrate a systematic decline in enrollment over the decade has been research masters, which fell by more than 20%. In sum, enrollment patterns show a trend towards an increasing proportion of post-baccalaureate students in professional programs (professional masters and doctorates, certificate, and residency programs) compared to research-based degrees (M.A., M.S., and research doctorates, primarily due to greater growth in professional programs. As of Fall 2010, students in professional programs made up about 60% of students in post-baccalaureate programs, compared with 52% at the beginning of the decade[6].

UMTC Fall Graduate & Professional Enrollment Trends, by Degree Objective*

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	10 year change
Professional masters	3,737	3,775	4,145	4,462	4,656	4,777	4,696	5,108	5,066	5,225	5,176	1,439
% of 2000 enrollment	100%	101%	111%	119%	125%	128%	126%	137%	136%	140%	139%	+ 39%
Professional doctorate	2,411	2,613	2,824	2,894	2,962	2,972	2,993	3,042	3,096	3,174	3,295	884
% of 2000 enrollment	100%	108%	117%	120%	123%	123%	124%	126%	128%	132%	137%	+ 37%
Research doctorate	3,740	3,864	4,158	4,353	4,571	4,582	4,541	4,560	4,600	4,567	4,565	825
% of 2000 enrollment	100%	103%	111%	116%	122%	123%	121%	122%	123%	122%	122%	+22%
Certificate	10	19	126	257	329	382	401	354	430	463	459	449
% of 2000 enrollment	100%	190%	1260%	2570%	3290%	3820%	4010%	3540%	4300%	4630%	4590%	+ 359%
Med fellow/resident	605	733	669	638	784	593	783	801	785	809	751	146
% of 2000 enrollment	100%	121%	111%	105%	130%	98%	129%	132%	130%	134%	124%	+ 24%
Non-degree	630	855	859	807	770	798	725	799	737	622	526	-104
% of 2000 enrollment	100%	136%	136%	128%	122%	127%	115%	127%	117%	99%	83%	- 17%
Research masters	2,492	2,565	2,452	2,346	2,326	2,224	2,201	2,144	2,226	2,062	1,964	-528
% of 2000 enrollment	100%	103%	98%	94%	93%	89%	88%	86%	89%	83%	79%	- 21%
Total	13,625	14,424	15,233	15,757	16,398	16,328	16,340	16,808	16,940	16,922	16,736	3,111
% of 2000 enrollment	100%	106%	112%	116%	120%	120%	120%	123%	124%	124%	123%	+ 23%

Scale for % of enrollment in 2000	50 - 79%	80-89%	90-94%	95-105%	106-110%	111-120%	121-150%	151-200%	> 200%

*Shading represents the % of enrollment in fall 2000, where warm colors indicate increase and cool colors indicate decrease.

Table 17. UMTC graduate and professional enrollment trends, by degree objective

To evaluate post-baccalaureate enrollment at the University of Minnesota by discipline, we analyzed University enrollment data according to Classification of Instructional Programs (CIP) codes, a classification system of academic disciplines used by the U.S. Department of Education[7,8]. Enrollment trends over the decade differ substantially by discipline. While many areas experienced sustained growth, or growth followed by a plateau, other areas peaked in enrollment and then declined, or even showed a net decline. Areas showing overall growth in enrollment included those related to health professions, business, engineering, public administration, biological

[6] Non-degree students were omitted from this calculation.
[7] For CIP classification information, see the IPEDS website at Hhttp://nces.ed.gov/ipeds/cipcode/H.
[8] CIP classification of Minnesota programs is available in the table at Hhttp://www.grad.umn.edu/programs/UMTC_Grad_and_Profl_programs.xlsxH.

sciences, architecture, mathematics, and computer sciences. Those showing growth followed by a reversal include education, social sciences, psychology, communication, and leisure and fitness studies (kinesiology). Those showing a net loss include family and consumer sciences, natural resources and agriculture, and areas of the humanities.

Table A3 provides detail on net change in enrollment by degree type within each CIP area. A net increase of more than 200 students enrolled occurred in certificate programs in education (228), professional doctorate programs in health-related professions (766), research doctorate programs in engineering (287), and professional masters programs in business, management, and marketing (689), health-related professions (488) and public administration and social services (265). By contrast, research masters in health-related areas fell (-380).

How Ph.D. Programs Make Decisions about Enrollment Targets

Post-baccalaureate enrollment management is fundamentally different than undergraduate enrollment management at the University of Minnesota. Whereas undergraduates apply to colleges, graduate and professional students apply directly to programs. Therefore, while undergraduate management principles tend to focus on enrollment targets at the college level, Ph.D. program management principles focus much more directly on the program level.

In addition to enrollment practices, graduate and undergraduate programs differ in other ways that have implications for enrollment management. Although the majority of our undergraduates are from Minnesota and adjacent states, our Ph.D. programs recruit students from all over the world and thus serve as talent magnets that attract high achievers to the state. Therefore, while undergraduate enrollments must consider demographics of the state of Minnesota and its surrounding region, Ph.D. programs are not strongly affected by regional demographic trends. By contrast, Ph.D. program enrollments are most strongly affected by particular research strengths at the University of Minnesota and the opportunities these create for training advanced students in research. The national and international reputation of our graduate programs is perhaps the largest factor in attracting top graduate students.

To better understand the process Ph.D. programs (and research-oriented masters programs) use to decide on the number of students they admit, we conducted several focus groups with Directors of Graduate Studies or their representatives from programs across the University. We included in our focus groups a number of the top-ranked programs from colleges across the university. We also worked directly with graduate school staff and institutional research staff who were able to provide information and perspective on existing data about graduate programs and to identify criteria for enrollment management decisions.

While professional school programs are responsive to market demands and students' willingness to pay for training, Ph.D. programs, if they are to be nationally competitive, must provide significant funding for students. In the sciences much of this funding comes from extramural funding to individual investigators and also training grants. In many fields, including those that do not receive significant grant funding, students are supported with teaching assistantships and some internally supported research assistant positions. Internal and extramurally awarded fellowships round out the funding available to Ph.D. students.

Determining the right size of a graduate program is a complex process. The best Ph.D. programs base their decisions on how many students to admit on the qualifications of the applicant pool, the amount of funding they can offer students, and the number of faculty available to advise students. They carefully balance advising workloads with other faculty responsibilities. Top-ranked programs admit for success. By only admitting students who meet their high standards and by taking care not to exceed capacity, these highly successful programs are expecting and enabling students to complete their degrees. Admitting enough students to provide a strong cohort experience is also valuable, such as when students take coursework in the early years of study, or where collaboration or other peer interactions are important. Programs also try to offer faculty the opportunity to teach graduate seminars in their specialty. This practice is considered important for the education of students, for enhancing the quality of faculty research, and for the retention of faculty members.

UMTC Fall Graduate & Professional Enrollment Trends, by Discipline*

CIP Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	10 Yr Change
51. Health Professions	3,002	3,029	3,162	3,351	3,486	3,582	3,669	3,761	3,933	3,872	3,973	971
% of 2000 enrollment	100%	101%	105%	112%	116%	119%	122%	125%	131%	129%	132%	+ 32%
52. Business	1,716	1,748	1,981	2,166	2,296	2,330	2,311	2,627	2,607	2,655	2,361	645
% of 2000 enrollment	100%	102%	115%	126%	134%	136%	135%	153%	152%	155%	138%	+ 38%
14. Engineering	1,117	1,293	1,359	1,345	1,301	1,282	1,252	1,314	1,368	1,327	1,433	316
% of 2000 enrollment	100%	116%	122%	120%	116%	115%	112%	118%	122%	119%	128%	+ 28%
44. Public Admin & Soc Serv	421	404	474	545	589	560	581	559	567	640	685	264
% of 2000 enrollment	100%	96%	113%	129%	140%	133%	138%	133%	135%	152%	163%	+ 63%
13. Education	1,672	1,878	1,924	1,942	1,979	2,009	1,874	1,828	1,745	1,763	1,834	162
% of 2000 enrollment	100%	112%	115%	116%	118%	120%	112%	109%	104%	105%	110%	+ 10%
26. Biological & Biomed Sci	663	702	757	783	797	835	867	855	836	829	823	160
% of 2000 enrollment	100%	106%	114%	118%	120%	126%	131%	129%	126%	125%	124%	+ 24%
30. Multi/interdisc Studies	143	164	195	205	224	210	197	214	232	233	288	145
% of 2000 enrollment	100%	115%	136%	143%	157%	147%	138%	150%	162%	163%	201%	+ 45%
04. Architecture	217	231	256	258	261	278	295	317	304	353	344	127
% of 2000 enrollment	100%	106%	118%	119%	120%	128%	136%	146%	140%	163%	159%	+ 59%
60. Residency Programs	634	765	700	660	784	593	783	802	785	809	756	122
% of 2000 enrollment	100%	121%	110%	104%	124%	94%	124%	126%	124%	128%	119%	+ 19%
27. Math & Statistics	162	170	189	194	219	210	186	230	257	275	272	110
% of 2000 enrollment	100%	105%	117%	120%	135%	130%	115%	142%	159%	170%	168%	+ 68%
22. Legal Professions	716	735	803	817	848	853	839	820	844	823	810	94
% of 2000 enrollment	100%	103%	112%	114%	118%	119%	117%	115%	118%	115%	113%	+ 13%
11. Computer & Info Sci	237	255	272	277	292	298	303	307	332	323	321	84
% of 2000 enrollment	100%	108%	115%	117%	123%	126%	128%	130%	140%	136%	135%	+ 35%
45. Social Sciences	391	429	470	442	461	443	478	507	495	487	463	72
% of 2000 enrollment	100%	110%	120%	113%	118%	113%	122%	130%	127%	125%	118%	+ 18%
40. Physical Sciences	400	384	385	403	465	459	414	405	422	428	433	33
% of 2000 enrollment	100%	96%	96%	101%	116%	115%	104%	101%	106%	107%	108%	+ 8%
42. Psychology	388	405	411	426	455	446	442	445	439	420	417	29
% of 2000 enrollment	100%	104%	106%	110%	117%	115%	114%	115%	113%	108%	107%	+ 7%
09. Communication, Journalism	101	108	120	142	133	147	167	179	183	160	128	27
% of 2000 enrollment	100%	107%	119%	141%	132%	146%	165%	177%	181%	158%	127%	+ 27%
41. Science Technologies	6	8	8	12	15	16	16	14	18	19	21	15
% of 2000 enrollment	100%	133%	133%	200%	250%	267%	267%	233%	300%	317%	350%	+ 250%
31. Leisure & Fitness	74	88	95	95	93	83	81	88	75	65	80	6
% of 2000 enrollment	100%	119%	128%	128%	126%	112%	109%	119%	101%	88%	108%	+ 8%
50. Visual & Performing Arts	297	308	301	316	318	312	317	279	289	291	290	-7
% of 2000 enrollment	100%	104%	101%	106%	107%	105%	107%	94%	97%	98%	98%	- 2%
05. Area, Ethnic, Culture, Gender	69	72	82	76	73	71	60	60	62	57	56	-13
% of 2000 enrollment	100%	104%	119%	110%	106%	103%	87%	87%	90%	83%	81%	- 19%
03. Nat Resources & Conserv	151	150	147	136	141	136	137	135	140	135	137	-14
% of 2000 enrollment	100%	99%	97%	90%	93%	90%	91%	89%	93%	89%	91%	- 9%
38. Philosophy & Religion	38	38	43	45	45	44	35	32	29	27	23	-15
% of 2000 enrollment	100%	100%	113%	118%	118%	116%	92%	84%	76%	71%	61%	- 39%
19. Family & Consumer Sci	86	108	137	155	155	152	100	108	114	90	69	-17
% of 2000 enrollment	100%	126%	159%	180%	180%	177%	116%	126%	133%	105%	80%	- 20%
54. History	137	149	155	145	145	149	133	133	130	125	120	-17
% of 2000 enrollment	100%	109%	113%	106%	106%	109%	97%	97%	95%	91%	88%	- 12%

