

Final Report of the  
Faculty Consultative Committee  
Metrics and Measurements Subcommittee

Submitted September 18, 2008

Subcommittee Members

Jennifer Windsor (Subcommittee Chair), Professor of Speech-Language-Hearing Sciences  
William Durfee, Professor of Mechanical Engineering  
Emily Hoover, Professor of Horticultural Science  
Jeffrey Kahn, Director, Center for Bioethics; Professor of Medicine  
Subcommittee Staff: Gary Engstrand, FCC; Jeanie Taylor, Assistant Vice Provost

## TABLE OF CONTENTS

	Page
I. Executive Summary	2
II. Introduction	4
III. Preliminary Considerations	7
IV. Consultation with University Administrators	10
V. Consultation with University Faculty	23
VI. Other Subcommittee Discussion	28
VII. Recommendations	30
A. External Measures	31
B. Internal Measures	35
VIII. Appendix A	
Table A1: Metrics and Measurements Task Force Metrics	38
Table A2: Awards and Academy Memberships included in the Metrics and Measurements Task Force Report	39
Table A3: Comparison Public Institutions included in the Metrics and Measurements Task Force Report	40
IX. Appendix B	
Table B1: Consultation Meetings	41
Table B2: Memo sent to University Department Chairs and Heads	42
X. Appendix C	
References	43

## I. EXECUTIVE SUMMARY

Significant scholarly and creative work by faculty is fundamental to a great university. In the current academic climate, ‘measuring’ an activity has become a critical acknowledgement of the centrality of the activity to an institution. If we are to measure the excellence of any set of the multiple activities at the University of Minnesota, scholarly and creative work seems particularly important to address. In 2006 the Metrics and Measurements Task Force identified a set of external measures of research and discovery, teaching and learning, public engagement, and resources and infrastructure. The Task Force Report is an important document in that it describes and motivates aspects of strategic planning at the University. However, faculty scholarly and creative work was not addressed significantly in the measures. This document reflects the work of the Faculty Consultative Subcommittee on Metrics and Measurements (2007-08) and provides a response to the Task Force measures of *research and discovery*.

The value and impact of research and discovery is embedded in multiple perspectives and multiple audiences. The notion of distilling that value to a small set of measures is surrounded by diverse epistemological and methodological views. There also is the concern that measurement leads to a solely market- or profit-driven approach to academia, and that a cottage industry now surrounds university ranking systems. The Subcommittee took the view that, even if the construct of measurement and specific measures are imperfect, it is both important and possible to begin a discourse about “how do we know what we’re doing is valuable” and to gauge whether we are maintaining and increasing academic distinction at the University of Minnesota.

Based on consultation with faculty and administrative leaders, the Subcommittee makes the following 13 recommendations:

### **External Measures: Campus-Wide Aggregates**

1. Publication in scholarly outlets be added as an external measure of Research and Discovery.
2. Intellectual property commercialization be changed to an external measure of Research and Discovery rather than a measure of Public Engagement as proposed originally.
3. National academy members and faculty awards be combined as one external measure, with subsets of award types identified when necessary.
4. Total and federal research expenditures be maintained as external measures of Research and Discovery.
5. Post-doctoral appointees not be considered an external measure of Research and Discovery.
6. Faculty and staff diversity be considered an external measure of Culture rather than an external measure of Research and Discovery.

7. Faculty satisfaction be considered an external measure of Culture rather than an external measure of Research and Discovery.
8. The scholarly and creative work of only probationary and tenured regular faculty and contract faculty with professorial rank and research/clinical responsibilities be included in external measures of Research and Discovery.
9. Faculty from each of the Crookston, Duluth, Morris, and Rochester campuses have significant involvement in developing measures of core scholarly and creative activities carried out by faculty on these campuses.

#### **Internal Measures: Campus-Wide Aggregates**

1. Disciplinary or other significant faculty awards (non-University awards) which typically are precursors of or intermediate to the small number of external faculty awards be used as an internal measure.
2. Number and dollar amount of submissions for external funding be used as an internal measure. Also, total and federal research obligations be used as internal measures to supplement the external measures of total and federal research expenditures.

#### **Internal Measures: Unit or Segment Measures**

1. Individual units (or groups of units) be encouraged to examine progress on one or more internal metrics of research and discovery that are relevant to the current missions and goals of that unit and which align with relevant 7.12 statements. When possible and appropriate, units are encouraged to compare performance with peer units at other institutions.
2. As proposed by the Senate Joint Subcommittee on Databases, there be a web-based system/database service for faculty to report scholarly and creative activities for tracking internal metrics.

Details of each recommendation are proposed beginning on page 30.

## II. INTRODUCTION

### Purpose

To respond to the work of the University of Minnesota Metrics and Measurements Task Force and propose additional measures which address the quality of scholarly and creative activities of the faculty. Given that measures may have an impact in strategic positioning, the Subcommittee's goal was to identify representative and valued indicators of faculty scholarship and creative work.

### Background

As part of the University's strategic planning, the Metrics and Measurements Task Force was charged in 2005 to "identify the right metrics, and establish processes to best support and analyze the University's progress toward its goal to become one of the top three public research universities in the world within the next decade." This focused move to measurement was in line with international recognition of the role of metrics and ranking systems. The Metrics and Measurements Task Force proposed 20 University-wide performance measures, including six measures of *research and discovery*, six measures of *teaching and learning*, three measures of *public engagement*, and five measures of *resources and infrastructure* (see Table A1 in Appendix A). The Final Report of the Metrics and Measurements Task Force (2006) is available at: <http://purl.umn.edu/5656>.

Given the potential importance and long-term impact of these measures on University life, in Summer of 2007 the Faculty Consultative Committee (FCC) discussed the importance of ensuring that the measures included relevant aspects of faculty scholarship and creative work. The work of the faculty is the cornerstone of the caliber and reputation of any university, and the FCC wanted to ensure that appropriate and valid measures of faculty work are included in any performance indicators that the University might use to document progress toward the aspirational goal of being among the top three public research universities. Notwithstanding concerns that might be raised about the difficulties and imperfections inherent to measuring faculty work and acknowledging that "not everything that counts can be counted," the FCC considered that, if measures are to be used, the selected measures should be as representative and useful as possible.

Most of the discussion focused on the six measures of research and discovery proposed by the Metrics and Measurements Task Force. These include:

1. national academy members
2. faculty awards
3. post-doctoral appointees
4. research expenditures
5. faculty and staff diversity
6. faculty satisfaction.

A seventh measure, (7) publication in scholarly journals, was identified as being under consideration. The first four measures draw from the Center for Measuring University

Performance's annual report, the Top American Research Universities.<sup>1</sup> The specific national academy memberships and faculty awards included in (1) and (2) are listed in Table A2 in Appendix A. The measures of faculty and staff diversity and faculty satisfaction were identified to further align with the University of Minnesota's own goals and values. The 10 public research institutions identified by the Metrics and Measurements Task Force as comparison institutions are shown in Table A3.

The FCC considered that the Task Force had identified measures that are important for a great university, but questioned whether the six measures were sufficient by themselves to represent in a significant way the core scholarly and creative activities of the faculty. With the support of Provost Thomas E. Sullivan and Vice President for Research R. Timothy Mulcahy, the FCC Metrics and Measurements Subcommittee was charged by the FCC to evaluate current measures and recommend additional measures to address this question.

In addition to the work of the Metrics and Measurements Task Force, there has been previous discussion about the distinctive roles of the University in local to global arenas. In particular, the 2004 Report of the Instrumentalization Task Force (the Lighthouse Report) addressed the "roles and uses of the University within the various constituencies that make up the University community and its larger public." The Instrumentalization Task Force focused on the public good role of the University, especially within Minnesota, and contrasts it with a metrics-based approach by beginning "Have you ever tried to define the University of Minnesota without using numbers? Try it! It is exciting! Ignore the numbers." The Report of the Instrumentalization Task Force is available at: <http://www.umn.edu/usenate/fcc/lighthouse.html>.

The contrasting approaches outlined above speak to a key strength of the University, the diversity of views represented here. There is not only diversity in views; there are natural differences in language and ways to communicate which reflect the breadth of backgrounds and perspectives in the broader University community. The FCC Subcommittee's goal was to identify representative aspects of faculty work across disciplines and professions which could support the premise that the scholarly and creative activities in which University faculty engage are of sustained high-quality over time, especially in comparison with peer institutions. The Subcommittee built on previous work to speak directly to the University's selection and use of measures associated with strategic planning.

### Scope

Three factors initially guided the scope of the Subcommittee:

1. Research and discovery, teaching and learning, and public engagement inherently are related and are interwoven in the work of many faculty members. However, there is ongoing work by other groups at the University on teaching and learning, especially in line with the Voluntary System of Accountability which focuses on the undergraduate experience (e.g., the development of student learning and development outcomes, student evaluation of courses, liberal education requirements). The new Associate Vice President for Public Engagement also recently joined the University. Thus, the Subcommittee focused on measures of faculty **research and discovery only**. The

President's Emerging Leaders (PEL) Team Project on Aligning and Delivering Research Metrics, sponsored by the Office of the Vice President for Research, also recently examined current research metrics used by units.

2. In defining research and discovery, the Subcommittee looked to the Instrumentalization Task Force's description: "Generate and preserve knowledge, understanding, and creativity by conducting **high-quality research, scholarship, and artistic activity** that benefit students, scholars, and communities across the State, the nation, and the world." Following the Faculty Culture Task Force Report,<sup>2</sup> research was not limited to the publication of scholarly or creative works, but also included "innovative activities which lead to the public availability of products or practices which have a significance to society" (e.g., artistic products, patents and other instances of commercialization). This description aligns with the notion of research and artistic achievement identified in Section 7.11 of the University Tenure Code for regular faculty.
3. The FCC recognized that the five University campuses have complementary but distinct missions. The Subcommittee was charged by the FCC to focus on the **Twin Cities campus (Minneapolis and Saint Paul) only**.

### III. PRELIMINARY CONSIDERATIONS

Not everything can or should be measured. In attempting to identify useful measures of the University's research and discovery, the Subcommittee first considered what *not* to measure. Discussion focused on the distinction between external and internal measures, the relevant audience for measurement (especially ranking) outcomes, and the constraints inherent to any measurement system.

1. **External and internal measures of research and discovery serve different goals.** Like the Metrics and Measurements Task Force, the Subcommittee focused mainly on a **small number of external measures** of research and discovery, that is, Twin Cities campus-wide quantitative aggregates which provide benchmarks for progress toward institutional goals. The goal and utility of these external measures lies in the extent to which meaningful comparisons can be made with other institutions. These measures: (a) tend to be restricted to only a small set of attributes, and (b) may sample attributes rather than count every single instance of an activity at the University. To compare across institutions, the attributes (c) must be numeric and (d) the way in which external measures are obtained and the value that is placed on them must be conventional or shared across institutions.

