EXECUTIVE SUMMARY

In support of NIU’s overarching goal to become the most student-centered public research university in the Midwest, the Faculty Work, Excellence, and Rewards Working Group was asked to develop performance indicators related to NIU’s abilities to attract, support, and retain a diverse and productive faculty. The committee chose to address this challenge by working together as one large group, so that expertise across the spectrum of disciplines represented at NIU informed every deliberation. To this end, the working group met six times between January and April of 2011; moreover, these face-to-face interactions were complemented by electronic collaboration via Blackboard.

The committee determined that the key issues to benchmark for the intended purpose were: faculty salaries, faculty diversity, and faculty productivity beyond classroom teaching. This last category was defined to include four general areas: 1) contributions to the academic discipline in intellectual, scholarly or artistic products; 2) service contributions to NIU; 3) service contributions to the profession; and 4) service contributions to the non-academic community. Institutional data are available to facilitate comparisons of NIU’s sponsored research and technology transfer activities with those of selected competitors. However, many aspects of faculty members’ academic and service contributions defy easy comparison across institutions and are thereby more amenable to internal benchmarking.

Ultimately, the working group felt comfortable comparing NIU with MAC institutions and selected additional competitors in terms of: 1) faculty salaries; 2) research expenditures; 3) proposal submissions and external awards to support research, instruction and public service; 4) invention disclosures; 5) patents pursued, issued and licensed. Internal benchmarking was recommended for measures related to faculty demography, and for a number of measures of faculty productivity that could ultimately be tracked automatically using Digital Measures.

Specific benchmark goals were established as follows:

FACULTY SALARIES

With respect to faculty salaries, NIU is competitive with a majority of MAC institutions at the assistant professor rank, but becomes less competitive within that comparison group at the ranks of associate and full professor. Between now and
2020, it will be imperative for NIU to maintain competitive salaries for assistant professors as well as address the apparent salary compression. The specific benchmark goal is to have faculty salaries for assistant, associate and full professors among the top eight of the thirteen MAC institutions by 2020.

To meet this objective, NIU will need to maintain its competitive position with respect to assistant professors, while addressing the existing salary compression. Strategies for accomplishing the latter should be focused on rewarding and retaining the most meritorious associate and full professors.

FACULTY DIVERSITY

With respect to faculty diversity, NIU needs to continue to track and increase the number of job candidates from underrepresented groups who interview on campus, and to establish a positive trend over time for the percentage of tenure-track faculty identifying as Black and Hispanic.

To meet this objective, NIU should revise recruitment and retention practices as needed based on feedback from minority candidates who decline employment at NIU and minority faculty members who decide to leave NIU. Additional investment in targeted recruitment and hiring initiatives may be needed.

FACULTY PRODUCTIVITY BEYOND CLASSROOM TEACHING

With respect to measuring faculty productivity beyond classroom teaching, NIU is well poised to develop a campus-wide system for tracking faculty accomplishments. The committee has suggested a strategy for selecting common measures of productivity, creating a data collection system with the use of Digital Measures, and establishing reasonable timelines for implementation. NIU must have this type of tracking capability to recognize and reward faculty excellence appropriately at the university level. Full implementation of this internal benchmarking effort is possible by 2015.

TECHNOLOGY TRANSFER

With respect to technology transfer, NIU lags significantly behind the comparison institutions; in fact, NIU places close to or at the bottom of the comparison group in terms of both invention disclosures and licensing of patents. Going forward, the number of licenses and options executed must be accepted as the leading indicator of success in technology transfer. The specific benchmark goal is to increase licenses and options executed annually from the current level (0-1) to 5 in 2020.

To meet this objective, NIU will need to increase external research funding received from industrial as well as federal sources in key areas such as life sciences
and engineering. In addition, the expertise and infrastructure available to support NIU inventors must be increased. Cost effective strategies for meeting these goals may include creating internship opportunities for business and law students in the technology transfer office and cultivating strategic partnerships with research and commercialization organizations focused in relevant technology fields and markets.

SPONSORED RESEARCH ACTIVITY

With respect to sponsored research activity, for 2005-08, NIU ranked tenth in total research expenditures among a group of 17 comparison institutions that included MAC institutions other than SUNY Buffalo and Temple, along with the Illinois Institute of Technology, Wichita State University, University of Northern Arizona, University of North Texas, and University of North Carolina, Greensboro. The specific benchmark goal is to achieve a 30% increase in total and federal research expenditures by 2020.