Other	54	51	72	70	53	59	87	87	72	58	37	-17
% of 2000 enrollment	100%	94%	133%	130%	98%	109%	161%	161%	133%	107%	69%	- 31%
24. Lib Arts and Sci, Gen Studies	146	154	152	182	168	173	171	190	160	158	118	-28
% of 2000 enrollment	100%	105%	104%	125%	115%	118%	117%	130%	110%	108%	81%	- 19%
23. English Lang & Lit	172	165	156	169	179	160	158	157	161	162	141	-31
% of 2000 enrollment	100%	96%	91%	98%	104%	93%	92%	91%	94%	94%	82%	- 18%
16. Foreign Lang, Lit, Linguistics	163	160	162	160	170	175	169	159	157	146	126	-37
% of 2000 enrollment	100%	98%	99%	98%	104%	107%	104%	98%	96%	90%	77%	- 23%
01. Agriculture & Ag Operations	252	272	265	240	253	263	218	196	184	192	177	-75
% of 2000 enrollment	100%	108%	105%	95%	100%	104%	87%	78%	73%	76%	70%	- 30%
Total	13,625	14,423	15,233	15,757	16,398	16,328	16,340	16,808	16,940	16,922	16,736	3,111
% of 2000 enrollment	100%	106%	112%	116%	120%	120%	120%	123%	124%	124%	123%	+ 23%

Scale for % of 2000 enrollment	50 - 79%	80- 89%	90- 94%	95- 105%	106- 110%	111- 120%	121- 150%	150- 200%	> 200%

*Shading represents the proportion of enrollment in fall 2000, where warm colors indicate increase and cool colors indicate decrease.

Table 18. UMTC fall graduate and professional enrollment trends, by discipline

Graduate and Professional Degrees Awarded at the University of Minnesota

The University of Minnesota currently ranks third in production of graduate and professional degrees among our peer institutions, according to IPEDS data. The University of Florida produces the most masters degrees, followed by Michigan, then Minnesota, which climbed from 5th to 3rd position over the decade (see Table A4 for data by year). Similarly, in terms of doctoral degrees granted (research/scholarly and professional practice combined), Minnesota is currently 2nd, trailing Florida by about 500 degrees per year (see Table A5).

Minnesota's overall third place position in advanced degree production is slightly at odds with its second place position in graduate and professional enrollment. The reason for the slight gap in production of degrees is uncertain. It may be a function of the balance among different types of post-baccalaureate programs (e.g. certificate or other non-degree awarding programs), which likely differs among institutions. It is also possible that rates of degree completion may be low or time to degree may be long in some University programs relative to top-performing peer institutions. Evaluation of student outcomes in graduate and professional programs merits a closer look.

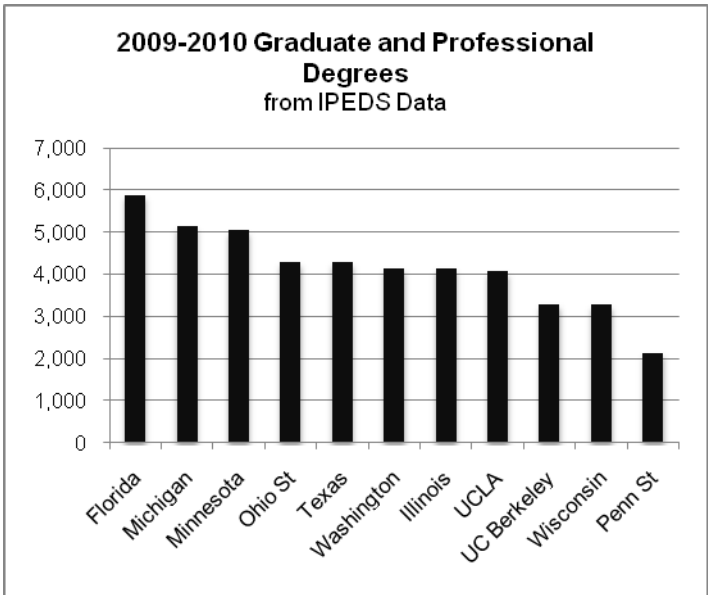


Figure 15. Peer institution graduate and professional degrees, 2009-10

To evaluate institutional trends in graduate and professional degree production, we examined University data according to degree objective category[4]. All categories showed a net increase in degrees produced over the decade, with the most growth in the professional masters, and the least

growth in research doctorates, which actually decreased in number during the early part of the decade. The net increase in numbers of research doctorates (~15%) did not keep pace with the increased enrollment in these programs over the same period (~23%). Interestingly, about 24% more research masters were produced in 2009-10 than in 2000-01, even though enrollment in research masters programs actually *decreased* by about 20% over the same period. The increase in research masters degrees is likely due to some students in Ph.D. programs converting to masters programs. The increase in the number of professional doctorate degrees is due in part to new programs, including Doctor of Physical Therapy (D.P.T.), Doctor of Audiology (Au.D.), and Doctor of Nursing Practice (D.N.P.), which produced their first graduates during this decade.

UM TC Graduate and Professional Degrees Awarded*

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	change
Professional masters	1,406	1,500	1,570	1,699	1,803	1,836	1,907	2,116	1,959	2,251	845
% of 2000-01	100.0%	106.7%	111.7%	120.8%	128.2%	130.6%	135.6%	150.5%	139.3%	160.1%	+60%
Research masters	953	1,003	1,001	986	1,023	1,156	1,136	1,117	1,191	1,179	226
% of 2000-01	100.0%	105.2%	105.0%	103.5%	107.3%	121.3%	119.2%	117.2%	125.0%	123.7%	+ 24%
Professional doctorate	714	704	739	778	829	840	922	894	920	924	210
% of 2000-01	100.0%	98.6%	103.5%	109.0%	116.1%	117.6%	129.1%	125.2%	128.9%	129.4%	+ 30%
Research doctorate	610	547	545	532	631	704	751	690	683	702	92
% of 2000-01	100.0%	89.7%	89.3%	87.2%	103.4%	115.4%	123.1%	113.1%	112.0%	115.1%	+ 15%
total	3,683	3,754	3,855	3,995	4,286	4,536	4,716	4,817	4,753	5,056	1,373
% of 2000-01	100.0%	101.9%	104.7%	108.5%	116.4%	123.2%	128.0%	130.8%	129.1%	137.3%	+ 37%

Scale for % of degrees 2000-01	50 - 79%	80-89%	90-94%	95-105%	106-110%	111-120%	121-150%	150-200%	> 200%

*Shading represents the proportion of enrollment in fall 2000, where warm colors indicate increase and cool colors indicate decrease.

Table 19. UMTC graduate and professional degrees awarded, 2000-01 through 2009-10

Student Outcomes in Ph.D. Programs

Monitoring student outcomes, including % retention and time to degree, for undergraduate programs has fostered institutional progress towards higher graduation rates. Developing a similar approach for graduate programs would encourage the most efficient use of resources and also encourage programs to admit for success and not to exceed their capacity to support and mentor students. This approach would best serve students' needs. Furthermore, metrics for student outcomes are used in program rankings. Therefore, defining goals for graduate student outcomes is likely to also improve institutional reputation. Currently, measures of student success are not routinely tracked at the institutional level for graduate programs, although some programs may track these factors.

Recommendation 1: Set goals for graduate student outcomes and track progress for all graduate programs.

We recommend that the Graduate School should be charged with annual monitoring of student outcomes for all graduate programs, and that this information should be made available to colleges and programs. Further, we recommend that appropriate, discipline-specific targets should be set for % retention, % completion and median time to degree. To set such targets will require consultation with programs and colleges. The Graduate School's Graduate Education Council is an appropriate place to initiate the discussion.

The recent ranking of Ph.D. programs performed by the National Research Council (NRC)[9] used two measures of student success: median time to degree and % completion within a defined period of time. For programs in the humanities, % completion was measured over an 8-year period, while a 6-year period was used for programs in other disciplines. Completion rates for University programs ranged from 0% to 94% within the defined period, with 44% as the mean value. The median time to degree ranged from 3.4 years to 10.3 years, with 5.9 years as the mean value for all programs. We wondered whether the outliers with long times to degree were in fields where the trend was towards similarly long times to degree. The NRC data was helpful to compare the outliers to like programs around the country. In general, we found that University programs with high values for median time to degree were generally also outliers within their disciplines (See Appendix B).

Our committee developed an index to measure student outcomes for University Ph.D. programs that takes into account time to degree, dropout rates, and conversion from a Ph.D. track to a master's degree. A full description of the Bostrom Efficiency Index (BEI) and an analysis of data are presented in Appendix C. Briefly, in this index every student outcome is awarded "points," where receiving the Ph.D. is worth 15 points, leaving with a masters from the program but not the Ph.D .is worth 5 points, and the elapsed time spent in the program is deducted (1 year = 1 point; maximum 10 points deducted). Therefore, programs with a high completion rate and a short average time to a degree would have high scores, whereas programs would have low scores (ranging into negative values) if degree completion rates are very low and average time to degree is long. Data were compiled for student outcomes over an 8-year period, and scores were calculated based on degrees granted in a rolling three-year window. Not including Ph.D. programs that have since closed, the highest index score observed was 12.9, and the lowest was -2.5. The median score for the most recent 3-year period was 5.9. Ph.D. completion rates varied from a low of 13-14% to a high of over 80%. Anything below 50% indicates that more dropouts and non-completions than degrees conferred. Over an eight-year period, 30 out of 97 programs fell below that standard. Field differences notwithstanding, this record should be improved.

By using the BEI to compare extant programs to those that have closed recently, it appears that student outcome data may constitute a leading indicator of looming difficulties in a graduate program. Therefore, downward trends should be identified early and reversed if possible.

We caution against using these criteria as the sole or major measure for evaluating quality, however. While timely progress towards a degree and a high proportion of degree completion are characteristics of good to great programs, these metrics are not sufficient to indentify outstanding programs. In order to identify top performance, the impact and reputation of programs must also be assessed (addressed below). Judgments of program performance and funding decisions should not be based on small differences in student outcomes.

Furthermore, inter-field comparisons in median time to degree need to be made cautiously, especially between STEM and non-STEM fields. Most science Ph.D.s continue their training for multiple years as post-doctoral associates, whereas other students must fold these additional years into their pre-doctoral training. As a result, we recommend that program efficiency should be compared to national norms by field rather than across fields within the University.

[9] See: Hhttp://sites.nationalacademies.org/PGA/Resdoc/index.htmH for background and data.

To determine how well measures of programs' average student preparedness could predict predict programs' student outcomes, we correlated incoming students' GRE scores with the BEI values, as described in Appendix C. For non-STEM programs, we found that programs' average quantitative GRE scores were fairly good at predicting which programs will more successfully move more students along to a timely completion. The results for STEM programs are quite different, however. The best predictors for timely success in these programs are the verbal and area GRE scores of the matriculating class. Incoming STEM students are often selected on the basis of their quantitative GRE scores, so the entering classes all tend to have high quantitative scores. Among this set of matriculants, it seems that those who have the greatest field knowledge and the greatest verbal abilities are more likely to complete their degrees and move through their graduate studies efficiently.

We therefore recommend that all GRE scores should be continuously tracked for University of Minnesota graduate programs, as part of an overall quality assessment.[10] This is in contrast to the practice in the NRC report, which used only quantitative scores to evaluate STEM programs and verbal scores to evaluate non-STEM programs. Additional measures of motivation and accomplishment would be ideal but may be impossible to collect and track centrally.