While the major focus was on external measures, the Subcommittee recognized that **internal measures**, that is, benchmarks that are not used to compare with other institutions, also serve distinct goals. A major value of internal measures is that they highlight distinctive and important aspects of research and discovery in various parts of the University that potentially are masked or not represented in the aggregated external measures. Selected internal measures may be useful as intermediate benchmarks to predict progress toward higher standing on external measures. Second, even when internal measures are unrelated to the University's overall standing, they allow for measuring change within the overall University and its units over time.

Internal measures complement external measures in that they: (a) may draw from a broader, more flexible and fluid set of possibilities than external measures and (b) need not be used conventionally by other institutions. Internal measures may be used to assess performance related to (c) highly distinctive markers of the University that are not necessarily shared by other institutions, such as the University's large size and comprehensive mission, including the land-grant mission. Importantly, internal measures need not represent the University as a whole but (d) may be specific to one or more units at the University (*where 'units' refer to segments of the University such as departments, centers, schools, and colleges*). The Subcommittee did not wish to link the concept of internal measures with that of resource allocation among units. Rather, the Subcommittee's focus was on units having the flexibility to use internal measures to compare relevant aspects of faculty work with, for example, peer departments/fields at other institutions or peer units within the University.

The Subcommittee considered *interdisciplinary research and discovery* as an illustrative example of the distinction between useful external and internal measures. Interdisciplinary activities have been a recent focus at the University; the activities may have very high value, and may over time become a distinctive characteristic of the University. For some units, identifying an internal measure(s) of interdisciplinary research and discovery could have particular value. At



the same time, there are different ways in which interdisciplinary activities are defined at the University; and the common administrative definition of cross-collegiate activities is not necessarily a definition that is shared with other institutions. Moreover, the construct may not be aggregated meaningfully at the level of the University. That is, counting the total number or percentage of interdisciplinary activities/products at the University is unlikely to represent the added value of these activities or to be a useful comparison with other institutions. Thus, while an internal measure of interdisciplinary work may be valuable to many segments of the University, a campus-wide external measure would seem to have limited use.

2. **There are multiple audiences for external measures and various ways to measure what it means to be an elite public research university.** Prospective undergraduate, graduate, and professional students and their parents may rely on ranking information available in the popular press to inform their selections among institutions. Potential employers may rely on an institution's overall reputation in employee recruitment. Federal, state, and local policy makers may look to outcome measures such as undergraduate graduation rate and tuition cost to examine fiscal accountability. Globally, higher education leaders increasingly are being challenged to be among the 'top' universities. While all audiences are relevant, the Subcommittee considered that the most immediate audience for information on external measures of research and discovery is the national and international higher education community, mainly faculty and administrators at peer institutions. This is the audience from whom distinguished scholars and administrators are recruited; and it is an audience which pays very close attention to relative strengths and specialization in a given field, which looks to form cross-institutional collaborations, which competes for prestige in terms of research dollars and national awards or artistic vibrancy and prominence, and which helps define institutional reputation.

The University of Minnesota currently ranks 28<sup>th</sup> in the world in the Academic Ranking of World Universities,<sup>3</sup> which is published each year by Shanghai Jiao Tong University. The 2007 ranking was 33<sup>rd</sup> (with a national ranking of 25<sup>th</sup>). However, the University was ranked 142<sup>nd</sup> in the world (49<sup>th</sup> in the United States) in the 2007 edition of The Times Higher-QS World University Rankings<sup>4</sup> published in The Times Higher Education Supplement (but ranked 41<sup>st</sup> for publication citations/faculty). The University was ranked 187<sup>th</sup> in the world in this system in 2006. The Top American Research University rankings, published by the Center for Measuring University Performance at Arizona State University (formerly at the University of Florida) has received increasing national attention and was considered by the Metrics and Measurements Task Force in making their recommendations. The University of Minnesota-Twin Cities is ranked in the top dozen public research institutions in these 2007 rankings. The University of Minnesota has a national ranking of 61<sup>st</sup> in the U.S. News and World Report 2009 rankings.

Institutional rank thus can vary quite markedly, in part because different ranking systems use different sets of indices of excellence, different time frames, and different data sources. For example, U.S. News and World Report rankings include characteristics such as tuition cost, ethnic and economic diversity, student retention, and alumni giving. The Top American Research Universities includes endowment assets/giving and SAT scores in addition to indices of research and discovery, but does not include an index of scholarly or creative output. For the 2006 Times Higher-QS World University Rankings the time window for tracking faculty publications was reduced from the most recent 10 years to 5 years. For the 2007 rankings the

citation database was switched from Thomson Reuters Essential Science Indicators to Elsevier's Scopus. The Subcommittee considered there to be little value in aligning the selection of measures/methods with one or more specific ranking systems. This seemed to distract from rather than facilitate the central goal of identifying useful measures that speak to distinctive University research and discovery.

**3. There are inevitable constraints on measures of research and discovery at this and other universities.** In addition to the complexity inherent to ranking systems, the Subcommittee acknowledged that there are inherent limits on any measurement activity. These include, for example, staffing and software constraints on amount and type of data that can be collected validly and reliably; institutions' selective use of measures and weighting formulae to highlight known strengths; and relative rankings often being influenced by faculty size and past reputation within the institution or given field. These constraints are compounded by differences in fields that predominate at a given institution; multiple different audiences for scholarly and creative work; and multiple unit-specific missions. All measurement tools have constraints, and it seems unlikely that any particular set of measures by itself determines definitively which institutions actually are the top three public research universities.

However, it should be possible to identify a small set of adequate external measures of research and discovery on which the University wants to make progress relative to other institutions. It also should be possible to develop quantitative and/or qualitative measures of process and/or outcomes that show whether the University improves or declines over time relative to internal benchmarks. There are many innovative and exceptional scholarly and creative activities at the University, and it should be possible to address the question of "how do we know what we're doing is valuable and that we're heading toward our stated goals?"

#### IV. CONSULTATION WITH UNIVERSITY ADMINISTRATORS

The Subcommittee consulted faculty and administrative leaders in the University to discuss measurement issues and for input on representative measures (Table B1 in Appendix B lists meetings). The Subcommittee also considered several background readings, including readings about the range of measures used to rank universities and critiques<sup>5-11</sup> of both the concept of measuring quality and specific measures (Appendix C). Section IV reports on the core issues and perspectives raised by administrators with whom the Subcommittee consulted. This section also summarizes additional Subcommittee work that built on the issues raised by administrators.

Leaders from several administrative offices were consulted both for their perspectives on measurement and suggestions of specific measures. Most discussion focused on external measures of research and discovery. Six overarching issues/findings were discussed across meetings, as well as four other issues that were specific to individual meetings.

The six general points of discussion were:

1. **The nation-wide move toward external measures of universities, that is, university-wide measures that are used to compare and rank one university to others.** There is ongoing national and international discussion of the value and limitations of measuring a university's strengths and weaknesses relative to other universities. There was some diversity of views among administrators on the short- and long-term value of external measures to strengthen the University; however, there was general recognition that selected external measures were significant to document the trajectory of the University toward preeminence among public and private institutions.
2. **The value of external measures aggregated at the University/campus level; that is, tracking overall performance of the University versus the value of internal measures, that is, tracking performance at the unit (department, center, school, college) level.** It was recognized that external measures often are gross reflections of institution size. Moreover, any one single external measure or single set of external measures was not considered appropriate across all units, and that consequences for individual units on irrelevant or insensitive measures would be of concern. For instance, federal research expenditures was not viewed as a sensitive measure of quality in the humanities nor were publication citation indices seen as sensitive measures in the arts. It also was recognized that there are resource factors that affect preeminence of units that may be beyond the immediate control of unit leadership to change (e.g., faculty size, student-to-faculty ratio, physical space, potential for attracting large donors, centrality to University strategic planning). In particular, faculty size was noted as an important component of success in some external ranking systems. Finally, as long as they are applied consistently across institutions, there was a general consensus that external measures need not capture every separate aspect of each individual faculty member's work, but instead could provide a representative sample of overall University performance.

On the other hand, internal measures, that is, local measures that may be used by only a segment of the university, were suggested by some as most appropriate to document changes in strength of a unit over time. These measures could be unique to the University of Minnesota or segments

of the University, would not be constrained by the need to share the same measurement units as other institutions, and likely would sample individual faculty members' work in more detail.

2. **The need to identify appropriate denominators for measures of faculty scholarship and creative work.** The University is large and complex; and there are individuals in a range of appointment categories who contribute to scholarship and creative work (e.g., tenure-track and tenured faculty members, contract clinical scholars, postdoctoral fellows, research associates and other academic professionals). The University does have collegiate personnel plans in place which enable tracking of the proportional representation of different academic appointment categories. Identifying which appointment categories are appropriate to include, especially in external measures, is important to ensure that overall aggregates and per-capita measures are reliable indices. Discussion with Medical School Associate Deans Moldow, Mulcahy, and Perkowski suggested that this may be particularly difficult in the Medical School where there is an especially diverse range of appointments. Although appointment types are identified in PeopleSoft (see Academic Appointments with Teaching Functions at: <http://www1.umn.edu/ohr/policies/hiring/acadteach/index.html>), some Academic Professional (P&A) appointments may be used in somewhat different ways across the University, potentially obscuring whether the individual in the position has research and discovery responsibilities. There is a related tracking difficulty in that only Academic Professional positions with 'research' in the appointment title, such as Research Associate/Research Fellow, are countable as contributing to research and discovery.

Although these types of issues potentially are problematic, the majority of the total academic appointments on the Twin Cities campus (59%) are held by regular tenured or tenure-track faculty and another 12% are held by faculty on contract appointments, many of whom are involved in research in some way. The other 29% of academic appointments are held by temporary, visiting, and adjunct faculty and by P&A employees with primary teaching responsibilities (see Table 1 on the next page). Excluding P&A with primary teaching responsibilities, faculty and contract employees account for 90% of individuals with academic appointments. Thus, these two categories alone may be of most interest for any per-capita measures as they account for the majority of individuals carrying out research and discovery. There remains some ambiguity in that the category of faculty includes individuals with Without Salary Appointments and faculty members currently serving in full-time administrative positions.