To meet this objective, it will be necessary for NIU not only to support and sustain existing research programs that attract external funding, but also to focus specifically on increasing the funding received from the National Institutes of Health. This will necessitate a restructuring of institutional priorities and a reallocation of resources used to support research infrastructure. Maintaining and strengthening the university’s current Carnegie Research High Classification will require changes in the institutional culture and practices. Going forward, it will be critical for NIU to maintain steady incremental growth in research expenditures. The research base determines the institutional capacity for attracting external funding to support mission-critical programs related to engaged learning and regional economic development.

MEMBERSHIP

- Lisa Freeman, Vice President for Research, Co-Chair
- Greg Waas, Chair, Psychology, Co-Chair
- Narayan S. Hosmane, Professor, Chemistry and Biochemistry
- Jeff Kowalski, Professor, Art History
- Andrew Krmenec, Chair, Geography
- Sue Ouellette, Chair, Allied Health and Communicative Disorders
- Nick Pohlman, Assistant Professor, Mechanical Engineering
- Fred Pugh, Admissions Records Supervisor, The Graduate School
- Reed Scherer, Interim Associate Dean for Research and Graduate Affairs, CLAS
• Jennifer Schmidt, Associate Professor, Leadership, Educational Psychology and Foundations
• Pam Smith, Professor, Accountancy
• David Stone, Office of Sponsored Projects
ISSUE
Faculty salaries

INDICATOR
• Annual unadjusted salary by academic rank (assistant, associate, full)
• Annual regional cost-of-living adjusted salary by academic rank (assistant, associate, full)

NIU’S BENCHMARK AND COMPARISON TO COMPETITORS
The data presented below (Bar Graph 3.1) were provided by the office of Human Resources and Compliance based on information compiled for FY 2010. Both raw and regional cost-of-living adjusted salaries are provided for MAC institutions.

NIU salaries are competitive at the assistant professor rank: Among our competitors, there are two institutions with relatively high salaries ($M$ (raw) = 70.7); a large group of eight institutions, including NIU, with competitive salaries ($M$ = 62.5; NIU = 62.3), and three institutions with relatively low salaries ($M$ = 55.5).

Among associate professors (Bar Graph 3.2), the competitiveness of NIU salaries erodes somewhat: There are two schools with relatively high salaries ($M$ (raw) = 90); a group of seven schools with competitive salaries ($M$ = 74.64); a group of three schools, including NIU, with less competitive salaries ($M$ =70.17; NIU = 70.6); and one institution that is noncompetitive ($M$ = 52).
Among full professors (Bar Graph 3.3), a pattern similar to that of associate professors is found: There are two schools with relatively high salaries ($M$ (raw) = 128.5); a group of six schools with competitive salaries ($M = 100.33$); a group of four schools, including NIU, with less competitive salaries ($M = 92.45$; NIU = 92.6); and one institution that is noncompetitive (Ball State = 82.1).

A recent article in *The Chronicle of Higher Education* reported that average salaries in 2010-11 for faculty members at public doctoral institutions were: professor, $118,054$; associate professor, $81,266$; and assistant professor, $69,777$.

The discrepancy between NIU and its competitors’ salaries tends to increase with academic rank. Bar Graph 3.4 below shows the average NIU salary at each rank (raw and adjusted) as a percentage of MAC institutions’ median salary.

### NIU Faculty Salaries as % of Median Among MAC Institutions

**Bar Graph 3.4**

The average NIU assistant professor unadjusted salary is at the MAC median; the average associate professor salary is 96% of the MAC median (i.e., $2,600 below the median salary); and the average full professor salary is 94% of the MAC median (i.e., $5,400 below the median salary).

**Additional Notes:**

- NIU has the second-highest cost of living among MAC schools (i.e., the salary discrepancy increases between NIU and its competitors [except for Temple] when cost of living is controlled). It is unclear the degree to which the relatively high cost of living for NIU faculty is compensated for by the cultural, intellectual, industrial, and technology advantages afforded by the northern Illinois region.
- In considering the above salary data it is important to note that we
Currently do not have access to data on the number of faculty at each rank or the average years-in-rank for faculty at peer institutions. These are important data because a discrepancy between institutions in the number of faculty at junior versus senior levels within an academic rank will significantly affect the average salary for that group of faculty (e.g., a large percentage of newly promoted full professors will tend to lower the average salary for that rank). Despite these limitations, however, a consistent pattern emerges from these data: NIU salaries lag behind peer institutions, and this discrepancy tends to increase with academic rank.