Evaluation of Reputation and Quality of Ph.D. Programs

National/international reputation is a major factor attracting the best students to our programs. Prospective students often look to program rankings to aid their selection of a graduate program. It is most certainly true that the University of Minnesota wishes to maintain as many programs as possible with sterling national reputations for scholarship and graduate education.

The NRC rankings released in 2010 are the most recent and comprehensive evaluation of Ph.D. programs[9]. We recognize that like all such ranking systems, the NRC approach has some significant limitations. For example, the data compiled are already about five years old and represent a single point in time. The metrics used were quite broad, but still may not capture all the important information about program quality, especially non-quantitative information. The rankings did not address all fields of post-graduate study; they did not address professional doctorates or Ed.D. programs, and covered only 69 of our >90 Ph.D. programs. The most recent review also used different methodologies than previous NRC rankings, making longitudinal comparisons awkward. However, the 2010 rankings do provide a useful snapshot of many of our major Ph.D. programs. Moreover, the data set collected by NRC is valuable for evaluating the reliability of the metrics used, and could be useful for aiding the choice of metrics for ongoing evaluation of programs.

The 1995 and 2010 NRC rankings of Ph.D. programs indicate that Minnesota has some notable, highly ranked programs (see Appendix D). The NRC moved away from an exact ranking in 1995 to a probable range of ranks in 2010. The new approach makes the identification of the top programs somewhat problematic, in that such classification depends on the choice and interpretation of metrics. However, it is clear that the University of Minnesota continues to have many of its programs ranked highly by the NRC. The 2010 NRC report includes measures based on national reputation rankings (Regression-based, or R rankings) and on program characteristics deemed by faculty to be related to quality (Survey-based, or S rankings) that are expressed in the

[10] Keep in mind that we are not analyzing individuals so we are not attempting to predict the success of individuals within any particular program. We are analyzing aggregate program data on the assumption that programs that are able to attract graduate students with the highest GRE scores are stronger programs, all else equal.

form of confidence intervals[11]. Based on the 5th percentile confidence limit and the confidence intervals[12], examples of our top-ranked programs in the most recent ranking are Aerospace Engineering; Chemical Engineering; Chemistry; Child Psychology; Ecology, Evolution and Behavior; Economics; Electrical Engineering; Geophysics; History; Kinesiology; Materials Science and Engineering; Mechanical Engineering; and Psychology. Additional programs rank close behind these front-runners. Using the 5th percentile confidence limit of the R or S ranking as a sole criterion, about half of Minnesota's ranked programs may be in the top 20% of programs nationally (see Appendix D).

Despite the strong performance of many of our Ph.D. programs, our overall program R rankings place us lower than eight out of ten universities in our peer group. This places us near the middle among public AAU institutions, where the proportion of programs estimated to be in the top 20% ranged from 98% (UC-Berkeley) to 12% (University of Kansas). The S rankings use a different weighting for the quality measures. The two rankings often result in different rank-orders of quality, so we also evaluated Minnesota's standing based on the S rankings. Again, Minnesota ranked in the middle of public AAU institutions, while UC-Berkeley had the greatest proportion of programs in the top 20% (86% of programs). Among the broad fields evaluated by the NRC, Minnesota's rankings were strongest in Agricultural Sciences and in Engineering, both of which had two-thirds to three-quarters of programs estimated to be in the top 20% based on the R and S rankings.

2010 NRC Rankings of the University of Minnesota and Peers

Institution	Programs Ranked (Count)	Percent of Programs in top 20% of Field(R Ranking*)	Percent of Programs in top 20% of Field (S ranking*)
UC-Berkeley	50	98.0%	86.0%
Michigan	65	83.1%	73.8%
UCLA	59	79.7%	71.2%
Texas	52	69.2%	40.4%
Wisconsin	78	67.9%	59.0%
Washington	59	62.7%	62.7%
Illinois	58	62.1%	53.4%
Penn St	65	58.5%	67.7%
Minnesota	**69**	**49.3%**	**40.6%**
Ohio St	64	48.4%	29.7%
Florida	60	31.7%	20.0%

* based on the 5th percentile confidence interval of R or S Ranking, respectively, as a criterion.

Table 20. Peer institution NRC rankings

Metrics for evaluating program quality: Use of NRC data for proof of concept

[11]The R rankings are based on the predictive ability of each NRC metric in reproducing reputation judgments and are more akin to the 1995 NRC reputational ratings than are the S rankings. See the analysis by Stephen Stigler, Distinguished Professor of Statistics at the University of Chicago (*news.uchicago.edu/btn/ncr.summary.php*). Appendix C also includes the S-rankings, which coincide less with the reputational rankings but provide additional leverage on quality.

[12] We defined top-ranked programs as those with all of the following characteristics: the 5th percentile confidence limits of the R ranking within the top 20% of the field; the 5th percentile confidence limits within the top 20% of the field; and the mid-range of the confidence interval for the R and/or S ranking(s) within the top 20% of the field.

We hypothesized that the various metrics used by the 2010 NRC rankings of Ph.D. programs might form coherent clusters of related measures, where clusters would be relatively independent of one another. If so, it would be desirable to choose reliable indicators from each cluster to make sure to assess the varied facets of program quality in ongoing analysis.

In Appendix E, we present an analysis that we conducted in conjunction with Institutional Research to evaluate the efficacy and independence of the metrics used in the 2010 NRC report. Briefly, we found that the data collected by the NRC to assess overall quality formed several coherent, independent clusters, as follows:

- **Quality of Faculty** seemed to be reliably measured by four items: publications per faculty, awards per faculty, percent with grants, and citations per publication.
- **Preparedness of Students:** The NRC data included only one GRE score (verbal for Humanities and quantitative for other fields) as a measure of the quality of graduate students. We analyzed this more fully with all three GRE scores from programs within the University of Minnesota, and recommend using all available scores (see appendix C).
- **Program Efficiency:** Two NRC items, program completion rate and time to degree, formed a strong cluster measuring program efficiency in producing Ph.D. degrees.
- Measures of the **Diversity of Students and Faculty** were included in the NRC data set, including percent non-Asian minority faculty and students, percent female faculty and students, and percent international students. The results of our analysis suggest that these measures form separate components and are not generally related to broader measures of quality such as faculty research impact or median time to degree. However, because diversity can, under certain conditions, enhance quality, we recommend that these measures should be tracked centrally at the University of Minnesota. Diversity can relate to race/ethnicity, student educational background, work experience, background in the current field of study and country of origin, for example.

Are our Ph.D. programs overextended for available resources?

A working hypothesis of this report is that the University of Minnesota has been admitting more Ph.D. students and/or has more programs than is affordable or wise for the promotion of high quality programs of excellence, given available resources. Simply put, we may be spread too thinly. If true, this reduces our ability to provide top quality graduate student experiences and to maintain our reputation as a source of the best Ph.D.s in a variety of academic fields.

Several factors support this hypothesis, including data introduced above:

- As detailed above, Minnesota currently is at or near the top of our peer group in both numbers and proportions of post-baccalaureate students.
- Ph.D. program quality, as assessed by the recent NRC rankings, indicates that although we have highly-ranked programs, we also have programs that appear not to be competitive with peers in impact, performance and reputation.
- Student success rates, as measured by median time to degree and % completion rates, are also highly variable.
- Although it is difficult to get a handle on the numbers of programs at peer institutions and the relationship between size and quality, two indicators suggest that UMTC may have more post-baccalaureate programs than many of our peers. First, among our peers, Minnesota ranked second in the total number of Ph.D. programs among the 62 categories available, with 69 programs (see above table). The number of programs in our peers ranged from 50 (UC-

Berkeley) to 78 (Wisconsin), with an average of 58.5. Second, an informal survey of web-based materials of our peers also seems to indicate that Minnesota has a comparatively high number of graduate programs, but not the highest among its peers (See Table A6). We cataloged 160 current graduate programs at UMTC, including post-baccalaureate certificate programs. By contrast, the number of programs among our peers ranged from 103 (UC-Berkeley) to 173 (University of Wisconsin-Madison), with an average of 140.

An alternative hypothesis, which is not mutually exclusive, is that criteria other than quality influence enrollment trends and numbers of programs, with outcomes that are sometimes to the detriment of quality. The relationship between budget factors, for example, and quality is currently unclear, but budget-related trends in enrollment are likely. One such trend may be the growth of programs that are in high demand and have a low cost to operate, with strong potential for generation of revenue. Such a scenario is likely one factor affecting the increased enrollment in professional masters programs, and could also impact enrollment in doctoral programs where the norm is for students to be self-supporting. We stress, however, that the relationship between potential for revenue generation and program quality has not yet been evaluated.

A second likely budget-related trend would be cuts to programs where costs, including cost pool and assistantship expenses, exceed revenue. We are aware that at least one college has moved to reduce the size of their aggregate graduate enrollment. This factor is likely to be related to the falling enrollments in some disciplines (see data presented above and in Table A3). If collegiate units make across-the-board cuts without regard to program quality for excellence, high quality programs will be adversely affected. Of particular concern is the reduction of program size below a "critical mass" needed to promote the highest quality graduate education.

We believe that a focus on excellence is equally important in lean budget times as when resources are more widely available. Taken on their own, student demand and the potential for tuition generation should not be sufficient to drive enrollment targets. Overall program performance, including quality, must be considered. Poorly performing programs serve neither the needs of the students nor the reputation of the institution. Poor performance metrics may indicate that a large program has exceeded its capacity and could be downsized to create a better fit with capacity. For small programs, poor performance metrics may indicate insufficient critical mass to attract, support, and graduate qualified students. Under-performing programs should be remediated or considered for resizing, restructuring, or (if non-essential) elimination. A corollary of this is that ALL of our graduate programs need to continuously strive consistently for high quality of excellence of scholarship and training.

Quality-centric Enrollment Management

The committee does not recommend setting a specific target for total campus enrollment in Ph.D. programs or for numbers of Ph.D. programs. These decisions should continue to be made locally, but informed by quality metrics. The following recommendations propose a process for advancing the overall quality of the University's Ph.D. programs which uses quality metrics to guide enrollment decisions.

Recommendation 2: Maintain the role of the graduate school in providing incentives for program improvement and in monitoring and promoting quality.

Our current model of devolving the authority to make decisions about graduate education to colleges allows them to consider the entire mission of the college in their strategic planning and in their budget decisions. Involvement of deans in the process of funding graduate education makes it more likely that colleges' priorities will be reflected in the budget. However, colleges may not, by themselves, be able to support their high quality programs at the level needed to maintain quality. Therefore, the central administration must maintain mechanisms to direct funds for distribution through a central graduate school in order to maintain high quality programs and to make strategic investments in programs that have high potential for achieving excellence. Graduate school involvement is also important for the oversight and funding of interdisciplinary programs. For example, the graduate school could also provide critical funding for existing and new interdisciplinary programs that either are already excellent or show promise of excellence.

Regular monitoring of performance measures is needed to track trends. Measures of program performance can provide a bellwether of potential problems that can be more easily corrected when identified early. Likewise, regular monitoring can identify programs on an upward trajectory, to the benefit of strategic planning within colleges and for coordination with otheunits. Yet, some colleges, especially smaller ones, may not be able to allocate personnel for extensive data acquisition and analysis. Also, central tracking of data will assure a common approach and standard of data. Therefore, we maintain that it is essential for the graduate school to play a central role in monitoring performance metrics for graduate programs and sharing that information with decision makers in the colleges and with the programs themselves. By contrast, some factors are best monitored locally, for example student placement information and discipline-specific measures of productivity, scholarly impact or creativity.