**Table 1: Summary of Academic Appointments With Teaching Functions for Employee Groups on the UMTC Campus**

Employee Group		Headcount	FTE
Faculty	Tenured <i>Any percentage of appointment</i>	2031	2008.44
	Tenure Track <i>Any percentage of appointment</i>	572	569.27
	Subtotal:	2603	2577.71
Term	Contract <i>Appointments 67%-100%</i>	508	495.11
	Temporary <i>Appointments 67%-100%</i>	40	39.27
	Visiting <i>Appointments 67%-100%</i>	33	31.37
	Adjunct Outside <i>Appointments 67%-100%</i>	284	70.10
	Subtotal:	865	635.85
P&A	Primary Teaching <i>Any percentage of appointment</i>	936	460.29
	Subtotal:	936	460.29

Note. Numbers are for the Twin Cities campus only (including UMD Medical School); only 'Faculty' includes without salary appointments; employee status of active, paid leave, or unpaid leave included. Table prepared by Nancy Wilhelmson, Director of Human Resources, March 27, 2008.

**4. The question of 'granularity' or level(s) of data collection that is most useful for internal measures.** Comprehensive research universities are multi-faceted and while all corners of the University engage in scholarship and creative work, the nature of such work and the appropriate peer group for comparison varies by unit, especially by college and department. The question arises of what it means for one research university to be better than another. Does it mean that common metrics averaged across all units come out higher than the same metrics averaged across all units of the other university? The averaging process masks peaks of excellence and valleys of mediocrity. A university could have a dozen or more, recognized world-leading units but still be ranked low on average measures. While a measure such as quantity of journal publications can be normalized to number of faculty to account for institution size, it can be biased by, for example, one university having a larger medical school, where publication rates tend to be higher, than the other university.

Another option to address the question of relative excellence is to collect data by college or even by department and to compare the data to an appropriate set of peer colleges or departments. This comparison has great relevance to the college or department and every unit is encouraged to compare themselves to their peers on measures relevant to the unit. The Subcommittee consensus, however, was that external measures of faculty scholarly and creative activities for the university as a whole should not be broken down by college or smaller unit for three reasons. First, data

collection by unit is a complex and expensive proposition and it is unlikely that it could be implemented reliably and consistently for a university as complex as ours. Second, reliable data on a unit basis for other institutions may be difficult if not impossible to find (other than peer assessments as in the U.S. News and World Report). Third, if central administration collected and compared data on a unit by unit basis, there would inevitably be suspicion that the purpose of the activity was to weed out underperforming units and direct resources to superior units based purely on imperfect, superficial numeric data that may not be equally relevant across departments. This would not be healthy. The Subcommittee felt that the best approach would be to collect data for external measures on a campus-wide basis, using appropriate normalizing factors to account for size and possibly overall makeup of the university and to leave finer granularity comparisons on internal measures to individual colleges, departments, and centers.

5. **The value of more regular and more systematic information sharing or centralization of measurement and other resources among University offices.** More than one administrative office at the University is engaged in examining and/or developing various indices of faculty activities. For example, examination of faculty publication citations is being explored by the Office of the Vice President for Research as well as the Office of Institutional Research. Associate Vice President for Planning Robert Kvavik also has begun to examine key performance indicators (“academic analytics”) to track and assess the University’s operational and strategic performance. Individuals in the University Libraries have strong data management expertise as well as access to database services, such as those offered by Thomson Reuters (formerly Thomson Scientific and Thomson Institute of Scientific Information or ISI), to facilitate measurement at the University. Some University offices appear to reference different online data sources (e.g., National Center for Education Statistics, National Science Foundation); however, the information is not shared proactively with other offices. An example of an area in which there does appear to have been more systematic sharing of information across offices relates to support for faculty awards. The Office of the Vice Provost for Faculty Affairs and Development now has increased links with the Office of the Vice President for Research and University Relations to report and highlight faculty awards. Regents Professors, McKnight Professors, and National Academy award winners also meet to discuss nominees for National Academies. Overall, the Subcommittee considered that there was extensive expertise at the University to support measurement activities, and that more systematic coordination among offices would enhance these activities.

6. **For most units, information on faculty scholarly and creative activities such as that gathered annually for merit salary review apparently is not maintained in any permanent, central, or accessible way at the level of the University.** Moreover, this information appears to be formatted in multiple individualized ways across schools/colleges and generated in media that often are not amenable to aggregation or analysis. Thus, a potentially rich source of information about faculty activities that could serve multiple purposes is not captured. There also may be an increased workload because of the re-creation of information over time. The Carlson School of Management, College of Human Ecology, and Humphrey Institute of Public Affairs have developed/are in the process of developing online faculty reporting systems. Also, the University Libraries has examined activity/data reporting tools produced by Digital Measures (<http://www.digitalmeasures.com/>) as a way to collect information about faculty research, teaching, and service activities. Finally, the Senate Joint Subcommittee on Databases recently

proposed a resolution to combine faculty expertise information generated for the public with information needed for annual reviews and promotion and tenure dossiers via a central software system, the Integrated University Expertise and Activity Report System (see <http://www.research.umn.edu/crad/documents/IFARSrel--FinalReportJointSubcommitteeondatabases.208.pdf>). Although they may not meet all needs, must allow for privacy and security, and will require an initial time investment; such systems seem a profitable avenue to explore in terms of a common approach to identifying faculty activities.

In addition to these six general issues, the Subcommittee discussed four other specific types of measures with individual administrative leaders. These included research measures, faculty awards, measures of scholarly and creative productivity, and reputational measures:

7. **Measures of research and other external faculty awards** (Discussion with the Vice President and Associate Vice President for Research). Research “that is recognized by peers and that pushes back the frontiers of knowledge”<sup>5</sup> is not the only marker of an important university, but it is a central one for a university that is striving to be among the elite public institutions. The Subcommittee agreed with the Metrics and Measurements Task Force that *total research expenditures* and *federal research expenditures* are conventional and important external measures of Research and Discovery. As indicated in the 2007 Annual Research Report produced by the Office of the Vice President for Research ([http://www.research.umn.edu/communications/regents\\_presentations/documents/2007AnnualBORPPT\\_web.pdf](http://www.research.umn.edu/communications/regents_presentations/documents/2007AnnualBORPPT_web.pdf)), the national standard of research used for comparison across universities comes from the National Science Foundation Research and Development Expenditure Data. These data reflect science and engineering research only, and the Subcommittee agreed with the findings of the Research Report that additional measures of sponsored programs expenditures are valuable.

Vice President for Research Mulcahy indicated that more fine-grained analysis of expenditures beyond *total* and *federal research expenditures* is difficult and time-consuming to track reliably because of differences in unit accounting procedures and practices. Instead, *research obligations* could serve as an effective proxy for expenditures. Research obligations typically are indicated in notices of grant awards and thus are available centrally through Sponsored Projects Administration, at least for the grants that reside there. There may be some unreliability in tracking research obligations from grants that go through one of the University’s foundations rather than SPA.

University of Minnesota research expenditures have increased over the last decade. However, relative to growth rates at other institutions, there have been periods of lower growth in University external research funding.<sup>12</sup> There has been a large, positive rebound in relative growth in 2006, suggesting a return to an upward trajectory. The number of external grant proposals that are submitted appears to have remained constant. A total of 4,945 proposals were submitted by the University in 2004 and 4,923 proposals were submitted in 2007 (with increases/decreases in some colleges).<sup>13</sup> The number of proposals submitted to federal agencies in the same time period declined by about 10% (from 3,679 to 3,354 proposals<sup>14</sup>). Vice President Mulcahy suggested that frequency of external proposal *submissions* may be a sensitive

intermediate measure of research productivity. Percentage of unit budget lines supported by external funds also was discussed as a possible internal measure. The Office of the Vice President for Research does track college and department summaries of total sponsored awards and expenditures. Support mechanisms for increasing the frequency of submissions for limited or highly competitive grant and other external faculty awards also was discussed (e.g., large, multi-discipline grants awarded to the institution, individual awards for which the University may nominate only one applicant).

Finally, funded research (number or size of projects) clearly is not a representative index of quality across the breadth of the university. The overall amount of grant dollars which a university receives depends critically on university size, making total external research funding a fairly gross measure of comparative strength. Moreover, in fields such as the humanities and the arts, where external funding opportunities are scarce, research expenditures/obligations may be a limited measure of scholarly and creative processes. The Subcommittee recognized that external and internal research measures are not sensitive measures of quality for a number of fields.

8. **National academy and other faculty awards** (Discussion with the Vice Provost for Faculty Affairs and Development). Not all fields place a high value on awards or other honors. However, the Subcommittee agreed with the Faculty Culture Task Force that peer institutions take national and international awards very seriously. An informal survey of colleagues at Committee on Institutional Cooperation (CIC) institutions indicated that some institutions have mechanisms that support faculty awards. These include, for example, calls for nominations for awards where the sponsor accepts only a limited number of applications, appointing a selection committee, and central oversight of available awards. Historically there appears to have been little systematic support at the University of Minnesota for units in identifying and shepherding applications for highly prestigious faculty awards to successful outcomes. There was also little support for significant faculty awards, such as disciplinary honors and fellows, which are conventional prerequisites for the most prestigious awards. The Subcommittee considered this to be a competitive disadvantage for the University in achieving awards.

Tangible demonstration of the type of historical disadvantage in University faculty awards is illustrated in the membership numbers for the American Academy of Arts and Sciences. Table 2 on the next page shows Academy membership for the comparison institutions included in the Metrics and Measurements Task Force Report. The disparity in membership across universities suggests not only the impact of institutional reputation (e.g., as for University of California-Berkeley); it also suggests a relationship between membership and the number of nominations from a university. Nomination data for the American Academy of Arts and Sciences are difficult to access and the second column of Table 2 shows a partial number of nominees for the June 2002 deadline for nominations. The most recent Guggenheim awards follow the same general pattern across institutions. The final column shows the total number of Howard Hughes Medical Institute (HHMI) Investigators since inception of this award. The HHMI Investigators award, which recognizes biomedical researchers, is not among the major faculty awards proposed by the Metrics and Measurement Task Force. The HHMI Investigator awardees include Nobel Prize laureates and many members of the National Academy of Sciences. Thus, it seems a very good example of an award that would be relevant to track and support within the University as a possible precursor to the most prestigious awards.