- It will be important to track these benchmark data over time in order to achieve a stable estimate of how NIU salaries compare to peer institutions.

**Goal**

- Maintain competitiveness among assistant professors.
- Move the mean NIU associate professor salary into the “competitive” group (i.e., top nine institutions). Currently, this would require an increase in the average NIU associate professor’s salary of approximately $2,000.
- Move the mean NIU full professor salary into the “competitive” group (i.e., top eight institutions). Currently, this would require an increase in the average NIU full professor’s salary of approximately $3,500.

**Justification for the Goal**

Having salaries that lag behind other competitor institutions will make it difficult for NIU to both recruit and retain excellent faculty needed to meet the overarching goal of becoming the most student-centered public research university in the Midwest.

**Suggestions for How NIU Meets the Goal**

- In order to maintain the observed competitiveness of NIU salaries at the assistant professor rank it will be critical to monitor closely salary norms within disciplines and to make salary offers that fit within these norms. In the short run, this may lead to salary compression or inversion within some academic units, but we should not allow our competitive position to erode at the assistant professor level.
- Salary increases among associate and full professors should focus on the most meritorious faculty at each rank.
• Remedial strategies should reflect the observed pattern that a greater relative discrepancy exists among faculty at higher academic rank (i.e., full professors are most discrepant, followed by associate professors). Separate “catch-up” merit funds might be set aside that reflect these differences.

• It will be critical to consider retention issues as a part of addressing NIU faculty salaries. In a recent report from Human Resources and Compliance it was noted that annual turnover among tenure-track faculty has recently been above 10%, and more than half of those departing faculty were mid-career individuals who left NIU for other institutions. Failure to retain high quality faculty is disruptive to the institution and expensive in terms of both lost investment in the departing faculty and the cost of recruiting and equipping a new faculty member. High rates of turnover among senior faculty also results in relatively inexperienced, low salary faculty at the more senior academic ranks.

• The relatively high cost of living for NIU employees is a reality of NIU's location in the northern Illinois region. However, the proximity of NIU to the Chicago metropolitan area is also advantageous in terms of both personal and professional growth. The advantages of NIU’s location should be marketed aggressively as a part of recruitment and retention efforts.

ORGANIZATIONAL OR POLICY CHANGES REQUIRED
TBD

BUDGETARY CONSIDERATIONS
TBD

PLANNING DOCUMENTS THAT ADDRESS THE ISSUE
• The NIU Great Journeys Strategic Plan: http://www.niu.edu/strategicplan/summary/diversity.shtml
• Northern Illinois University Report from the Faculty Salary Equity Task Force Executive Summary (2005): http://www.niu.edu/pcsw/resources/.../Sal-Equity-Study-Summary%20Final.doc

GROUP(S) IN CHARGE OF APPROVING OR IMPLEMENTING THE GOAL
Office of the Provost
ISSUE
Faculty diversity

INDICATOR
Percentage of tenured and tenure-track faculty self-identified as Women, Black, Hispanic, Other, White

NIU’S BENCHMARK AND COMPARISON TO COMPETITORS
Data below is for 2010. Data are not available for competitor institutions.

<table>
<thead>
<tr>
<th>DIVERSITY AMONG NIU FACULTY 2010 DATA</th>
</tr>
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<tbody>
<tr>
<td>Faculty Group</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Women</td>
</tr>
<tr>
<td>Black</td>
</tr>
<tr>
<td>Hispanic</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>White</td>
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Table 3.1

<table>
<thead>
<tr>
<th>NIU FACULTY GENDER DIVERSITY 2002-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>2010</td>
</tr>
<tr>
<td>2008</td>
</tr>
<tr>
<td>2006</td>
</tr>
<tr>
<td>2004</td>
</tr>
<tr>
<td>2002</td>
</tr>
</tbody>
</table>

Bar Graph 3.5

From 2002 to 2010, the percentage of NIU tenured faculty who were women increased ($p < .05$); however, no such trend was found among tenure-track faculty. The percentage of tenured faculty who are women consistently lags behind the percentage of tenure-track faculty who are women. (Bar Graph 3.5)
From 2002 to 2010, no discernible trend was observed in the percentage of individuals self-designated as “Black” or “Hispanic” among either tenured or tenure-track faculty.

From 2002 to 2010, the percentage of both tenure-track and tenured faculty who self-identified as an “Other” racial group increased ($p < .05$). The percentage of tenured faculty who self-designate as “Other” lags behind the percentage of tenure-track faculty who self-designate as “Other.”