Recommendation 3: Provide programs with regular and systematic information concerning program performance that leads to high quality graduate programs.

A focus on metrics has driven reform in undergraduate education. We believe it can do the same thing for graduate education. Appropriate metrics can be used to assess the quality of programs in several ways. Some measures may be widely applicable across programs, allowing the identification of outstanding versus underperforming programs. By contrast, some indicators of quality and impact may be more discipline-specific. These more targeted indicators are useful for longitudinal evaluation of individual programs and for comparisons with similar programs at peer institutions. We must continue to learn what data sources are and will be predictably available, which measures are valid indicators of quality, and what new data must be collected.

We recognize that the term “quality” may invoke diverse epistemological and disciplinary perspectives. Productivity, efficiency, and output metrics are not necessarily the same as measures of impact, distinctiveness, and integrity of the scholarly and creative process. Also, no single measure is likely to represent unit quality and distinction. Even so, it remains important and possible across disciplines to gauge whether we are maintaining and increasing academic distinction at the University of Minnesota. We must be able to address the questions of “how do we know what we’re doing is valuable” and "how do we communicate this value to internal and external audiences."

To evaluate overall program quality successfully, we believe that several types of metrics are needed to evaluate faculty quality, student input metrics, program effectiveness, and student success. While many of these metrics are similar to those used in the last NRC ranking, additional approaches are needed. For example, the most important measure of the quality of a Ph.D. program, the success of our graduate students after they complete their programs, is the least well measured. We will need to identify or create mechanisms for tracking student success after graduation.

The following table presents a full list of measures of the different types of quality metrics that we recommend, from inputs through program to outputs. These are discussed more fully below.

Recommended metrics for evaluating Ph.D. program quality

Metric Type	Name of Measure	Source of Data
Input: Graduate Student Ability, Motivation, Past Performance	Verbal GRE Score Quantitative GRE Score Writing GRE Score	Submitted directly to Grad School
	Area GRE Score GPA Undergraduate degree GPA Post-baccalaureate degree (if applicable)	Official transcripts from schools
	Type of Undergraduate institution Type of Post-baccalaureate institution (if applicable)	Carnegie Classification System
	Number of applications, Number of acceptances, % yield	
Input: Faculty Measures	Faculty grants Faculty publications Faculty citations per publication Extramural Faculty awards Creative and artistic works; performances University/internal honors and awards	NRC (for data collected from previous reports) private metrics firm such as *Academic Analytics* Self-reporting University records
Input: National/International Reputation Measures	National rankings	NRC Disciplinary rankings
Program Operation: Program Efficiency and Competence (graduate student level)	Student publications and conference papers	Programs
	Student satisfaction	Council of Graduate Students (COGS), Graduate School, programs/colleges
	Training grants to programs Student external Fellowships, Awards, Grants Student internal Fellowships, Awards, Grants	Programs/Graduate School
Program Operation: Program Efficiency and Competence (program	Bostrom Efficiency Index (BEI) composed of: Time to Degree/Degree Completion Rates	Graduate School

level)	Faculty/graduate student ratio Faculty/student collaboration Shannon Diversity Index (Interdisciplinary)	University records Departments Graduate School
Output: Graduate Student	Academic/Non academic placement type Quantity trends Alumni citation index scores Alumni awards Alumni publications	Departments Departments Private metrics firm such as *Academic Analytics*

Table 21. Recommended metrics for evaluating PhD program quality

Quality Measures for Ongoing Evaluation of Ph.D. Programs:

- ***Inputs: Quality of Program Faculty.*** We recommend that four NRC (faculty publications, citations per publication, grants per faculty member and external honors and awards) should be continuously tracked for University of Minnesota graduate programs to assess quality of program faculty. We recommend that a private firm such as Academic Analytics be used to provide these data on scholarly impact and productivity. The Graduate School should also track and use measures of internal honors and awards for these quality assessments. In disciplines where these four measures are not the currency of faculty productivity and impact (such as the arts and humanities), other indicators of excellence will need to be developed.

- ***Inputs: Characteristics of Entering Students.*** At the present time, the Graduate School maintains records of the verbal, quantitative, and written GRE scores of applicants, admitted students, and matriculating students for graduate programs. The results in Appendix C suggest that the STEM programs should pay attention to verbal and, where available, the field GRE scores (not just quantitative scores). Similarly, non-STEM programs should pay attention to the quantitative GRE scores. We recommend that GRE data be supplemented if possible by recording the type of undergraduate institution (using the Carnegie Classification System) and perhaps the GPAs of the same three sets of students.

- ***Program National Reputation:*** Among our programs that were evaluated by the NRC both in 1995 and 2010, most of those that were highly rated in 1995 were also highly rated in 2010 (See Appendix D). This suggests that reputation measures may be generally stable over time. Although they can only be updated at intervals rather than continuously, they are likely to be reliable enough to use even given their periodicity. We recommend using the NRC reputation measures, augmented as possible from other sources, such as disciplinary rankings, where available.

- ***Quality of Program Operation***. We recommend the use of the Bostrom Index, discussed in Appendix C, to track effectiveness of programs in retaining and graduating their students. It incorporates measures of time to degree and completion rates. It should be supplemented with data on the faculty/graduate student ratio. The Graduate School routinely collects these data. The Graduate School also currently has data on the extent to which the program is interdisciplinary, the Shannon Index. We also recommend that the Graduate School track graduate and professional teaching awards, as well as student evaluations, by program as an indicator of excellence in instruction by graduate students. We recommend that programs

provide data to the Graduate School on graduate student publications, conference papers, external and internal awards and fellowships, and faculty/student collaborative research. Finally, student satisfaction should be regularly evaluated by program, as is carried out by the Graduate School's exit survey of doctoral graduates and in an annual survey by the Council of Graduate Students.

- ***Output Quality: Placement and Impact of Graduates:*** Departments should provide the Graduate School with systematic data on student placements, using the Carnegie Classification System for academic placements. Non-academic placements should also be measured. In addition, the Graduate School should obtain data on program alumni using similar measures as for faculty, including publications, citations and awards. Data should be stratified by decade in which the degree was received in order to monitor trends in the "impact" of program graduates. Discipline-specific data that parallels that collected for faculty should also be collected for alumni.

Recommendation 4: Establish an internal review process for Ph.D. programs that guides fiscal investment and enrollment targets.

In order to maximize the maintenance and enhancement of high quality scholarship, we recommend a methodical multi-stage and multi-level decision-making strategy and allocation process. This report accepts the premise that declining financial support for higher education is creating a fundamentally new threat to maintaining high quality programs. A firm commitment to quality will require significant changes to and re-allocations in funding for graduate education. At its most extreme, our choice appears to be between more-or-less across-the-board reductions or targeted re-allocations aimed at protecting from serious decline the very best graduate education programs at the University of Minnesota. The overarching goal of this report is to focus first and foremost on **preserving the highest quality programs** of scholarship that currently exist and on nurturing the conditions required to foster additional very high quality graduate programs. This cannot be done without a laser-like focus on quality.

We propose that the University of Minnesota engage in a multi-stage decision making process in setting graduate and professional program priorities for funding and enrollment. In the first stage, programs would be classified into categories based on quality metrics. Program classification would guide subsequent decisions about enrollment targets, funding, and goals for program development. In subsequent stages, these decisions would be finalized and implemented.

Stage 1: Program Evaluation and Graduate School Action

Program assessments and classification would be applied by a non-compensatory model that emphasizes academic quality[13]. An all-university advisory committee, selected by the President and/or Provost, should conduct quality assessments. Similar approaches are being taken by some peer institutions among the public AAU universities.

[13] A non-compensatory model identifies and maximizes one particular value, in this case program quality. Units cannot compensate for the lack of excellence by scoring high on other criteria, such as meeting the demands of external constituencies. The latter criteria and many others would be considered during the subsequent stages of decision-making, conducted at the unit level.

We recommend that the all-university review committee should include the following in its membership:

- Top university scholars (e.g. Regents Professors, McKnight Presidential Chairs, Distinguished McKnight Professors and McKnight Land Grant Professors). These scholars have been selected for these honors based upon their individual accomplishments as scholars and researchers and they come from units in all fields. They represent all stages of scholarship from non-tenured scholars (Land Grant McKnight) to the most senior scholars (Regents Professors).

- Faculty that have demonstrated leadership and excellence in graduate education, for example current or past Directors of Graduate Study who have received the Best DGS award; past or current members of the Graduate Education Council; and faculty that have received the Award for Outstanding Contributions to Post-baccalaureate, Graduate, and Professional Education.

- Graduate School staff with knowledge of past program reviews and related areas.

- Consideration should be given to including one or more graduate students on the committee, and also to inviting participation from a graduate dean from a peer institution.

The committee would assess academic quality and program performance based on data collected by the Graduate School and additional materials submitted by programs. Examples of the types of metrics we recommend are discussed in the preceding section, and would include indicators of the quality of program **inputs** such as the quality and scholarship of faculty and students; indicators of program **efficiency** and **performance;** measures of the program's **national reputation;** and indicators of the quality of the **outputs,** including placement success and the scholarly impact of graduates on their academic field. It is important to evaluate data and information representing multiple time points in order to identify any trends in program performance. Therefore, where available, data represented a ten-year period should be presented for evaluation.

After reviewing performance metrics for programs, the committee should assign each program to one of the following categories:

(1) **Outstanding** (programs with distinguished scholarship, outstanding training opportunites, and exemplary program operation that merit special support; this category should include only the very best programs.

(2) **Strong** (programs of strong quality with high potential to move into the 'Outstanding' category and/or growth while maintaining quality; candidates for further investment)

(3) **Good** (programs that are doing reasonably well, appropriately sized, with critical mass (e.g. some minimum cohort) and appropriate plans for the future)

(4) **Needs Reassessment** (programs with one or more indicators of poor performance, such as low demand; high dropout rates; inability to attract highly qualified applicants; high dropout rates; excessively long times to degree; low faculty and/or student productivity; and low national and international rankings. Such programs would be candidates for remediation, restructuring or elimination)

A brief summary of the committee's findings and recommendations should be prepared for each program. This should be shared with the program and home college. Programs classified at the top and bottom levels require immediate action involving the Graduate School, as defined in recommendations 5-7, while other decisions would be made at the collegiate and program levels.

We recommend that all programs should be re-reviewed and classified on a regular schedule (e.g. every three years). The Graduate School should annually update the measures used to assess program quality, and provide data to programs and colleges in between reviews.

Recommendation 5: Provide financial augmentation and flexibility to Ph.D. programs deemed to be "Outstanding."

Programs designated by the review committee to the 'Outstanding' category would be allocated a financial augmentation by the Graduate School. Outstanding programs are successful, high quality programs that share some common characteristics. Indicators of faculty performance document that program faculty are creative, productive, and that their work has high impact. Such programs draw highly qualified students, who complete their degrees in high proportions and in a timely fashion. Program faculty create an innovative training environment that fosters student creativity and research success, resulting in placement of students in strong positions in their discipline. Outstanding programs develop a strong national reputation for the achievements of their faculty and graduates.

Programs such as these do not achieve their status overnight or by chance; they grow to this status due to sustained effort and achievements over many years, but it can be easily eroded if conditions are adverse. These are the programs that we most want to sustain, and constitute signature strengths of the University. Outstanding programs also provide examples that other programs can emulate. Therefore, providing financial augmentation to 'Outstanding' Ph.D. programs would serve two purposes. First, it would help to sustain the quality and performance of these programs. Second, it would present an incentive to other programs to improve performance so that they might move up into the 'Outstanding' category in subsequent reviews.