**Table 2: Selected Faculty Awards Across Comparison Public Institutions**

<b>Institution</b>	<b>AAS Membership 2007</b>	<b>AAS Nominations 2002</b>	<b>Guggenheim Fellows 2008</b>	<b>HHMI Investigators 2008</b>
University of California-Berkeley	695	7	6	10
University of California-Los Angeles	77	10	7	7
University of Michigan	60	15	7	8
University of Wisconsin	54 <sup>+</sup>	n/a	3	4
University of Washington	47	0	0	12
University of Illinois	28	9	2	2
<b>University of Minnesota</b>	<b>28</b>	<b>2</b>	<b>3</b>	<b>1</b>
University of Texas-Austin	27	4	2	0
Pennsylvania State University	11	1	2	0
University of Florida	7	0	0	0
Ohio State University	5	n/a	2	0

Note. American Academy of Arts and Sciences and Guggenheim data calculated by Professor Emeritus Martin Dworkin; + = membership data for 2002; n/a = not available

The Office of the Vice Provost for Faculty Affairs and Development now has developed central databases of (a) major national awards and (b) all individuals at the University who have received awards. There is a position dedicated to faculty awards in the Office of the Vice Provost for Faculty Affairs and Development; and the Committee considered the activities of this position important to enhance the University’s ability to achieve prestigious awards. These have been positive steps, and the Subcommittee considered that continued attention to facilitating award applications would be useful (e.g., identifying faculty who are likely to be eligible for major awards based on previous award achievements).

9. **Other measures of scholarly and creative work.** The Subcommittee considered that, other than research productivity and faculty awards, a sensitive external measure(s) of faculty scholarly and creative output was not included in the Metrics and Measurement Task Force’s measures of Research and Discovery. Three possible measures were discussed in detail, National Research Council rankings, the Faculty Scholarly Productivity Index, and the Web of Knowledge Essential Science Indicators and other bibliometric search procedures:

9a. **National Research Council (NRC) measures** (Discussion with the Director and Assistant Director of Institutional Research, discussion with the Graduate School Associate Dean). NRC rankings of research doctoral programs traditionally are a highly visible way in which comparisons are drawn among institutions. Administrators and faculty agreed that they are important not only at the level of the institution but are highly significant for and closely watched by individual units. NRC rankings draw from a series of detailed questionnaires of student, faculty, and program characteristics as well as a reputational assessment by other institutions. The major measures of scholarly distinction include per capita publication counts, publication citation counts, honors and awards, and external research funding. Productivity is a core concept (e.g., number of faculty publications and grants, proportion of faculty time dedicated to research). NRC rankings also represent the quality of the educational experience of students in research

doctoral programs. Table 3 shows the most recent (1995) NRC rankings among public and private institutions for the 39 University programs included in this ranking system.

**Table 3: NRC Rankings of University of Minnesota Graduate Programs (1995)**

<b>Graduate Program</b>	<b>Rank</b>
Aerospace Engineering	12
Anthropology	50
Art History	30
Astrophysics and Astronomy	24
Biochemistry and Molecular Biology	40
Biomedical Engineering	17
Biostatistics	45
Cell and Developmental Biology	34*
Chemical Engineering	1
Chemistry	21
Civil Engineering	13
Classics	24
Comparative Literature	28
Computer Sciences	47
Ecology, Evolution, and Behavior	15
Economics	10
Electrical Engineering	18
English Language and Literature	36
French Language and Literature	26
Geography	3
Geosciences	31
German Language and Literature	11
History	21
Materials Science	17
Mathematics	14
Mechanical Engineering	8
Molecular and General Genetics	39
Music	30
Neurosciences	34
Pharmacology	21
Philosophy	32
Physics	22
Physiology	71
Political Science	13
Psychology	7
Sociology	24
Spanish and Portuguese Language and Literature	27
Statistics	13

Note. Rankings from *Research-Doctorate Programs in the United States: Continuity and Change* (1995). Programs may extend across departments; there are different numbers of programs among which each program is compared.

\*Cell and Developmental Biology was ranked in two different fields and was ranked 37<sup>th</sup> in the second field.

Averaged across all scores, the University was ranked 13<sup>th</sup> nationally among public and private institutions (and ranked 23<sup>rd</sup> nationally when averaged across all non-zero scores.) Updated rankings are expected to be made public in September, 2008. Acknowledging the relative imprecision in ranking, this information will be given in ranking bands rather than as a specific rank for an institution.

NRC rankings conventionally are viewed as the most reliable comparative data about graduate programs. The Subcommittee noted that the excellence of graduate programs is only one aspect of overall quality of research and discovery. Further, NRC rankings pertain only to research doctorate programs and do not address fields such as education, business, law, and medicine among other fields. However, because the quality of graduate programs is a key component of research and discovery, NRC rankings are taken very seriously by departments that contribute to program rankings and by the University as a whole. Importantly, these rankings address faculty scholarship published in books as well as journal articles, giving this ranking system a core advantage over other systems which do not address books. The data collection for NRC rankings is, however, very laborious and time-consuming to implement and requires local knowledge of graduate programs. The rankings also are carried out infrequently, about once every 10 years.

9b. **Faculty Scholarly Productivity Index** (Discussion with the Graduate School Associate Dean). While NRC rankings often are considered the coin of the realm in distinguishing among research doctoral programs, there also are selected private and public data available to institutions through outlets such as the Association of American Universities Data Exchange (<http://www.pb.uillinois.edu/AAUDE/>). Recently, the Faculty Scholarly Productivity Index designed by the company Academic Analytics has received attention, in part because the methodology draws on the same measures of scholarly distinction used in the recent round of NRC rankings. The Index focuses on quantity rather than quality and is a per-capita description of the productivity of faculty members in a particular field/discipline in comparison to a selected set of peer institutions. Institutions purchase the service and select the specific set of peers for which they wish to obtain comparative data (about \$10,000 to 30,000 for a 3-year subscription depending on the number of peer institutions chosen<sup>15</sup>). These specific comparisons are not available to other institutions, unless they select the same peer institutions (for a description see <http://chronicle.com/stats/productivity/>). The Index data citation source for books, Amazon.com, has been criticized for its relatively small size (an Elsevier product, Scopus is the citation database for journal articles). The core criticism of the measurement technique is that the per capita measures are drawn from Ph.D. program faculty listed on department web sites. This potentially creates high unreliability because web sites may be outdated and/or may list a variety of faculty types. This may include appointments that do not carry primary scholarly or creative responsibilities and appointments where the primary affiliation is with another department; substantively skewing per capita measures (see Wasley<sup>16</sup> for a critique). The University of Minnesota previously has subscribed to Academic Analytics; however all available data were not seen in preparing this report. The University's analysts are aware of the current methodological limitations of the Index and the information it provides does not appear to be used as part of the University's accountability efforts. If the subscription to Academic Analytics were to be renewed at some point, it would be important for all relevant University offices to have access to this data set. Despite methodological imperfections, The Index has gained some traction in the broader

academic community. For example, The Chronicle of Higher Education identifies annually the top-ranked programs in the Index.

9c. **Thomson Reuters Web of Knowledge Essential Science Indicators, Scopus, and Google Scholar** (Discussion with the Director of the Digital Library Development Laboratory).

While NRC rankings and the Faculty Scholarly Productivity Index incorporate a range of information about a given department/field at an institution, bibliometric tools such as the Essential Science Indicators speak to only scholarly publications. The Subcommittee was interested in this type of measure because no direct measure of scholarly output was included in the Metrics and Measurement Task Force Report. Moreover, many department chairs/heads indicated that scholarly output was a major point of comparison for their units. We were particularly interested in the Thomson Reuters Essential Science Indicators because this is the current standard for calculating journal reference and citation indices. The Essential Science Indicators draw on three citation databases (science, social sciences, arts and humanities) to provide cumulative, comparative bibliometric information across and within institutions (accessible using a University internet ID at <http://www.lib.umn.edu/cgi-bin/esi.cgi>). While designed primarily as an external measure, the Essential Science Indicators or similar measure may be attractive in some units as an internal benchmark of research and discovery. Table 4 on the next page shows one example of the type of information that is available from the Essential Science Indicators - a ranking of institutions by putative impact factor (citations/paper) of each institution's cumulative body of published peer-reviewed journal papers (for citation methodology see <http://sciencewatch.com/about/met/core-sci/>). As an example of how the ISI information compares with a much broader set of measures that extends beyond research and discovery, the last two columns of Table 4 show the most recent U.S. News and World Report and Top American Research Universities rankings.

Table 4 shows that the ISI rankings are fairly stable across the two reporting periods, with Minnesota's rank changing from 21<sup>st</sup> in citations/paper in 2007 to 23<sup>rd</sup> in 2008 and remaining at 11<sup>th</sup> for the total number of papers published. There are a few clear differences across the type of information provided by the ISI rankings and that provided by the two other ranking systems. For example, the high cost of tuition at University of California-San Francisco is a likely factor influencing the U.S. News and World Report ranking for this institution. However, excluding this outlier, the correlation between the ISI and U.S. News and Word Report rankings is a robust .66 (using rankings for the top 30 institutions in the 2008 ISI rankings).

**Table 4: Top 30 U.S. Institutions Ranked by Citations per Paper (Essential Science Indicators)**

ISI Rank 2007	Institution	ISI Papers 2007	ISI Citations 2007	ISI Cit/Paper 2007	ISI Cit/Paper 2008	ISI Rank 2008	News Rank 2009	Top Tier 2007
1	Harvard	95,457	2,651,015	27.77	26.65	1	1	(1)
2	UC San Francisco	36,621	981,823	26.81	26.04	2	127	3
3	Washington University	29,752	704,179	23.67	22.83	3	12	(1)
4	Yale	37,307	867,884	23.26	22.28	5	3	(1)
5	Stanford	49,363	1,131,732	22.93	22.40	4	4	(1)
6	Johns Hopkins	53,594	1,211,258	22.6	21.81	7	15	(2)
7	MIT	36,315	814,312	22.42	22.04	6	4	(1)
8	UC San Diego	41,318	920,778	22.29	21.38	8	35	3
9	Washington	55,003	1,131,765	20.58	20.24	9	41	2
10	Duke	35,859	718,220	20.03	19.48	10	8	(1)
11	Pennsylvania	46,505	919,519	19.77	19.29	11	6	(1)
12	Columbia	42,745	839,310	19.64	19.07	12	8	(1)
13	UC Berkeley	48,514	935,323	19.28	18.95	13	21	1
14	UC Los Angeles	54,878	1,024,193	18.66	18.28	14	25	1
15	Pittsburgh	36,333	660,600	18.18	17.58	15	58	1
16	Northwestern	30,367	534,018	17.59	17.07	17	12	(1)
17	Colorado	36,461	635,574	17.43	16.93	18	77	6
18	Cornell	41,930	730,020	17.41	17.08	16	14	(1)
19	Michigan	54,703	931,193	17.02	16.49	19	26	1
20	North Carolina	38,138	634,147	16.63	16.22	20	30	1
<b>21</b>	<b>Minnesota</b>	<b>46,087</b>	<b>722,768</b>	<b>15.68</b>	<b>15.09</b>	<b>23</b>	<b>61</b>	<b>2</b>
22	Arizona	28,954	446,592	15.42	-	-	96	3
23	Wisconsin	51,337	758,960	14.78	14.42	26	35	1
24	Maryland	42,129	617,124	14.65	14.44	25	53	5
25	Pennsylvania State	37,686	525,381	13.94	13.35	27	47	2
26	UC Davis	37,661	499,075	13.25	13.14	28	44	4
27	Ohio State	36,358	469,514	12.91	-	-	56	2
28	Illinois	54,812	686,388	12.52	12.2	29	40	1
29	Florida	39,162	422,038	10.78	10.62	30	49	2
30	Texas A & M	30,981	326,125	10.53	-	-	64	3

Note. The 30 institutions in Table 3 are the top 30 U.S. institutions when ranked by 2007 total number of papers published (from 1997-2007). The citations/papers and rank for 2008 reflect the updated information for the period from January 1998 through April 2008. News = rankings in the U.S. News and World Report; Top = tiers in the Top American Research Universities. – indicates that the institution did not appear in the top 30 institutions when ranked by 2008 total number of papers published. Replacing the University of Arizona, Ohio State, and Texas A & M; the University of Alabama, University of Southern California, and Indiana University received citations/paper rankings of 21<sup>st</sup>, 22<sup>nd</sup>, and 24<sup>th</sup>, respectively in the 2008 figures. The tiers in the Top American Research Universities are given separately for public institutions compared to other public institutions and for private institutions (in parentheses) compared to other private institutions.