From 2002 to 2010, the percentage of both tenure-track and tenured faculty who self-identified as “White” decreased ($p < .05$).

**Bar Graph 3.6**

Additionally:
- Data regarding the representation of racial groups at different academic ranks were not available.
- Data regarding the precise composition of the “Other” group were not available.
- Although the sample sizes for groups comprised of individuals identifying themselves as White, Women, and Other were adequate (e.g., 2010 tenure track $Ns = 125, 106, 72$, respectively), the sample sizes for groups identifying themselves as Black and Hispanic were quite small ($2010$ tenure track $Ns = 7$ and $4$, respectively).

**GOAL**

Given the chronic difficulty of recruiting and hiring faculty from underrepresented groups in many disciplines, it is likely unrealistic to set absolute goals at this time. Instead, it may be more useful to set intermediate goals such as:
• tracking and increasing the number of candidates from underrepresented groups brought to campus for interviews;
• establishing a positive trend over time for the percentage of faculty identifying as Black and Hispanic.

JUSTIFICATION FOR THE GOAL
A diverse faculty is consistent with NIU’s academic mission and improves the educational environment. It is also a core element of the NIU Great Journeys Strategic Plan.

SUGGESTIONS FOR HOW NIU MEETS THE GOAL
• Conduct an ongoing analysis of the factors contributing to faculty candidates from underrepresented groups declining offers from NIU; conduct a parallel analysis of factors contributing to faculty from underrepresented groups deciding to leave NIU.
• Establish a pool of dedicated funds in each college to support diversity recruitment efforts. These funds could be used for such initiatives as travel to conferences for recruitment interviews, funding on-campus visits (e.g., invited colloquia) by targeted potential recruits, and other innovative strategies to identify and recruit high-quality faculty from underrepresented groups.
• Establish funds for “opportunity” hires of high-quality faculty from underrepresented groups among productive departments.
• Reactivate an incentive system to reward departments that successfully hire faculty from underrepresented groups.
• A more detailed analysis is needed to explicate the consistent findings that the percentage of tenured faculty who are women and self-designated as “Other” lags behind the representation of these groups among tenure-track faculty as a whole.

ORGANIZATIONAL OR POLICY CHANGES REQUIRED
TBD

BUDGETARY CONSIDERATIONS
TBD

PLANNING DOCUMENTS THAT ADDRESS THE ISSUE
• The NIU Great Journeys Strategic Plan:
  http://www.niu.edu/strategicplan/summary/diversity.shtml
• Diversity Development Plan (Office of the Provost):
  http://www.niu.edu/diversity/plan/
• Diversity Resources and Programs: Efforts to Increase Employment
  and Retention of Diverse Faculty and Staff (Office of the Provost):
  http://www.niu.edu/diversity/resources/#II
• Diversity and Retention Task Force (Office of the Provost)

GROUP(S) IN CHARGE OF APPROVING OR IMPLEMENTING THE GOAL

Office of the Provost
ISSUE
Faculty productivity beyond classroom teaching

INDICATOR
Currently, there is no mechanism to obtain and manage university-wide data regarding faculty productivity outside of the classroom. The working group recommends tracking four general areas of productivity outside the classroom:

- Contributions to one’s field in intellectual, scholarly, or artistic products
- Service contributions to the institution
- Service contributions to one’s profession
- Service contributions to the community outside of academe

NIU’S BENCHMARK AND COMPARISON TO COMPETITORS
For the near and mid-term, this will be an exercise in internal benchmarking. Note, however, that over time it may be possible to use specific tracked measures for external as well as internal comparisons. For example, a measure used to track “honors and awards” could be designed to facilitate comparisons across a selected subset of institutions with a common definition of what constitutes prestigious national and international awards and recognitions.

GOAL
Given that no system exists currently to track faculty productivity across all departments and centers on campus, it is premature to establish specific benchmark goals. Instead, it is more useful to set intermediate goals related to the development of such a tracking system. The committee recommends the following:

- Acquisition and implementation of Digital Measures across all departments and centers on campus.
- Establish a task force to identify which components of Digital Measures should be adopted by all units on campus.
- Following the implementation of Digital Measures, review current productivity levels and establish goals for each common productivity indicator.

JUSTIFICATION FOR THE GOAL
In order to track, promote, and/or reward faculty excellence at the university level, it is necessary to have a system for developing measures of faculty productivity.
Productivity in the area of teaching is currently well documented by existing systems, but the university lacks a universal mechanism to measure faculty productivity outside of the classroom. Several colleges have adopted the Digital Measures program to collect such data. Although colleges vary in the degree of implementation at present, the data the committee was able to collect suggest that this program has promise for collecting relevant productivity data for analysis at the university level.