Augmented funding for 'Outstanding' programs, once designated, would be allocated centrally for the purpose of enhancing university-wide academic quality and excellence. Program augmentation should be a minimum of $1,000 per student in each 'Outstanding' Program. Further, we recommend that these programs should be able to use this funding to maintain the strength of their graduate programs at their discretion, for example to augment student stipends or to support novel program elements that enhance the training environment.

Excellence is the result of a behavior pattern that needs to be cultivated. Once cultivated it becomes an internalized set of behaviors. In general, programs that were among the strongest at the University of Minnesota several years ago are still among the strongest. They have created and institutionalized a set of values and norms that have been successful and they have had the ability to replenish themselves with the best scholars generation after generation. They have developed and sustained cultures of excellence in scholarship. Putting them at risk would be extremely foolish. We know that what they have been doing has been immensely successful and should not be changed unless the leading colleagues in those departments recognize, from the ground up, that their disciplines are shifting sufficiently that significant changes are required. Administrators need to trust them and give them maximum resources and flexibility to exercise and perpetuate their

habits of excellence. All across this University and academe more generally, these programs have long been, and still are, perceived to be academically excellent.

We suggest that, as Deans and Directors strive to move programs into the "outstanding" category, much can be learned by identifying the "cultures" and "habits of excellence" that may have developed within our long-standing exemplary programs. The Graduate School could assist these programs in their quest to become even better by, for example, conducting focus groups with faculty and staff from the top programs, attempting to distill a set of "lessons learned" about the key factors responsible both for creating and for sustaining outstanding scholarly excellence.[14]

As suggested in our focus groups with Graduate Program Directors, the size of "Outstanding" programs has tended to be self-limiting, based on the resources available, the size of the faculty, and the desire NOT to accept students who were unlikely to be successful. As discussed above, we also observed that there is a minimum cohort size for achieving the "critical mass" necessary for maximizing the quality of graduate education in most programs.

For this reason, we propose that once graduate programs have been identified as "Outstanding" they should, if they deem it advisable, be able to enroll classes of **at least 10-15 students each year**.[15] Some outstanding programs may need larger, and some may choose, for various reasons, to have smaller entering classes. Each should, however, have the ability to enroll a class of size sufficient to maintain their existing quality. Cutting an outstanding program beyond that size is risky. Most of the top programs are likely to be able to gain access to sufficient resources to maintain this critical mass, but some will struggle to accomplish this without additional funding. Programs with 'Outstanding' status should work with the Graduate School and their collegiate units to monitor admissions and help maintain critical masses.

If an outstanding program continues to rank sufficiently high in periodic reviews, it would continue to benefit from its status as "Outstanding" and would receive maximum program flexibility and support.[16] As additional programs achieve these benchmarks, they too could quality for this status. As noted earlier, this would provide an incentive for colleges to focus their resources to create a larger number of exemplary programs.

Recommendation 6: Take action on programs deemed to "Need Reassessment."

Programs with poor performance and those of marginal quality would be identified by the all-university committee and assigned to the 'Needs Reassessment' category. We expect that this would be a minority of programs, but due to the seriousness of their status they would require immediate attention.

[14] Without prejudging the factors identified in such a study, there is considerable anecdotal as well as scholarly evidence that working cooperatively to achieve common goals, and the existence of high levels of interpersonal trust and strong but flexible leadership, among other qualities, tend to maximize performance within programs. There are graduate programs at the U of M that are impeded more by program dysfunction than by the lack of resources.

[15] This recommendation does not apply to programs without exceptional status.

[16] At one focus group session, it was suggested that only one measure—placement success—should be used to evaluate programs, and as long as that criterion was met, programs should be given resources and maximum autonomy. We advocate for a multi-measure approach to quality instead but recommend maximum flexibility for programs that do exceptionally well on these multiple measures. Giving maximum flexibility to programs that have not developed the habit of excellence is likely to be a mistake.

Programs in this category would be those deemed by the committee to have little potential for improving in ratings without intervention. Such programs are often are populated by faculty and students with low morale. Their graduates tend not to be among the most talented or best prepared junior scholars in their field. Because such programs are not able to provide a quality graduate student experience, students have relatively poor placement prospects. Some indicators of programs that are "at risk" would include low demand or the inability to attract highly qualified applicants; high dropout rates or excessively long times to degree; low faculty and/or student productivity; and low national and international rankings.

Programs in the 'Needs Reassessment' category would be placed at low priority for centrally allocated funding. The Graduate School would work with collegiate units that are home to such programs and the programs themselves to decide on outcomes for the programs. Possible outcomes would be restructuring (such as a merger) if that is feasible; downsizing if they are meeting a current need that cannot be abandoned; remediation if there are clear, practical plans for enhancing quality; or elimination if none of these options is feasible. Any outcome other than elimination must include follow up to ascertain that quality improves. There would of course be an opportunity for programs and colleges to make a case to the Graduate School and its advisory committee for program reclassification or redemption. Outcomes should be discussed and tracked during the compact process.

Stage Two: Unit Sizing & Funding Decisions at the Collegiate Level

The second stage of the decision-making process would take place at the collegiate level. The first task is to determine whether programs have been appropriately classified by the review committee. Colleges or programs could make a case to the Graduate School if they think programs have been mis-classified. Once program classification has been agreed upon, plans for programs in the 'Strong' (meriting greater investment) and 'Needs Reassessment' (needing remediation, right-sizing or possible restructuring) must be outlined, with appropriate benchmarks for evaluating progress.[17] Programs in the 'Good' category would require less intensive follow up. Deans would be expected to report on the outcomes of evaluations and plans as part of the compact process. Programs with promising improvement plans might be eligible for additional central funding.

To guide decisions about funding and enrollment targets, colleges would implement a compensatory model that relies on a more lengthy set of criteria. The presumption would be that within each college, the programs identified as 'Outstanding' would top the list of priorities for collegiate budgetary support, in order to support adequate cohort sizes in top programs. In allocating funds for other graduate programs, collegiate resources would be allocated based on collegiate strategic priorities and criteria. For example, sizing and resource decisions could be made after identifying programs that are poised for excellence and units could invest accordingly, striving to help good programs achieve exceptional status. Such a decision-making process could provide a strong incentive to avoid "across the board" decisions. In addition to reliance on the quality indicators in Table 1, Colleges would examine other factors, including the need for TAs for undergraduate programs; the amount of external funding available within programs; whether programs are meeting the needs of the state of Minnesota; the extent to which programs promote diversity; and the overall societal demand for the graduates of the programs. This information would help colleges determine which programs are now the right size, which may need to grow and/or receive additional investment, and which may need to be cut or eliminated.

[17] This would also be an appropriate mechanism for setting benchmarks for new programs.

Recommendations for further work

Recommendation 7: Evaluate impacts of graduate enrollment changes on academic units as part of the compact process.

Graduate programs do not exist in a vacuum. Clearly, faculty must devote time to other roles, including research, teaching in undergraduate and professional programs, and outreach. If graduate programs grow significantly without adding faculty capacity through hiring or redefinition of roles, the ability of faculty to satisfy all of their responsibilities may be taxed. Thus, plans for program growth must be considered in the context of overall planning for academic units.

Downsizing or elimination of graduate programs[18] will also have an impact on academic units. One possible consequence of eliminating graduate programs is that groups of faculty may play a diminished role in graduate education. Where graduate programs are key to research productivity and retention of research faculty, this challenge will need to be addressed. Some faculty members may have the option to participate in multiple graduate programs, so that the loss of one would still allow them to participate in graduate education. Others may not have that option. In some circumstances, it might be appropriate that faculty members take on more significant roles in the delivery of undergraduate education or professional education. Such situations will require individual consideration, because each situation may have unique circumstances.

Making decisions about program changes, and dealing with the context, must therefore involve academic departments, colleges, and central administration. The committee suggests that the compact process, or similar process, is a suitable place to address these concerns.

Recommendation 8: Develop processes for evaluating professional masters and professional doctoral programs.

As indicated above, the work of this committee has focused on Ph.D. and related research masters degrees (M.A. and M.S. degrees), which together enroll about 6,500 students. Enrollment in professional masters and professional doctorate programs totals about as many students. Additional efforts will be needed to develop criteria for evaluating program performance and establishing enrollment targets for these programs. The committee recommends the formation of a task force in FY12 for this purpose. The group should include members with working knowledge of the growing professional programs, as well as faculty and staff with understanding of metrics and processes for evaluating both undergraduate and Ph.D. programs. The group should determine which metrics that have been developed for undergraduate programs or proposed for Ph.D. programs, as outlined above, may be applicable for professional masters and doctoral programs. Furthermore, the group should consider what criteria need further definition, especially for characteristics unique to these programs (e.g. meeting work force needs, accreditation, etc.). Most importantly, the group should address the need to balance the potential for revenue generation with the objective of maximizing quality and program performance.

[18] In the case of elimination of academic departments, it should be noted that the University's tenure code protects tenure of faculty and specifies appropriate action.

Recommendation 9: Develop processes for evaluating post-baccalaureate certificate programs.

One of the guiding principles for this report is to give highest priority to degree-seeking students. As noted above, enrollment in post-baccalaureate certificate programs was almost nil a decade ago, and has now grown to over 450 students. The committee did not study factors affecting this trend. We recommend that enrollment in certificate programs should be evaluated in further work to develop guiding principles for enrollment decisions. As with other post-baccalaureate programs, the quality, comparative advantage, and need for certificate programs should be considered.

Summary for Graduate Education

Our report is centrally focused on identifying, sustaining and creating additional graduate programs of scholarly distinction. We believe that resource and other constraints will not allow the University of Minnesota to continue to offer such a wide variety of graduate programs to such large numbers of graduate students without suffering an across-the-board decline in quality. This would put at risk the signature high quality programs that we now have, and would make it nearly impossible to move our better programs into the ranks of the outstanding programs. To these ends, we have:

- Argued for the use of "multiple metrics", including measures of program inputs, program operation, and program outputs in order to identify the highest quality programs and to pinpoint areas that need improvement in other programs.
- Assessed a large pool of potential metrics that can be used to accurately identify and assess the quality of existing graduate programs.
- Used the NRC and additional U of M data to provide a "proof of concept" analysis, showing that such metrics can be used successfully to assess across the board the quality of our graduate programs.
- Proposed the creation of an all-University Graduate School committee made up of distinguished scholars and others who would assess the scholarly quality of each graduate program and assign it to four potential categories: **outstanding, strong, good and needs reassessment.**
- Proposed that programs designated as outstanding in their scholarship and graduate training be given supplemental funding and maximum flexibility.
- Proposed that desirable goals other than pure scholarly excellence be added to the "excellence" measures in making funding and sizing decisions at the collegiate level.

Enhancing quality is not merely a function of financial investment. While there are examples of additional resources leading directly to improved quality and enhanced reputation, there are also plenty of examples of investments that did not have the desired effects. One very important factor that needs to be considered is what we have identified as "internalized behavior patterns" that reflect "cultures of excellence." Among the subset of programs deemed to be in the "strong" category and that are potential candidates for investment, those that have a culture of cooperation and excellence, coupled with high quality academic leadership focused on quality, are the most likely to succeed. This means that they have already demonstrated that they will use their resources to maximize quality of scholarship and graduate education rather than some other set of values, that they can work together to achieve these goals, and that their investments have begun to have the intended effect. It also means that there is a widely shared ethos among program faculty that emphasizes scholarship. Even programs with strong leaders will fail unless there are also very high performing faculty scholars in the group. In short, at least four things are necessary for the kinds of improvements we are touting: additional resources; cooperation around the common goal of academic excellence; very strong academic program leadership; very strong across-the-board faculty research ethos and performance. To identify programs for additional investment, we recommend that the Graduate School conduct a study of the practices that led particular programs to be classified as outstanding.