This type of quantitative information measure has the advantage of being able to adjust for institution size and allows for different levels of reporting. For example, data can be reported for 22 individual fields (e.g., clinical medicine, agricultural sciences, engineering, etc.) as well as for individual research journals and authors. Although the Thomson Reuters source list of publications (<http://www.thomsonscientific.com/cgi-bin/jrnlst/jloptions.cgi?PC=master>) is well regarded, one disadvantage is that it emphasizes the biological sciences rather than the social sciences, and also addresses much less substantively the impact of faculty work in the arts and humanities.

Also, books, book chapters, patents, and other information types may be indexed as cited references in the citation database, but are not counted as primary indexed sources. Creative work, such as exhibitions and performances, are not addressed. Thus, the primary form of work of segments of the University is underrepresented or not addressed. Peer institutions face the same problems. Assuming institutions have about the same relative breadth of fields (and so produce about the same proportion of these different media); this does not necessarily weaken the Essential Sciences Indicators as an external aggregate measure that can be compared across institutions. It does mean that the measure is relevant to only some segments of the University. There also is a question about how well the individual fields classified in the Essential Science Indicators are representative of the way in which a given institution groups and names disciplines/fields. Essential Science Indicators are used by the Office of the Vice President for Research as a measure of research productivity (see the 2007 Annual Research Report). However, the Web of Knowledge/Essential Science Indicators do not appear to be used by other University administrative offices.

Another citation database, Elsevier's Scopus ([www.scopus.com](http://www.scopus.com)) has received increasing attention as both a complement and competitor to the Essential Science Indicators. Scopus is the largest citation database for research articles but does not include publications as far back in time as the Essential Science Indicators and has some different browsing functions. The University currently does not have an institutional affiliation with Scopus and the Subcommittee did not carry out a parallel citation analysis as was done with the Essential Science Indicators (Table 3). The open-access Google Scholar also has been used to track citations, and has the advantage of having books and other media in its database(s). However, Google Scholar frequently has been criticized as inadequate, with unknown data sources and reliability and infrequent and inconsistent upgrading. PubMed also is open-access and is receiving some recent attention for tracking faculty work. Several comparisons have been made between the major citation sources/tools (see Jasco<sup>17</sup> for an example). As for ranking systems, there is no clear 'best' analytic tool for tracking faculty publications. Rather the tools provide complementary information in that they are better equipped to identify publications and secondary citations in different fields, different subject matters, and different time frames.

**10. Reputational quality of the University (Discussion with the Vice President and Assistant Vice President for University Relations).** One issue that arose in discussion with both administration and faculty was that reputation among peers was a core external measure of prestige. It is noteworthy that overall university rankings may align strongly with reputation among other institutions. For example, the correlation is a very high .81 for the 2007 Times Higher-QS World University Rankings (unsurprising to the extent that reputation carries 40% of

the ranking weight in this system). Thus, increasing the visibility and accessibility of faculty scholarly and creative work may provide one avenue to improve external perceptions of the University. University Relations conducts an Annual Image and Reputation Survey to assess perceptions of the University that are held by Minnesotans (see pp. 62-64 in the University's Accountability Report: <http://www.academic.umn.edu/accountability/pdf/2007/sec2.pdf>). This survey focuses on factors such as educational quality, tuition cost, fiscal responsibility, and overall satisfaction. There do not appear to be surveys or other methods focused specifically on faculty research and discovery. The Subcommittee and Vice President and Assistant Vice President for University Relations discussed mechanisms to assess and increase the University's national and international reputation around research and discovery. For example, one suggestion was to examine perceptions of the University's national presence in research and discovery held by faculty at peer institutions. There also was discussion about the distinction between overall institutional reputation and the reputation of individual University units (e.g., as represented by the peer assessment component of the U.S. News & World Report rankings of graduate schools, see <http://www.usnews.com/sections/rankings>).

## V. CONSULTATION WITH UNIVERSITY FACULTY

There were two major forms of consultation with faculty. The Subcommittee sought written input from department chairs and heads across the University about the most important measures used in their fields to assess the quality of scholarly research or other creative work relative to peer institutions (Table B2 in Appendix B shows the memo sent to chairs, heads, and directors). Thus, these discussions were relevant mainly to external measures of research and discovery. The Subcommittee also had conversations with several chairs/directors and with members of the Faculty Consultative Committee to clarify and extend the written input. These discussions also included internal measures of research and discovery. This section of the report summarizes the input from faculty. For detailed faculty descriptions of these and other metrics see the PEL Team Project on Aligning and Delivering Research Metrics (<http://www1.umn.edu/ohr/pel/projects/index.html>).

### A Written input from department chairs and directors

Thirty-one chairs/directors from eight colleges/schools responded to the emailed request for information. While this does not represent the full breadth of the university, there were notable similarities and differences across these departments. Table 5 below shows examples of the different types of scholarly and creative outlets through which quality is evaluated most often, but with no one outlet relevant to all departments. Table 5 also shows there are many different terms used to describe quality. Although quantity of scholarly and creative output was important in many departments, there was a shared sense that quantity alone did not equate with quality.

**Table 5: Department Chair/Head Descriptions and Indices of ‘Quality’**

Scholarly/creative outlets	Descriptions of quality	Indices of quality
Books	A body of work	Citation indices
Collaborations with industry	Advances understanding	Diversity
Conferences	Applies to new technologies	External grants/contracts (number/prestige)
Editorial positions	Broad scope	Faculty awards (number/prestige)
Essays	Contributes	Graduate student admission attributes/time to degree
Exhibits	Elegant	Graduate student awards/honors (number/prestige)
External grants and contracts	Impactful	Graduate student placement (number/prestige)
Journal articles	Important	National Research Council rankings
Media coverage	Influential	Products (innovation)
Patents	Innovative	Professional offices (prestige)
Presentations	Leads to an extensive reputation	Publications (number/citations)
Professional offices	Leads to serious engagement	Publication outlets (prestige)
Technology	Meaningful	Post-doctoral fellows (number)
	Original	Reputational studies
	Paradigm-shifting	
	Receives attention	
	Recognized as leading authority	
	Sets/reorients scholarly agenda	
	Solves	
	Top-tier	
	Translational	
	Useful	



Of the several indices of quality, four were most frequently used: (a) prestige of publication/creative outlets; (b) external grants, contracts, and other funding; (c) faculty awards and honors; and (d) graduate student placement. Of these four, external funding (research expenditures) and awards are included in the six measures of research and discovery proposed by the Metrics and Measurements Task Force. The seventh measure proposed for consideration by the Task Force, but not acted upon, was publication in scholarly journals, a quality index that was mentioned often in department responses.

A striking **difference between faculty and administrator reports** was that faculty indicated that comparisons with peer departments/disciplines at other institutions typically were the most important type of comparison. That is, that a department's reputation among faculty and graduate students in the discipline often was more immediately relevant than the overall reputation of the University.

1. Prestige of publication/creative outlet

Prestige of publication/creative venue was a major point of peer comparison for over two-thirds of departments. Prestige was identified in various ways:

- a. *Citation impact*, indices of the extent to which a scholar's peer-reviewed journal articles are referenced in other journals are relevant in some fields (e.g., the "citation study" used by Law Schools, Hirsch or h-index, and Thomson Reuters-Scientific Web of Knowledge and Essential Science Indicators). These indices tend to address quantity and identify quality as a function of how widely other scholars found the article to be significant in their own work. These indices can be applied to both to the output of individuals and to larger groups, such as departments and universities.
- b. *Journal impact factor*, the annual average of the frequency with which a specific peer-reviewed journal is cited in other journals, also was relevant for several departments in the sciences and social sciences.
- c. *Reputation* of the publication/creative outlet, following conventional perception of quality held by scholars and artists within a field.

However, several departments made it clear that these types of measures, especially the bibliometric measures, were considered only one part of a larger sense of scholarly/creative excellence. Some departments, especially in the humanities, conveyed that citation and journal impact factors were not important indices in their fields. Some other departments noted that faculty may publish high-quality scholarship in journals with a lower impact factor because they wish to reach particular disciplinary audiences. Overall, there was a concern that conventional metrics are not always useful to capture extraordinary scholarship that is innovative and less familiar in traditional academic paradigms.

## 2. External grants, contracts, and other funding

External grants, contracts, and/or other funding (including collaborations with industry) were a major point of comparison for about half of the departments and were not relevant for others. Most of these departments indicated that the funding was associated with research grants. Both number and size of external grants were considered important. There was no systematic association between external funding source and prestige. However, peer-reviewed grants from federal agencies and large health-related foundations (e.g., the American Cancer Society) were treated with more merit than grants from other sources in the Academic Health Center. One department reported that the decline in federal funding has made the level of external funding a less sensitive measure of overall quality.

## 3. Faculty awards and honors

Faculty awards and honors were a major point of comparison for almost half of departments, and were not as relevant for others. As for external funding, awards and honors appeared to be either conventionally available at some level within the field or conversely, to be quite sparse. Notably, faculty spoke about the importance of a greater range of awards, including discipline-specific awards, than were proposed by the Metrics and Measurement Task Force.

## 4. Graduate student placement

Graduate student placement was a major point of comparison for over one-third of departments. Both number and prestige of placements were identified, although prestige of Ph.D. student placement in other universities was generally considered the key marker. Placement prestige appeared to follow conventional understanding within a field of an institution's reputation. In following up, however, the Subcommittee found that it likely would be difficult to obtain reliable information on this potential measure at the level of the University as well as in large units. This is because the primary information source is self report by graduates who may be difficult to locate and because the point in time at which any report would be made would influence findings (e.g., reports made at 6 vs. 12 months after graduation might be quite different). For departments with reliable mechanisms in place to track graduate student placement, placement may be a very viable and valuable internal measure of excellence.

## B. **Conversations with department chairs and directors**

Discussions were held with chair/directors across the University and especially with faculty from the arts, humanities, extension, and design to expand on the breadth of written input that was received and to include discussion of internal measures.

Major issues that were discussed included the following:

### 1. **Measures of productivity or output are not the same as measures of impact, distinctiveness, depth of expertise, and integrity of the scholarly and creative process.**

Productivity measures, based on weighted contributions of publications, citations, grants, awards, and so on are a key component of well-known university-wide ranking systems such as The Top

American Research Universities, The Times Higher-QS World University Rankings, and the Academic Ranking of World Universities. Faculty leaders were aware of these ranking systems and also were familiar with new or lesser-known methodologies, including the Faculty Scholarly Productivity Index, LexisNexis, and also Google Scholar's PageRank algorithm (<http://www.google.com/technology>), which assesses journal and publication impact.<sup>18</sup> Some faculty also were aware of the emerging interest in multidimensional, usage-based metrics of scholarship (i.e., assigning value to publications on how often they are used in addition to how often they are cited as in MESUR,<sup>19</sup> see <http://mesur.org/MESUR.html>).

Several faculty members echoed the growing national sense of ranking/rating fatigue. These types of measures also were considered by faculty in the arts and humanities to be largely uninformative because of the narrow sense of excellence and sole focus on productivity/output amount. This was particularly an issue for units in which journal articles and research grants, contracts, and patents are not core media or outlets for faculty work. Especially in the arts, the process of creation and dynamic environment provided by colleagues and other partners in the broader community were valued; output and quantity of output were less relevant. This was in part because the value placed on creative output may carry a large subjective component; there was also the perspective that it is commitment to the creative process rather than output that distinguishes important creative and humanistic endeavors.

2. **Measures do not apply uniformly to all units.** An issue that was raised consistently was that a 'one size fits all' measurement system was not appropriate to address the breadth of fields at the University or differences in unit-specific missions and external audiences. Relying solely on campus-wide averages was seen as insufficient and problematic to address units' trajectory in scholarly and creative work over time.

3. **No single measure is representative of unit excellence.** The problem of a 'one size fits all' approach also was noted within fields in which a ranking system or multiple ranking systems are available (e.g., in Law). Even for units in which output measures (e.g., of scholarly productivity) were conventional and valued, there was a sense that true preeminence could not be captured by adding up performance on a finite set of attributes in a ranking system. That is, that an exclusive focus on a particular output or productivity measure(s) might be less likely to ensure an upward trajectory than thoughtful examination of the contexts/conditions needed for a unit to achieve greatness.

4. **Reputation within the discipline or field was an attribute that emerged as potentially being relevant across several units.** Faculty acknowledged that the reputation of a unit often relies on past rather than current accomplishments, that number of alumni influences reputational measures (i.e., that graduates tend to rate their own institution favorably), that reputation may coincide with faculty size, and that reputation relies on perception as well as more objective indices. Even given these known limitations, several faculty members mentioned U.S. News and World Report rankings held some weight in their fields. On the other hand, several faculty members spoke to attributes such as impact, distinctiveness, innovation, and ability to shift scholarly and creative paradigms as being valued attributes of reputation rather than the more conventional quantity or productivity measures.

5. **The value of measuring faculty scholarship and creative work relies in part on the resource contexts which facilitate improvements or declines.** That is, that measurement by itself does not promote improvement if there are stable resource constraints. Faculty noted that not all resources are financial or relate directly to faculty size, but for example, also may include: (a) units' ability to specialize in a given scholarly/creative area; (b) an institutional culture that facilitates and endorses true excellence; (c) aligning scholarly and creative work with the University's land-grant mission of education and service, and (d) effective mechanisms for increasing visibility of faculty scholarship and creative work, including visibility as University-affiliated work.

## VI. Other Subcommittee Discussion

Other Subcommittee discussion focused on four broad issues that were raised in discussion with both individual administrators and faculty members, including other members of the Faculty Consultative Committee.

1. **Measuring creative work needs to be done in a meaningful way.** Although there are many similarities between scientific and artistic practices in a university community, there are different perspectives about what matters most, and different epistemological frameworks for describing what matters. The mainly quantitative measures that are the focus of this report and the focus of most ranking systems are in line with a traditional scientific approach. That is, they emphasize the integrity and meaning of scholarly products more so than the integrity and meaning of the creative process. This does not necessarily weaken the value of aggregated external measures to compare the University with other institutions; it does limit the representative scope of the measures. Selected internal measures may be more meaningful to capture changes in the presence of the arts and the humanities at the University that promote discovery and new insights and which benefit society.

2. **Measuring diversity needs to be done in a meaningful way.** Faculty and staff diversity was considered an external research and discovery measure by the Metrics and Measurements Task Force. Some faculty members also stated that diversity was an important index of the quality of scholarly and creative work. In defining diversity, the Subcommittee referred to the definition proposed by the Systemwide Academic Task Force on Diversity: “the full range of human difference that influences access, equity, and relationships in living, learning, and working environments.” We agreed that diverse persons and perspectives are critical to extraordinary research and discovery and central to a great university. We also agreed with the Senate Committee on Equity, Access, and Diversity that diversity cannot be considered separately from excellence (<http://www1.umn.edu/usenate/ead/eadwhatislost.html>). As noted in the Report of the Systemwide Academic Task Force on Diversity (<http://purl.umn.edu/30>), the argument can be made that diversity is central to the University based on excellence, educational, economic, and social responsibility arguments. Indeed, diversity of persons and perspectives seems core to a great university across all the four Metrics and Measurements Task Force measures of research and discovery, teaching and learning, public engagement, and resources and infrastructure.

Thus, the Subcommittee considered that it would be valuable to include an additional ‘culture’ category in addition to the other four Metrics and Measurements Task Force external measures. We propose the term ‘culture’ because it already has been used by the Task Force on Faculty Culture (<http://purl.umn.edu/5621>) and Culture Task Force (<http://purl.umn.edu/5679>). The measure of faculty and staff diversity could be moved from the category of research and discovery to this new category. In making this proposal, the Subcommittee recognized that a measure(s) of diversity would not gauge research productivity and scholarly or creative recognition in the same direct way as do other measures in the research and discovery category. Importantly, we also considered the creation of a new category to explicitly identify a visible commitment to diversity as an important investment threaded throughout University activities and infrastructure.

Similarly, the Metrics and Measurements Task Force measure of faculty satisfaction (tracked through the Pulse Survey) encompasses a much broader construct than quality of research and discovery. The Subcommittee considered that this measure also could be moved from the research and discovery category to a new culture category.

3. **A central issue is which faculty or segments of the University to include in particular external and internal measures**, especially in developing per capita measures to adjust for organization size. Research and discovery is carried out at the University by individuals in a range of appointments, including post-doctoral fellows and academic professional and administrative employees whose positions involve research responsibilities as well as regular faculty and clinical scholars. Also, colleagues outside the University often are significant players in research and discovery (e.g., in the arts and in the Medical School). A related issue concerns the value of comparing the University with institutions which have a very dissimilar demographic profile. For instance, it seems unreasonable as a measure of relative excellence to compare per capita measures of federal grant applications or faculty awards across institutions which have very different opportunities to achieve external funding or awards (e.g., institutions which heavily emphasize science and engineering versus a broader mission). It also seems uninformative to use external measures for the purposes of internal comparison if these measures are not valued within a discipline (e.g., if a unit's external reputation relies more on distinctiveness and visibility of mission than a measure of publication productivity).

4. **Implementing new external or internal measures needs to be done thoughtfully** so as to limit additional staff and faculty workload, and not result in new or additional unfunded mandates. Many units carry out some form of measurement for internal purposes. There also are various annual data collection processes within units for internal and external purposes; related to reviews for merit, promotion and tenure, and accreditation, as well as other disciplinary/professional data gathering activities. Some segments of the University (e.g., in the Academic Health Center) already are piloting per capita internal measures as part of unit strategic planning and resource allocation. The Pulse survey <http://www1.umn.edu/ohr/er/pulse/> also provides information about faculty satisfaction about a variety of factors, including satisfaction with support for scholarship. Where possible, new measures should use the data generated from these types of existing processes. Finally, there may be work at other institutions that informs any new processes. The Subcommittee's correspondence with a small number of aspirational-peer institutions indicated that these other institutions have considered, but not implemented internal measures. However, it is notable that researchers at another Big 10 institution, Northwestern University recently have formulated a new measure of journal impact factor to identify high-quality research.<sup>20</sup>

## VII. RECOMMENDATIONS

Based on the consultation process, the Subcommittee makes three sets of recommendations, including (a) nine recommendations about external measures and relevant implementation and (b) two recommendations about internal measures of Research and Discovery. For comparison, Table 6 shows the complete list of measures proposed by the Metrics and Measurements Task Force and the measures of Research and Discovery proposed here.

**Table 6: Comparison of Proposed Measures**

<b>Metrics and Measurements Task Force Research and Discovery</b>	<b>FCC Subcommittee Research and Discovery</b>
<b>External Measures</b>	<b>External Measures (Campus-wide aggregates)</b>
1. National academy members	1. Faculty awards (including national academy members)
2. Faculty awards	2. Research expenditures
3. Post-doctoral appointees	2a. Total expenditures
4. Research expenditures	2b. Federal expenditures
4a. Total expenditures	3. Intellectual property commercialization
4b. Federal expenditures	4. Publication in scholarly journals
5. Faculty and staff diversity	
6. Faculty satisfaction	
	<b>Internal Measures: Campus-wide aggregates</b>
	1. Disciplinary or other significant faculty awards
	2. Research obligations
	2a. Total obligations
	2b. Federal obligations
	2c. External research submissions
	<b>Internal Measures: Unit-specific (examples only)</b>
	1. Number/amount of new patents submitted annually
	2. Number of scholarly publications submitted annually
	3. Number/amount of grant applications submitted annually
	4. Number/amount of grant applications funded annually
	5. Number of limited grant applications submitted annually
	6. Number of post-doctoral appointments made annually
	7. Successful graduate student placement
	8. Number of book published annually
	9. Reputation of book publisher
	10. Reputation of performance/exhibition
	11. Proportion of under-represented faculty in research
	12. Proportion of research that has public engagement
	13. Proportion of research that has cross-unit participation
	14. Ranking among peer units (e.g., NRC rankings)
	15. Number of invitations to give named addresses/performances
	16. Number of editorial/other significant disciplinary appointments

## A. EXTERNAL MEASURES

The six measures of Research and Discovery proposed by the Metrics and Measurements Task Force are measures that can be used to compare the University with peer institutions. By virtue of being used as external measures, the measures are designed to represent the University as a whole, and may be more or less robust for individual units.