Appendix A
Graduate and Professional Enrollment and Degree Data

Table A1 - Graduate & Professional Enrollment Fall 2000 through Fall 2009, UM and Peers

Source: IPEDS, except where noted*

Institution	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	F00 to F09
Minnesota (IPEDS)	**13,657**	**14,461**	**16,220**	**17,000**	**18,238**	**18,358**	**18,289**	**18,589**	**18,583**	**18,423**	**34.9%**
Florida	12,434	12,876	13,342	13,876	14,299	15,081	15,802	16,536	16,820	17,063	37.2%
Minnesota (STIX)	**13,625**	**14,424**	**15,233**	**15,757**	**16,398**	**16,328**	**16,808**	**16,940**	**16,922**	**16,722**	**22.8%**
Michigan	13,691	13,701	14,500	14,514	14,705	14,526	14,470	14,959	15,034	15,466	13.0%
Ohio State	12,203	12,428	12,821	13,126	13,486	13,093	13,339	13,359	13,503	13,666	12.0%
Washington	10,152	10,552	10,854	11,173	11,467	11,876	11,688	11,648	10,278	13,225	30.3%
Texas	11,834	12,007	12,600	13,043	13,000	12,818	12,660	12,711	12,595	12,827	8.4%
Illinois	10,051	10,545	11,052	11,232	11,055	11,029	11,266	11,431	11,829	12,404	23.4%
UCLA	11,879	12,166	12,700	11,340	11,020	10,814	11,179	11,548	11,684	11,863	-0.1%
Wisconsin	10,961	11,061	11,176	11,333	11,377	11,355	11,389	11,397	11,258	11,729	7.0%
Michigan State	9,024	9,353	9,740	9,689	9,428	9,488	9,699	9,973	10,305	10,781	19.5%
UC-Berkeley	8,599	8,859	9,310	9,859	9,923	10,065	10,057	10,304	10,245	10,300	19.8%
Indiana	7,693	7,806	8,151	8,270	8,272	8,396	8,419	8,596	8,728	9,857	28.1%
Purdue	6,998	7,234	7,657	7,999	7,908	7,840	7,941	7,924	8,328	8,552	22.2%
Iowa	9,027	9,165	9,210	9,512	8,307	8,126	8,078	8,210	8,329	8,413	-6.8%
Penn State	6,165	6,289	6,616	6,793	6,465	6,072	6,302	6,437	6,418	6,555	6.3%

* IPEDS data includes inactive students in the zero-credit status. Data reported from UM STIX data includes only active part- and full-time students who are registered for credits.

Table A2 - Graduate & Professional Fall Enrollment as a Percentage of Total Enrollment

Source: IPEDS, except where noted*

Institution	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	F00 to F09
Michigan	35.9%	35.8%	37.2%	37.2%	37.2%	36.3%	36.2%	36.4%	36.6%	37.1%	1.2%
Minnesota (IPEDS)	**30.0%**	**31.0%**	**33.3%**	**34.4%**	**35.8%**	**35.9%**	**36.3%**	**36.5%**	**36.3%**	**35.7%**	**5.6%**
Minnesota (STIX)	**30.1%**	**31.1%**	**32.1%**	**32.8%**	**33.4%**	**33.3%**	**33.8%**	**34.3%**	**34.3%**	**33.8%**	**3.7%**
Florida	27.6%	27.7%	28.2%	29.0%	29.8%	30.3%	31.0%	32.0%	32.7%	33.7%	6.1%
UCLA	32.2%	32.4%	33.8%	30.6%	30.6%	30.4%	30.5%	30.8%	30.6%	30.8%	-1.4%
Iowa	31.9%	31.9%	31.0%	32.0%	29.2%	28.6%	28.0%	28.2%	28.6%	29.0%	-2.9%
Washington	28.1%	28.2%	27.2%	28.5%	29.3%	30.3%	29.6%	29.0%	25.9%	28.8%	0.7%
UC-Berkeley	27.5%	27.6%	28.1%	29.8%	30.3%	30.0%	29.6%	29.5%	28.9%	28.7%	1.3%
Illinois	26.1%	26.8%	27.6%	27.8%	27.2%	26.3%	26.4%	27.0%	27.4%	28.3%	2.1%
Wisconsin	27.0%	27.0%	27.3%	27.7%	28.1%	27.8%	27.8%	27.4%	27.0%	28.2%	1.2%
Texas	23.7%	23.7%	24.1%	25.4%	25.8%	25.8%	25.5%	25.3%	25.2%	25.2%	1.5%
Ohio State	25.4%	25.6%	25.8%	25.9%	26.4%	25.9%	25.7%	25.4%	25.1%	24.8%	-0.6%
Indiana	20.7%	20.6%	21.0%	21.4%	21.9%	22.1%	22.0%	22.0%	21.6%	23.3%	2.5%
Michigan State	20.8%	21.1%	21.7%	21.8%	21.0%	21.0%	21.3%	21.7%	22.2%	22.9%	2.1%
Purdue	17.6%	18.1%	19.1%	19.8%	19.7%	19.5%	19.6%	19.5%	20.1%	20.8%	3.2%
Penn State	15.2%	15.4%	16.0%	16.3%	15.7%	14.9%	14.7%	14.9%	14.5%	14.5%	-0.7%

* IPEDS data includes inactive students in the zero-credit status. Data reported from UM STIX data includes only active part- and full-time students who are registered for credits.

Table A3. Changes in UM Graduate & Professional Enrollment from Fall 2000 to Fall 2010
CIP Classification versus Degree-objective Category

Source: UM STIX data base*

CIP Class \ Degree-obj Category	Certificate	Medical fellow/ resident	Non-degree	Professional doctorate**	Professional masters	Research doctorate***	Research masters	Total
51. Health Professions and Related Programs	169		-128	766	488	56	-380	971
52. Business, Management, Marketing, And Related Support Services	5		-32		689	-8	-9	645
14. Engineering	1		54		-35	287	9	316
44. Public Administration And Social Service Professions	11		-1		265	9	-20	264
13. Education	228		15		-156	85	-10	162
26. Biological And Biomedical Sciences			5		55	120	-20	160
30. Multi/interdisciplinary Studies General	4		32		30	51	28	145
04. Architecture And Related Services			5		98		24	127
60. Residency Programs	5	146	-29					122
27. Mathematics And Statistics	8				92	84	-74	110
22. Legal Professions And Studies			-2	100	-4			94
11. Computer And Information Sciences And Support Services			2		1	77	4	84
45. Social Sciences			1		-5	67	9	72
40. Physical Sciences					-1	41	-7	33
42. Psychology	4					6	19	29
09. Communication, Journalism And Related Programs	9					4	14	27

CIP Class \ Degree-obj Category	Certificate	Medical fellow/ resident	Non-degree	Professional doctorate**	Professional masters	Research doctorate***	Research masters	Total
41. Science Technologies/Technicians							15	15
31. Parks, Recreation, Leisure And Fitness Studies					-7	17	-4	6
50. Visual And Performing Arts				18	-28	0	3	-7
05. Area, Ethnic, Cultural, Gender, and Group Studies						-14	1	-13
03. Natural Resources And Conservation			-1			8	-21	-14
38. Philosophy And Religious Studies						-14	-1	-15
19. Family And Consumer Sciences/human Sciences	4		-11		-3	3	-10	-17
54. History						6	-23	-17
Other			-17					-17
24. Liberal Arts And Sciences, General Studies And Humanities			4		-32			-28
23. English Language And Literature/letters			-1		-1	-7	-22	-31
16. Foreign Languages, Literatures, And Linguistics	1		-1			0	-37	-37
01. Agriculture, Agriculture Operations, And Related Sciences			1		2	-53	-25	-75
Total	449	146	-104	884	1,448	825	-537	3,111

* Excludes students enrolled in zero-credit option; includes active students only. Cells with tan shading highlight growth of > 200 students and cell with light green shading highlights decrease of >200 students (as mentioned in the text).

** Professional doctorates are those encompassed by the current IPEDS category “doctor's degree - professional practice”. This includes the following degrees awarded at UM: M.D., D.D.S., D.V.M., Pharm.D., J.D., D.M.A, D.P.T, Au.D., and D.N.P.

*** Research doctorates are those encompassed by the current IPEDS category “doctor's degree - research/scholarship.” This category includes the Ph.D. and Ed.D. degrees.

Table A4 - Masters Degrees Conferred 2000-01 through 2009-10, UM and Peers

Source: IPEDS

Institution	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Florida	2,396	2,686	2,797	2,961	2,877	2,985	3,062	3,337	3,544	3,751
Michigan	3,042	2,944	3,431	3,446	3,563	3,292	3,347	3,336	3,479	3,596
Minnesota	**2,316**	**2,459**	**2,546**	**2,677**	**2,798**	**2,962**	**3,019**	**3,188**	**3,115**	**3,419**
Illinois	2,168	2,437	2,703	2,756	2,622	2,545	2,582	2,655	2,677	3,074
Washington	2,103	2,306	2,526	2,556	2,560	2,662	2,628	2,631	2,668	2,922
Texas	2,544	2,612	2,637	2,841	2,900	2,829	2,684	2,975	2,893	2,906
UCLA	2,008	2,106	2,303	2,488	2,545	2,402	2,296	2,571	2,634	2,707
Ohio State	2,340	2,457	2,515	2,606	2,685	2,718	2,635	2,576	2,679	2,695
Indiana	1,582	1,620	1,663	1,680	1,783	1,828	1,838	1,745	1,905	2,251
UC-Berkeley	1,617	1,739	1,834	1,896	2,040	1,980	1,966	2,053	2,033	2,046
Michigan State	1,776	1,879	1,914	2,091	2,004	1,867	1,910	1,817	1,942	1,936
Wisconsin	1,907	1,818	2,019	2,022	1,996	1,789	1,944	1,910	1,811	1,919
Iowa	1,254	1,280	1,370	1,358	1,412	1,449	1,296	1,361	1,303	1,457
Penn State	1,165	1,107	1,079	1,252	1,191	1,150	1,131	1,267	1,312	1,419
Purdue	1,284	1,340	1,392	1,583	1,548	1,420	1,377	1,326	1,321	1,342

Table A5. Doctoral Degrees (Research and Professional) Conferred, UM and Peers

Source: IPEDS

Institution	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Florida	1,412	1,514	1,532	1,658	1,665	1,732	1,957	2,107	2,028	2,127
Minnesota	**1,302**	**1,233**	**1,279**	**1,307**	**1,455**	**1,536**	**1,667**	**1,563**	**1,594**	**1,618**
Ohio State	1,287	1,392	1,314	1,342	1,432	1,549	1,501	1,611	1,617	1,596
Michigan	1,217	1,284	1,260	1,365	1,406	1,514	1,496	1,483	1,576	1,534
Texas	1,311	1,226	1,269	1,299	1,404	1,443	1,358	1,439	1,379	1,382
UCLA	1,168	1,132	1,174	1,251	1,225	1,271	1,307	1,361	1,382	1,358
Wisconsin	1,271	1,257	1,274	1,213	1,314	1,261	1,425	1,407	1,430	1,355
UC Berkeley	1,101	1,152	1,095	1,169	1,151	1,110	1,280	1,218	1,216	1,245
Washington	975	928	962	991	1,003	1,124	1,130	1,125	1,176	1,224
Illinois	933	919	918	882	971	998	1,018	1,067	1,081	1,066
Michigan State	725	751	745	774	774	768	855	770	876	921
Iowa	892	890	801	847	924	887	926	926	937	920
Purdue	648	601	666	662	763	785	837	840	882	845
Indiana	688	612	659	647	683	667	651	695	729	718
Penn State	526	519	503	539	571	646	664	643	703	718

Table A6. Graduate Programs, UM and Peers

Institution	Number of Graduate Programs*	Source	Notes
Wisconsin	173	http://www.grad.wisc.edu/education/mas/toc.html	
Penn State	161	http://bulletins.psu.edu/bulletins/whitebook/index.cfm?letter=A	
Minnesota	**160**	**http://www.grad.umn.edu/Programs/select_program.html?l=t**	**Includes certificates, but not minors**
Iowa	156	http://www.uiowa.edu/admissions/graduate/programs/program-details/index.html	
Indiana	154	http://graduate.indiana.edu/graduate-degree-programs.php	Does **not** include +/- 45 PhD minors
Michigan	153	http://www.rackham.umich.edu/dig/ & https://secure.rackham.umich.edu/academic_information/programs/index.php#notrackham	116 Rackham, 37 Non-Rackham
Michigan State	144	http://www.reg.msu.edu/academicprograms/Programs.asp?PType=GR	
UCLA	139	http://www.gdnet.ucla.edu/departments.html	
Illinois	135	http://courses.illinois.edu/cis/2011/fall/programs/graduate/grad_majors.html	
Florida	135	http://gradschool.ufl.edu/downloads/brochure-2010-2011.pdf	See pgs 16 - 19
Ohio State	130	http://www.gradsch.osu.edu/graduate-programs-degrees.html	
University of Washington	124	http://www.grad.washington.edu/Programs/gradprogs.aspx	
Texas	119	http://www.utexas.edu/ogs/admissions/programs.html	
Purdue	108	http://www.gradschool.purdue.edu/index.cfm & http://www.gradschool.purdue.edu/programs/academic.cfm	
UC-Berkeley	103	http://grad.berkeley.edu/admissions/list.shtml	

* Best estimate, based on institutions' websites.