The Subcommittee makes the following nine recommendations for the Twin Cities campus:

1. **Publication in scholarly outlets** be added as an external measure of Research and Discovery.

The Subcommittee found that number and significance of publications was not relevant across all segments of the University. There also is known measurement error in the various methodologies used to identify publications. However, there are many fields at the University in which publication productivity and impact are conventional and valued indices, and it also is possible to make useful comparisons with other institutions.

### Implementation

- i. Given the conventional status of Essential Science Indicators and recent international interest in Scopus, the Subcommittee recommends that the Office of Institutional Research (a) examine both database tools as possible ways to assess the quantity and impact of aggregated University publications and (b) report on the findings to the Senate Research Committee.
  - ii. The Subcommittee also recommends that there be procedures to enhance effective communication and centralization of data and other resources among the Office of Institutional Research, Office of the Vice President for Research, Office of the Vice Provost for Faculty Affairs and Development, Office of the Senior Vice President for the Health Sciences, and the University Libraries.
2. **Intellectual property commercialization** be changed to an external measure of Research and Discovery rather than a measure of Public Engagement as proposed originally.

As noted by the Faculty Culture Task Force, intellectual property commercialization is the equivalent of scholarly output for segments of the University, and so ought to be included among the metrics for assessing productivity in research and discovery.

### Implementation

- i. The Subcommittee recommends that the Office of the Vice President for Research continues to determine measure(s) of intellectual property commercialization and (b) reports annually on these measures to the Senate Research Committee.



3. **National academy members and faculty awards** be combined as one external measure, with subsets of award types identified when necessary.

National academy members and faculty awards are treated as separate measures in the Top American Research Universities. The Subcommittee recognized that national academy membership is particularly important for the sciences, engineering, and medicine; and that there may be greater reliability in identifying national academy memberships than other faculty awards. However, the Subcommittee viewed the separation of awards as potentially privileging excellence in different parts of the University.

#### Implementation

- i. The Subcommittee recommends that the Office of the Vice Provost for Academic Affairs and Development annually identifies and reports to the Senate Research Committee and relevant unit heads on the major faculty awards that are sought and achieved at the University.

4. **Total and federal research expenditures** be maintained as external measures of Research and Discovery.

The Subcommittee considered these measures to represent conventional and critical attributes of research and discovery. The national standard used for comparison across universities comes from the National Science Foundation Research and Development Expenditure Data. However, these data reflect science and engineering research only; and the Subcommittee considered that other measures of all sponsored programs expenditures would be relevant to include.

#### Implementation

- i. The Subcommittee recommends that the Office of the Vice President for Research report annually on total and federal research expenditures to the Senate Research Committee.

- ii. The Subcommittee also recommends that Sponsored Projects Administration and the University of Minnesota Foundation identify more systematic ways to reliably separate funds that are attributed to the research endeavor and funds that are attributed to other University activities.

5. **Post-doctoral appointees** not be considered an external measure of Research and Discovery.

Although this measure is used in the Top American Research Universities ranking system, the data source appears to be for appointments in science, engineering, and health fields only. Also, the distinction between post-doctoral appointees and other contingent/temporary research appointments is not clear-cut in this ranking system. The Subcommittee also considered that research publications, etc. of post-doctoral appointees typically would include faculty co-authorship and could be measured through faculty research products. However, the Subcommittee found that there are reliable ways to identify post-doctoral appointees at the University, and that tracking post-doctoral appointees may serve as a useful internal measure for some segments of the University.

6. **Faculty and staff diversity** be considered an external measure of Culture rather than an external measure of Research and Discovery.

The Subcommittee considered diversity to be a valuable and central institutional marker, but not one that could be captured as a countable measure of Research and Discovery and easily compared with research and discovery at other institutions. Moreover, the Subcommittee considered that the importance of diversity could more appropriately be highlighted in a separate category of external measures.

7. **Faculty satisfaction** be considered an external measure of Culture rather than an external measure of Research and Discovery.

While the Pulse Survey provides ongoing, systematic information about faculty work life; faculty satisfaction is a much broader construct than high-quality research and discovery, and not a measure that can easily be compared with other institutions. The Subcommittee considered that aggregated measures of faculty satisfaction could more appropriately be considered a measure of Culture rather than Research and Discovery.

8. The scholarly and creative work of only probationary and tenured **regular faculty and contract faculty with professorial rank and research/clinical responsibilities** be included in external measures of Research and Discovery.

Although individuals in a range of appointment categories are involved in scholarship and creative work, tenured and tenure-track faculty members and contract faculty members hired as (Assistant/Associate) Professors, Research (Assistant/Associate) Professors, and Clinical (Assistant/Associate) Professors are the largest appointment categories which carry primary research and discovery responsibilities. These appointment categories include clinical scholars in the Medical School (appointment type I). These categories clearly are the largest appointment types which carry primary research and discovery responsibilities. Although excluding other appointment categories omits some individuals' research or creative work, it likely affects only minimally overall per capita and aggregated measures.

### Implementation

- i. The Subcommittee recommends that the Office of Institutional Research use PeopleSoft appointment categories to identify the number of regular and contract faculty for external measures. This identification can be done reliably, and the primary academic home also can be identified accurately. Although there is some potential measurement error introduced by the inclusion of Without Salary Appointments, this effect should be relatively small for aggregated measures.

9. Faculty from each of the **Crookston, Duluth, Morris, and Rochester** campuses have significant involvement in developing measures of core scholarly and creative activities carried out by faculty on these campuses.

While this report focuses on the Twin Cities campus only, the Subcommittee recognized that adequate external measures are important for each of the separate campuses and for the University of Minnesota system as a whole.

## Implementation

- i. The Subcommittee recommends that the Office of Institutional Research report external measures of core scholarly and creative activities separately for each campus, including the Twin Cities campus so that distinctive campus profiles are not masked by University-wide aggregation.

## B. INTERNAL MEASURES

While external measures of Research and Discovery can be used to compare the University to peers, internal measures can be used to determine the direction and rate of change for the University or segments of the University over time. The Subcommittee considered two types of internal measures: (i) campus-wide aggregates of intermediate measures that are related directly to the small set of external measures and (ii) unit-specific measures that may or may not be related directly to external measures but which are sensitive markers of change for particular units or particular segments of the University.

### i. Campus-wide aggregates

One purpose of internal measures is to track progress over time toward enhanced performance on the four proposed campus-wide aggregates. With this focus in mind, the Subcommittee considered that there were two internal measures, one related to national awards and one related to external research expenditures that would be useful as campus-wide aggregates.

The Subcommittee makes the following two recommendations for the Twin Cities campus:

1. **Disciplinary or other significant faculty awards** (non-University awards) which typically are precursors of or intermediate to the small number of external faculty awards be used as an internal measure.

Faculty members receive a variety of major awards that are not systematically or formally communicated within the University (e.g., honors of professional societies, editorships of highly visible journals, nationally known pieces of literature, performances, and works of art). Competitive applicants for the most prestigious external awards typically have a history of recognized accomplishments. The Subcommittee considered it important to support and track major awards to increase the likelihood of the University achieving the most prestigious faculty awards.

### Implementation

- i. The Subcommittee recommends that Office of the Vice Provost for Faculty Affairs and Development work with units to identify relevant major awards.
  - ii. The Subcommittee also recommends that the Office of the Vice Provost for Faculty Affairs and Development continue to support units when appropriate to develop submission timelines to meet deadlines, gather letters of support and other materials for major awards, and develop a database of faculty with the credentials to be eligible for highly prestigious awards.
2. **Number and dollar amount of submissions for external funding** be used as an internal measure. Also, **total and federal research obligations** be used as internal measures to supplement the external measures of total and federal research expenditures.

Given that submissions for external funding are a precursor of successful funding, the Subcommittee considered it important to track submissions. Also, given that research expenditures may be difficult to track reliably, the Subcommittee found that research obligations,

which can be tracked adequately, would serve as a reliable proxy for University-internal purposes.

### Implementation

i. The Subcommittee recommends that the Office of the Vice President for Research reports annually to the Senate Research Committee on total and federal research obligations and on submissions for external research funds.

### **ii. Unit or segment measures**

In representing the campus as a whole, each of the four external measures (publication in scholarly journals, faculty awards, research expenditures, intellectual property commercialization) relies on a more or less representative sample of individual unit or faculty member's scholarly and creative work. The following measures are a non-exhaustive list of internal measures that are designed to track research and discovery for particular units (e.g., colleges or departments) or groups of units at a more fine-grained level and over a relatively short time window. The Subcommittee recognized that cross-institutional comparisons by department/field (rather than by the University or campuses as a whole) are a conventional and arguably the most important way in which faculty members determine relative reputation. Thus, these types of internal measures should be flexible enough to accommodate goals that address the predominant issues in specific fields, disciplines, and professions. They also should be flexible enough to include less conventional metrics where these are relevant to address the innovative and original nature of the scholarly and creative work.

The Subcommittee makes the following two recommendations for the Twin Cities campus:

1. Individual units (or groups of units) be encouraged to **examine progress** on one or more internal metrics of research and discovery that are relevant to the current missions and goals of that unit and which align with relevant 7.12 statements. When possible and appropriate, units are encouraged to compare performance with peer units at other institutions.

The Subcommittee considered that individual units are best placed to identify the specific internal measures that demonstrate growth and/or maintenance of unit excellence over time. The following examples are general measures that may be appropriate for one or more units or broader segments of the University. Several of the measures may be useful as per-capita measures (i.e., per tenure-track faculty member/clinical scholar in the unit).

- a. Number and amounts of new patents submitted annually
- b. Number of scholarly publications submitted annually
- c. Number and dollar amount of external grant/contract applications submitted annually
- d. Number and dollar amount of external grant/contract applications funded annually
- e. Number of limited or competitive grant/contract applications that the University submits annually (e.g., applications of \$10 million and above).
- f. Number of new post-doctoral appointments made annually
- g. Successful graduate student placement
- h. Number of books published annually

- i. Reputation of book publisher
- j. Reputation of performance/exhibition
- k. Proportion of under-represented faculty groups in research
- l. Proportion of faculty activities involving public engagement annually
- m. Proportion of faculty activities involving cross-unit engagement annually
- n. Ranking among peer units (e.g., National Research Council rankings)
- o. Number of invitations to give named professional addresses/performances
- p. Number of editorial or other significant disciplinary appointments

### Implementation

The Subcommittee considered that implementation of these unit-driven measures should be referred to individual units.

- 2. As proposed by the Senate Joint Subcommittee on Databases, there be a **web-based system/database service** for faculty to report scholarly and creative activities for tracking internal metrics.

There is no shared system for aggregating external or internal data even though data are generated annually by faculty for the purpose of merit review. This hampers reliable measurement and may lead to increased administrative and faculty workloads in data collection.

### Implementation

The Subcommittee concurs with the Senate Joint Committee on Databases in recommending that the web-based system be developed with broad input from faculty so it has the capability for customization at the unit and college levels, as well as the capability for aggregation across different segments of the University. The FCC Subcommittee considered that once a web-based system is operating efficiently, it should replace rather than add to existing documentation required for annual and merit review purposes so as not to introduce additional faculty workload. All University stakeholders should know that these database services are available.

## VIII. APPENDIX A

*Table A1: Metrics and Measurements Task Force Metrics*

---

### **Research and Discovery**

1. National academy members
2. Faculty awards
3. Post-doctoral appointees
4. Research expenditures
  - 4a. Total
  - 4b. Federal
5. Faculty and staff diversity
6. Faculty satisfaction

### **Teaching and Learning**

7. Student quality
8. Student diversity
9. Affordability
10. Student outcomes
  - 10a. Retention
  - 10b. Timely graduation
  - 10c. Degrees conferred
11. International involvement
  - 11a. Study abroad
  - 11b. International students
  - 11c. International scholars
12. Student satisfaction

### **Public Engagement**

13. Citizen satisfaction
14. Intellectual property commercialization
15. Student participation in public engagement activities

### **Resources and Infrastructure**

16. Financial strength
    - 16a. Total financial resources
    - 16b. Ratio of unrestricted resources to operations
    - 16c. Total endowment assets
    - 16d. Annual giving
  17. Library and resources
  18. Facilities condition
  19. Faculty and staff salary and compensation
  20. Staff satisfaction
-

*Table A2: Awards and Academy Memberships included in the Metrics and Measurements Task Force Report*

---

**Faculty Awards in Arts, Humanities, Science, Engineering, and Health  
(Source: Directories or web-based listings for multiple agencies)**

American Academy of Arts and Sciences Member  
American Academy of Nursing Member  
American Association for Advancement of Science Fellow  
American Council of Learned Societies Fellow  
American Law Institute Member  
Fulbright American Scholar  
Guggenheim Fellow  
National Institutes of Health Merit Award  
National Science Foundation Career Award  
Nobel Prize  
Pulitzer Prize

**National Academy Members  
(Source: Directories for each organization)**

Institute of Medicine  
National Academy of Engineering  
National Academy of Sciences

---

Note. These categories draw from the Center for Measuring University Performance's annual report, the *Top American Research Universities*.



*Table A3: Comparison Public Institutions included in the Metrics and Measurements Task Force Report*

---

University of California-Berkeley  
University of California-Los Angeles  
University of Michigan-Ann Arbor  
University of Wisconsin-Madison  
University of Florida  
University of Illinois-Urbana Champaign  
University of Texas-Austin  
University of Washington-Seattle  
Ohio State University-Columbus  
Pennsylvania State University-University Park

---

## IX. APPENDIX B

*Table B1: Consultation meetings*

---

<b>Date</b>	<b>Group</b>
October 24, 2007	University Director of Institutional Research Richard Howard: Metrics and Measurements Task Force
November, 2007	Various Department Chairs/Heads: Measures of scholarship and other creative work
November 8, 2007	University Director of Institutional Research Richard Howard and Assistant Director Ronald Huesman: National Research Council ranking procedures
November 19, 2007	Vice President for Research Timothy Mulcahy and Associate Vice President for Research Frances Lawrenz: Measures of research
November 21, 2007	Vice Provost for Faculty and Academic Affairs, Arlene Carney: 7.12 statements of research and artistic achievement, faculty awards
December 13, 2007	Medical School Associate Deans Charles Moldow, Patricia Mulcahy, and Linda Perkowski: Measures of scholarship in the Medical School
January 9, 2008	Members of the President's Emerging Leaders Program Research Metrics Project (Sharri Boone, Sandra Ecklein, Elizabeth Grossman, Peter Haeg): PEL and FCC Subcommittee charges
January 24, 2008	Professors Theresa Glomb, Nathan Kuncel, and Paul Sackett: Measure validity and reliability
March 3, 2008	Vice President for University Relations Karen Himle and Assistant Vice President for University Relations Ann Aronson: Reputation and visibility of faculty research and discovery
March 3, 2008	Director of the Digital Library Development Laboratory John Butler: Digital content/technologies for identifying faculty products
March, 2008	Various colleagues from Committee on Institutional Cooperation institutions (CIC faculty leaders listserv): Support mechanisms for faculty awards; response to metrics and measurement
March 10, 2008	Graduate School Associate Dean George Green: Academic Analytics (joint meeting with the PEL Research Metrics Project)
May 1, 2008	Faculty Consultative Committee: Discussion of draft report

---

*Table B2: Memo Sent to University Department Chairs and Heads\**

---

Dear Department Chairs and Heads:

As a follow-up to the work of the Metrics and Measurements Task Force, a subcommittee of the Faculty Consultative Committee has been charged to explore additional measures that address core faculty activities. Because it is clear that the Board of Regents and the administration intend to take the metrics and measures seriously, we believe it important that they include measures that accurately reflect and measure faculty work. One integral part of faculty work is scholarship and other creative activities. We are very interested in faculty input about the measures that matter in your fields so that these can be considered in sustaining and strengthening research and creative work at the University.

What measures (3 to 4) are important in your field in assessing the relative quality of your department vis-a-vis your peers in the level and impact of scholarly research or other creative work?

Please email a brief/bulleted response to Gary Engstrand (use your "reply" key) by October 26.

Thanks very much for your input and time.

William Durfee, Mechanical Engineering  
Emily Hoover, Horticultural Science  
Jeffrey Kahn, Center for Bioethics  
Jennifer Windsor, Speech-Language-Hearing Sciences (subcommittee chair)

---

\*Emailed to the DOD list on October 17, 2007

## X. APPENDIX C

### References

1. Lombardi, J.V., Capaldi, E.D., & Abbey, C.W. (2006). *The top American research universities*. The Center for Measuring University Performance, Arizona State University (<http://mup.asu.edu/>).
2. Transforming the University: Report of the Task Force on Faculty Culture. May 10, 2006 (<http://purl.umn.edu/5621>) .
3. *Academic Ranking of World Universities*. Institute of Higher Education, Shanghai Jiao Tong University (<http://ed.sjtu.edu.cn/rank/2007/ranking2007.htm>).
4. *The Times Higher-QS World University Rankings*. The Times Higher Education Supplement (<http://www.topuniversities.com/worlduniversityrankings/>).
5. Altbach, G. (2004). The costs and benefits of world-class universities. *Academe*, 90, 20-23.
6. Gater, D.S. (2003). Using national data in university rankings and comparisons. *The Center Reports*, The Center for Measuring University Performance, Arizona State University. (<http://mup.asu.edu/gaternatldata.pdf>)
7. Hazelkorn, E. (2008). Learning to live with league tables and ranking: The experience of institutional leaders. *Higher Education Policy*, 21, 193-215.
8. Ioannidis, J.P.A., Patsopoulos, N.A., Kavvoura, F.K., Tatsioni, A., Evangelou, E., Kouri, I., Contopoulos-Ioannidis, D.G., Liberopoulos, G. (2007). International ranking systems for universities and institutions: A critical appraisal. *BioMed Central Medicine*, 5 (<http://www.biomedcentral.com/1741-7015/5/30>).
9. Liu, N.C., & Cheng, Y. (2005). Academic rankings of world universities: Methodologies and problems. *Higher Education in Europe*, 30, 1-14.
10. Jensen, M. (2007). The new metrics of scholarly authority. *The Chronicle Review*, 53, B6.
11. Salmi, J., & Saroyan, A. (2007). League tables as policy instruments: Uses and misuses. *Higher Education Management and Policy*, 19, 31-68.
12. Pardey, P.G., Dehner, S., & Beddow, J. (2007). Long gone Lake Wobegon: The state of investments in University of Minnesota research. *International Science and Technology Practice and Policy Report*. Department of Applied Economics, University of Minnesota. (<http://www.instepp.umn.edu/publications/newpubs.html>).

13. Office of Oversight, Analysis and Reporting (2007). *Table 5: University of Minnesota comparison of proposals submitted fiscal years 2004 through 2007 by college*. Date of report: 8/24/07 (<http://www.oar.umn.edu/trends/documents/TABLE5TEST911.pdf>).
14. Office of Oversight, Analysis and Reporting (2007). *Table 6: University of Minnesota comparison of proposals submitted fiscal years 2004 through 2007 by agency*. Date of report: 8/24/07 (<http://www.oar.umn.edu/trends/documents/TABLE6TEST911.pdf>).
15. Fogg, P. (2007). A new standard for measuring doctoral programs. *The Chronicle of Higher Education*, 53 (19), A8.
16. Wasley, P. (2007). Faculty-productivity index offers surprises. *The Chronicle of Higher Education*, 54 (12), A10.
17. Jasco, P. (2005). As we may search: Comparison of major features of the Web of Science, Scopus, and Google Scholar citation-based and citation-enhanced databases. *Current Science*, 89, 1537-1547.
18. Hascall, V.C., Bollen, J., & Hanson, R.W. (2007). Impact factor page rankled. *ASBMB Today*, 16-19.
19. Rodriguez, M.A., Bollen, J., & Van de Sompel, H. (2007). *A practical ontology for the large-scale modeling of scholarly artifacts and their usage*. Poster presented at the Joint Conference on Digital Libraries. Vancouver, B.C., Canada.
20. Stringer, M.J., Sales-Pardo, M., Nunes Amaral, L.A. (2008). Effectiveness of journal ranking schemes as a tool for locating information. *PLoS ONE* 3(2): e1683. doi:10.1371/journal.pone.0001683