Appendix B. Inter- vs Intra-University Comparisons in Median Time to Degree

In the body of the text, we argued that measures of Ph.D. program efficiency, such as time to degree, should be used to identify outliers rather than to make judgments based on small differences, and that inter-program comparisons need to be made cautiously, especially between STEM and non-STEM fields. In this appendix, we illustrate how the NRC data can be used to compare U of M programs with national norms on Median Time to Degree (MTTD)[1] and also on any of the metrics the NRC collected.

We identified outliers in MTTD at the U of M and then compared these programs with the same programs at other AAU universities. We examined the highest MTTD programs at Minnesota to find out whether they were also outliers nationally among similar programs. In general, they were not only slow in comparison to other U of M programs, but slow in comparison to similar programs elsewhere. For example, the two longest MTTD among the U of M graduate programs included Anthropology (10.3) and Philosophy (9.5). Is this because a Ph.D. in Philosophy or Anthropology requires more time than other programs, or because our departments happen to be slower than other such programs? The NRC data provide a clear answer. Both our Anthropology and Philosophy Departments rank near the highest of AAU Anthropology and Philosophy Departments in MTTD. Most Anthropology programs have a MTTD of 6-8.5 years compared to 10.3 at Minnesota. Most AAU philosophy programs have a MTTD of 5-7 years compared to 9.5 at Minnesota. Similarly, other U of M programs with the longest MTTD exceed the average of their fields.

[1] For the purposes of data collected for the NRC rankings, time to degree was calculated based on elapsed time from students' initial entry into the program, regardless of initial degree objective, to the date the degree is awarded.

Appendix C
Bostrom Efficiency Index: A Measure of Student Outcomes in UM Ph.D. Programs

Bostrom Index: From milestones and dates captured in the University's student information system, it is possible to compute other commonly used data points such as time-to-candidacy, time-to-degree, and completion rates for cohorts. The Graduate School created a composite index of program efficiency based on number of years to degree and completion rates. Every outcome is awarded "points," where receiving the PhD is worth 15 points, leaving with a masters from the program but not the PhD is worth 5 points, and leaving without a degree is worth zero points. The elapsed time spent in the program is deducted (1 year = 1 point; maximum 10 points deducted).

Program Efficiency: The Bostrom Index showed a great deal of variation across programs and within colleges in years to completion of the Ph.D. and the dropout rates of graduate students. Current eight-year completion rates vary from a low of 13-14% in Linguistics, French and Anthropology to a high of over 80% in Pharmaceutics, Child Psychology and Microbiology, Immunology & Cancer Biology. Anything below 50% indicates as many drop-outs and non-completions as completions over an eight year period, and 30 out of 97 programs fall below that standard.

Predicting Student Outcomes with Student Input Data: Graduate programs routinely use Graduate Record Exam (GRE) scores as one means of evaluating applicants' readiness for graduate school. GRE scores (three to four separate components) are reported to the U of M as part of the admissions process. Through the student information system it is then possible to compute average scores of applicants by graduate program, and subgroups such as admitted students and matriculated students.

Table C-1 contains data on University of Minnesota graduate students over a five year period from 2006-2010. It addresses the question, separately, for STEM and non-STEM programs, "to what extent do any of the four GRE scores help predict years to completion and completion rates for U of M graduate programs"? We address this question by making use of GRE scores for program matriculants over this period of time, and by using the Bostrom Index of program efficiency, developed for our subcommittee. We do so separately for programs in science and technology because they weight the relative importance of the four GRE scores quite differently than non-science and non-technology programs. In fact, the findings for the two different types of programs are significantly different in some particulars.

It turns out that for non-STEM programs, when we examine all matriculating students we find that programs' average quantitative GRE scores are fairly good at predicting which programs will have the highest proportion of matriculants finishing, and finishing in a timely fashion. The data in Table 1A take all matriculants and compare those who finish in a timely fashion with those who do not. The greatest difference appears to be in their quantitative GRE scores, which correlate with the Bostrom Index at .45. They have fewer (proportionately) who either fail to finish (drop out) or are still in the program but have not yet finished the degree. For this set of programs, looking at the quantitative GRE scores appears to give some leverage on predicting which programs will more successfully move more students along to a timely completion.

The results for the science and technology programs are quite different, however. Table 1B shows that the best predictors for timely success in these programs are the verbal and area GRE scores of

the matriculating class. Incoming students are often selected on the basis of their quantitative GRE scores, so the entering classes all tend to have high quantitative scores. Among this set of matriculants, it seems that those who have the greatest field knowledge and the greatest verbal abilities are able to move through their graduate studies most efficiently.

An ancillary purpose of this analysis is to explore how interrelated the four GRE scores are when examining U of M graduate programs at the aggregate level. It turns out that among the non-science, non-technology programs mean GRE scores are highly correlated. Programs with the highest average quantitative GRE scores also tend to have the highest verbal and area GRE scores; those with high average written GRE scores also tend to have matriculants with the highest verbal and area scores. Even given this commonality among mean scores, it is the programs with the highest quantitative scores that prove to have the highest scores on the Bostrom Efficiency Index.

Among the science and technology programs, GRE scores are not as highly correlated. In fact, the mean verbal and quantitative GRE scores by program are uncorrelated. And although the correlations are not quite statistically significant, it is the programs with the highest area and verbal mean GREs that prove to have the highest scores on the Bostrom Efficiency Index.

GRE Scores Correlated With One Another & With Bostrom Completion Index: By Field

Table C1. Summary of Findings Non-Science and Non-Technology Programs (N=38)

	Matriculants' Verbal GREs	Matriculants' Quantitative GREs	Matriculants' Area GREs	Matriculants' Written GREs
Five Yr. Bostrom Index	-0.21	0.45*	-0.07	-0.18
Verbal GREs	1.00	0.31	0.43*	0.70*
Quant GREs		1.00	0.37*	-0.07
Area GREs			1.00	0.40*

Table C2. Summary of Findings Science & Technology Programs (N=55)

	Matriculants' Verbal GREs	Matriculants' Quantitative GREs	Matriculants' Area GREs	Matriculants' Written GREs
Five Yr. Bostrom Index	.23	-.08	.25*	.16
Verbal GREs	1.0	.05	.29*	.74*
Quant GREs		1.0	.00	-.25*

Area GREs			1.0	.18

***Significant at .05 level**

Appendix D. NRC Rankings of Ph.D. Programs

Table D1 presents results of the 1995 NRC rankings of graduate programs. It identifies the programs at the University of Minnesota that were ranked in the top 10% and the next 10% (10-20%). At that time, programs were evaluated based on their national reputation as measured by a national survey of program faculty. Five University of Minnesota programs were considered to be among the top 10% of programs nationally: Chemical Engineering, Psychology, Mechanical Engineering, Geography and Economics.

Tables D2 and D3 present the results of the 2010 NRC rankings of graduate programs, using two different methodologies, one labeled the R-based and the other labeled the S-based rankings. The regression-based (or R-based) rankings are most akin to the 1995 rankings in that they have a strong reputational component; rankings for programs were obtained by a survey of a sample of associated faculty members. These rankings were then repeatedly sampled and regressed on 20 quantitative measures of quality determined by the NRC to produce a distribution of rankings for each program. The survey based (or S-based) rankings, however, rely on faculty weights of the importance of each quantitative measure of quality (as opposed to the regression based weights), ostensibly eschewing the reputational component.[2] These two rankings sometimes result in very different rank-orders of quality, and so we will attend to both sets in this analysis.

Bearing in mind that many more programs were evaluated in the 2010 rankings, when we identify programs in the top 10% of either the R or the S rankings, the University of Minnesota has more programs in both the top 10% and 20% in 2010.[3] The list includes Germanic Studies, Chemical Engineering, Psychology, Kinesiology, Child Psychology, Mechanical Engineering, Entomology, Chemistry, Animal Sciences, Ecology Evolution & Behavior, Natural Resource Science and Management, Nursing, Veterinary Medicine, Geophysics and Aerospace Engineering.

Programs that were in the top 20% in 1995 and in the 10-20% range in either the R or S ratings in 2010 include Economics, Mathematics, Electrical Engineering, History, Civil Engineering and Political Science. Programs not in the top 20% in 1995 but that are in the 10-20% range in either the R or S ratings in 2010 include Nutrition, Materials Science & Engineering, Geology, Plant Biological Sciences, Neuroscience, and American Studies.

These results show that almost all of the top programs from 1995 have remained top programs in the 2010 ratings, and that in addition, a number of programs have improved their relative standing while other, newer programs have achieved top rankings.

[2] A more detailed explanation of both methodologies can be found at: http://www.nap.edu/rdp/.

[3] While the differences in methodologies between the 1995 and 2010 NRC studies are substantial, the most visible difference between the two assessments is probably that in the most recent iteration the NRC eschewed a ranking in favor of a range of ranking associated with the 5th and 95th percentile of an programs range of ranking. To determine if a program was in the top 10th or 20th percentile, the range of rankings we evaluated to identify if the associated cut point was included in the range of ranking. This is akin to traditional hypothesis testing and can be interpreted as 'failing to reject' the hypothesis that program was in the top 10th or 20th percentile.

Table D1. Top Minnesota Programs - Based on 1995 NRC Rankings

Top 10%			
Program Name	**No. Programs**	**Rank**	**Relative Rank**
Chemical Engineering	93	1	1.1%
Psychology	184	7	3.8%
Mechanical Engineering	110	8	7.3%
Geography	36	3	8.3%
Economics	107	10	9.3%

Top 10-20%			
Program Name	**No. Programs**	**Rank**	**Relative Rank**
Mathematics	139	14	10.1%
Ecology and Evolutionary Biology	129	15	11.6%
Chemistry	168	21	12.5%
Political Science	98	13	13.3%
Electrical and Computer Engineering	126	18	14.3%
Physics	147	22.5	15.3%
Immunology & Infectious Diseases	180	34	18.9%
History	111	21.5	19.4%
Civil and Environmental Engineering	66	13	19.7%
Statistics	65	13	20.0%
Biochemistry, Biophysics, and Structural Biology	193	39	20.2%

Table D2. Top Minnesota Programs Based on NRC 2010 Regression Based (R-Based) Ranking

Top 10%			
Program Name	**No. Programs**	**New R-Rank: 5%**	**Relative Rank**
Germanic Studies	29	1	3.4%
Chemical Engineering	106	4	3.8%
Psychology	236	10	4.2%
Kinesiology	41	2	4.9%
Child Psychology	236	15	6.4%
Mechanical Engineering	127	9	7.1%
Entomology	28	2	7.1%
Chemistry	178	13	7.3%
Animal Sciences	60	5	8.3%
Ecology, Evolution, and Behavior	94	8	8.5%
Natural Resource Science and Management	33	3	9.1%
Nursing	52	5	9.6%
Veterinary Medicine	60	6	10.0%

top 10-20%			
Program Name	**No. Programs**	**New R-Rank: 5%**	**Relative Rank**
Geophysics	140	15	10.7%
Nutrition	44	5	11.4%
Hispanic and Luso-Brazilian Literatures and Linguistics	60	7	11.7%
Electrical Engineering	136	16	11.8%
Economics	117	14	12.0%
Materials Science and Engineering	83	10	12.0%
History	137	19	13.9%
Microbiology, Immunology and Cancer Biology	78	11	14.1%
Applied Economics	28	4	14.3%
Geology	140	20	14.3%
Computer Science	126	19	15.1%
Applied Plant Sciences	116	18	15.5%
Mathematics	126	20	15.9%

Aerospace Engineering and Mechanics	31	5	16.1%
Political Science	105	17	16.2%
Mass Communication	83	14	16.9%
Civil Engineering	130	22	16.9%
Plant Biological Sciences	116	20	17.2%
Neuroscience	94	17	18.1%
American Studies	22	4	18.2%
Physics	160	31	19.4%

Table D3. Top Minnesota Programs Based on 2010 Survey Based (S-Based) NRC Ranking

Top 10%			
Program Name	**No. Programs**	**New S-Rank: 5%**	**Relative Rank**
Entomology	28	1	3.6%
Chemical Engineering	106	4	3.8%
Geophysics	140	7	5.0%
Ecology, Evolution, and Behavior	94	6	6.4%
Mechanical Engineering	127	10	7.9%
Child Psychology	236	19	8.1%
Psychology	236	20	8.5%
Chemistry	178	17	9.6%
Aerospace Engineering and Mechanics	31	3	9.7%

Top 10-20%			
Program Name	**No. Programs**	**New S-Rank: 5%**	**Relative Rank**
Germanic Studies	29	3	10.3%
Materials Science and Engineering	83	9	10.8%
Electrical Engineering	136	16	11.8%
Economics	117	14	12.0%
Natural Resource Science and Management	33	4	12.1%
Kinesiology	41	5	12.2%
Nutrition	44	6	13.6%
Civil Engineering	130	18	13.8%
Neuroscience	94	14	14.9%
Epidemiology	91	14	15.4%
Veterinary Medicine	60	10	16.7%
Plant Biological Sciences	116	20	17.2%
Nursing	52	9	17.3%
Mathematics	126	22	17.5%
Biostatistics	91	16	17.6%
American Studies	22	4	18.2%
Animal Sciences	60	11	18.3%
History	137	27	19.7%

Appendix E: Assessment of NRC Metrics

Conducted by the Graduate Education Subcommittee in conjunction with Ronald Huesman and Daniel Jones-White, Office of Institutional Research

Most measures of the quality of graduate programs have tended to focus on the quality of the faculty and students in the programs, or so-called "input" measures. An underlying assumption has been that programs with the most distinguished faculty and the brightest and most prepared students are most likely to produce the best scholars who are most likely to have a profound effect on knowledge in their fields. This has been assumed to be true whether or not the program itself was well-run or designed to serve the needs of students. As long as the program does not seriously impede the best faculty and students from doing their work, they are likely to conduct the best research.

Today, however, a much broader, multidimensional understanding of quality is emerging. It includes the standard "input" metrics of student and faculty quality such as GRE scores and grades, citation indices and academic awards, but it also includes metrics of program efficiency, student experience and satisfaction, the quality and rates of job placement and much more. To recognize this evolving view of the quality of graduate programs, we analyzed existing measures of these various dimensions of quality and identified several additional measures to collect for future analysis. In conducting our preliminary analysis of potential measures of quality, we have focused on "proof of concept" rather than specific program evaluations. We wish to demonstrate that these various dimensions of quality can be measured, the reliability and validity of various metrics can be assessed, and summary indices of the comparative quality of graduate programs at the University of Minnesota can be constructed and collected over time. These measures can, in turn, be immensely useful in supplementing other sources of information to make informed strategic decisions about the size of and support for graduate programs.

To that end, we worked closely with the Office for Institutional Research and with Graduate School staff to conduct a preliminary analysis of as many measures listed in Table 1 as we could. We conducted a series of principal components analyses and factor analyses of the metrics included in the NRC's most recent ratings and we analyzed measures of student quality and program efficiency presently available from the Graduate School at the University of Minnesota. First, using the "objective" measures that formed the core of the 2006 NRC assessments, our analysis of all programs except the Humanities[4] at all AAU Universities (N=2,000+) found the following:

The first principal component was *size*; we recommend that further statistical analysis use size as a control variable not as a measure of quality. When we conducted a factor analysis allowing the factors to be correlated, size did NOT correlate significantly with any of the measures of quality in the NRC data set. As a result, we dropped the size component and re-ran the analysis to identify the remaining substantive principal components, which were:

- *Quality of Faculty (Publications & Awards):* NRC used four measures that formed formed a strong and coherent component, all with high loadings. These measures were publications per faculty; citations per publication; percent with grants; awards per faculty. The most

[4]Results of principal components analyses by field showed essentially similar components for all fields except the humanities.

central (best) measures for this component were citations per publication and awards per faculty. Thus it is clear that it is not quantity of publication, but rather impact of the publications, that matter most for faculty quality. The diversity measure did not load on this component. One measure of quality of students, percent of first year students with external fellowships, also had a significant loading on this component, for obvious reasons--the quality of the faculty determines how many incoming "fellows" the program can recruit. On the basis of this analysis, it is safe to conclude that these five measures from the NRC can be used to assess the quality of faculty in various programs at the University of Minnesota. If a subset of measures is desired, the *average citations per publication* and *awards per faculty* would be the best subset to use.

- *Quality of Students*: The NRC included only one measure of student quality, GRE scores--the average Verbal GRE for Humanities and the average Quantitative GRE for Science & Social Science fields. We cannot do a detailed analysis of this construct using NRC data since there is only one measure at one point in time. For now, we are forced to assume that it is a reliable and valid measure. However, see Appendix B for an analysis of GRE scores among U of M programs.
- *Program Completion Efficiency*: The NRC evaluations include measures of program completion rates and time to degree, and those two items formed a strong component with the former loading -.82 and the latter loading .81. Our analysis of separate (more recent) data from the U of M on these same two variables confirms their reliability and validity as measures of program efficiency (Appendix B). We recommend that these two measures should be used to assess program efficiency, primarily to identify outliers, not to make fine-grained distinctions. We also recommend that the primary (but not only) comparisons should be to national norms within fields rather than comparisons across fields, which vary widely in their traditions and needs. For example, many science fields provide ample multi-year postdoctoral grants that, in essence, allow graduate training to continue several years after the Ph.D. is completed. Other fields have no postdocs and, in essence, require the equivalent of postdoctoral training to occur before the Ph.D. is granted. We will later demonstrate how intra-field comparisons can be done using NRC data.
- *Program Student Experience*: The NRC evaluations include measures of whether student work space is provided, the percent of first year students with full financial support, and the average number of Ph.D.'s granted. These three items form a fairly strong principal component, led by the percent of students with full support, which has a loading of .72. The average number of Ph.D.s granted has a moderately strong negative loading (-.41), showing that size has a negative effect on the quality of the student experience. We recommend continuous tracking of these measures.
- *Diversity of Faculty & Students*: The NRC included measures of the percent non-Asian minority students and faculty, percent female students and faculty, and percent international students. These items formed two principal components, the first of which included percent female faculty (.77) and percent female students (.83) as core elements. Percentage of international students and GRE scores both had significant negative loadings on this component. The percentage of non-Asian minority students and faculty formed a a separate component, unrelated to the non-Asian diversity component.

Subgroup Analyses of NRC Measures: Many of the results reported immediately above could primarily reflect differences among types of programs so we repeated our analysis separately for Agricultural Sciences, Biological and Health Sciences, Engineering, Physical and Mathematical Sciences, Social and Behavioral Sciences and the Humanities. The results mirrored the overall results with one significant exception: Among Humanities programs, the principle components solution resulted in different components extracted in different order. However, the measures of program efficiency were the same, and the measures of faculty quality were similar, with awards per faculty member and average number of publications providing the best measures. Grants played no role whatsoever for Humanities programs, and "citations per publication" was not included.

Appendix F: Provost Sullivan Charge Letter

UNIVERSITY OF MINNESOTA

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Gregory Vercellotti, Professor, Department of Medicine
Cathy Wambach, Associate Professor, Postsecondary Teaching and Learning
Mandy Stahre, graduate student, COGS
Paul Strain, undergraduate student, MSA

FROM: E. Thomas Sullivan, Senior Vice President for Academic Affairs and Provost

DATE: May 10, 2010

RE: Short- and Long-term Enrollment Management Committee

It is clear that as we move forward with our continued strategic planning efforts involving both the academic and administrative side of the University a careful plan for enrollment management is essential. The short- and long-term enrollment management will affect our budgets and fiscal health, the curriculum we deliver, faculty/student ratios, and access to the University. We must determine what the appropriate balance is among undergraduate, graduate, and professional education students. What is our particular enrollment niche given our role as the state's primary research institution? What is our comparative advantage?

I have asked Robert McMaster, Vice Provost and Dean of Undergraduate Education, and Henning Schroeder, Vice Provost and Dean of Graduate Education, to co-chair this committee. Suzanne Bardouche, Assistant Vice Provost for Undergraduate Education and Ron Matross, Head Enrollment Management Analyst for the Office of Undergraduate Education, will staff the committee. Other key faculty and administrative staff will be tapped for their expertise on particular matters as needed. I would like you to focus on principles that should guide decision-making. Some of the key questions that I would like this committee to address include:

1. What factors (such as quality, including diversity and international enrollments) should inform our enrollment goals at the undergraduate level, the graduate level, and the

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professional level? Are there different factors applicable to different colleges or programs?

2. At the undergraduate level, how should we determine the correct balance between PSEO, new high school students, and transfer students?
3. What is the relationship between enrollment at various undergraduate levels and the curriculum? Where are the pressure points?
4. How do we determine the appropriate enrollment balances among the colleges? What factors should be used to determine which colleges or programs should grow and which should be smaller?
5. How do we view the transfer relationship between MNSCU and the U of M, in particular for community colleges?
6. How do we determine the optimum balance among undergraduate, professional, and graduate enrollment, college by college?
7. How do we determine the appropriate role and numbers of part-time students?
8. How do we determine the appropriate size of an academic graduate program?
9. What are the appropriate metrics for monitoring the effects and success of enrollment management changes?
10. What is the appropriate balance between financial aid and tuition, and what level is sustainable over the long term?
11. Given the size of the faculty, the campus and its facilities, what is the optimum number of students who can be accommodated and still maintain a high quality educational experience?

I would like to receive a draft report by the end of this summer, and a final report by the end of fall semester 2010.

cc: Sharon Reich Paulsen, Associate Vice President and Chief of Staff to the Provost