SUGGESTIONS FOR HOW NIU MEETS THE GOAL

The working group recommends that all colleges make a commitment to collect data on faculty productivity on an ongoing basis through Digital Measures, and that a task force be created to ensure a degree of consistency in implementation across the university. The task force would include a representative from representative disciplines within each college and individuals with expertise in the implementation and use of Digital Measures. The task force will be responsible for setting timelines for implementation, selecting common measures of productivity that would be part of the data collection efforts across the university, and making recommendations for policies and practices that will keep the Digital Measures system populated with complete and accurate information. Below are some suggested starting points for such discussion.

SUGGESTED IMPLEMENTATION TIMELINE

Fall 2011 – Task force is formed and begins regular meetings; task force surveys current state of implementation of Digital Measures in all colleges, and gains commitments from all colleges for implementation.

January 2012 – Task force sets timeline for implementation of Digital Measures, finalizes list of common Digital Measures assessment fields, and shares these with colleges for implementation. Task force makes recommendations regarding policies and practices for populating the Digital Measures database and keeping data accurate and complete.

The remainder of the implementation timeline would be established by the task force. We anticipate that full implementation of Digital Measures could likely take place by 2015.

SUGGESTED COMMON MEASURES OF PRODUCTIVITY

Below is a list of fields from Digital Measures that could be used to measure faculty productivity in each of the four areas specified above. This list represents fields that currently exist in Digital Measures for the Colleges of Business, Education, and Engineering and Engineering Technology. Once a common set of fields
are identified, all colleges would need to require these fields in their reporting, and then a standard, customized report could be built so that comparable data could be collected across the university.

1) Measures of contributions to one’s field in intellectual, scholarly, or artistic products:

- Honors and Awards
  - Name of honor or award
  - Organization/sponsor
  - Purpose

- Sponsored Projects
  - Contract/grant/research type
  - Sponsoring organization name
  - Sponsoring organization type

- Presentations
  - Conference/meeting name
  - Sponsoring organization
  - Current status
  - Scope
  - Was this peer-reviewed/refereed?
  - Invited or accepted?

- Publications
  - Contribution type
  - Current status
  - Journal/publisher/proceedings publisher
  - Was this peer-reviewed/refereed?
  - Invited or accepted?

- Intellectual Property
  - Type of intellectual property

- Performances and Exhibits
  - Type of work
  - Sponsor
  - Was this academic or non-academic?
  - Scope
  - Was this peer-reviewed/refereed?
  - Invited or accepted?
  - Was this by audition, commission, competition, or invitation?
2) Measures of service contributions to the institution:
   • Department Service
     • Committee name
     • Role on this committee
     • Elected or appointed?
   • College Service
     • Committee name
     • Role on this committee
     • Elected or appointed?
   • University Service
     • Committee name
     • Role on this committee
     • Elected or appointed?

3) Measures of service contributions to one’s profession:
   • Professional Service
     • Organization name
     • Role in this organization
     • Elected or appointed?

Measures of service contributions to the community outside of academe:
   • Public Service
     • Organization name
     • Role in this organization
     • Elected or appointed?

POLICIES AND PRACTICES TO CONSIDER FOR MAINTAINING ACCURATE AND COMPLETE DATA IN DIGITAL MEASURES

• Appoint an administrator in the dean’s office of each college who is responsible for maintaining Digital Measures and for acting as a liaison between faculty and DM.
• Employ student workers to enter faculty past information from CVs into Digital Measures.
• Prospectively, require faculty to submit Faculty Service Reports through Digital Measures.
• Provide Digital Measures training for faculty.
• Construct Digital Measures reporting template to indicate required fields for university reporting and other purposes of value to individual colleges.
ORGANIZATIONAL OR POLICY CHANGES REQUIRED
See above.

BUDGETARY CONSIDERATIONS
• Cost of Digital Measures software
• Time to enter past CV activities
• Administrator in the dean’s office to coordinate the implementation at the college level and train faculty
• Faculty time to learn the system

PLANNING DOCUMENTS THAT ADDRESS THE ISSUE
None

GROUP(S) IN CHARGE OF APPROVING OR IMPLEMENTING THE GOAL
The Digital Measures Implementation Task Force would take responsibility for identifying the data common areas of data collection. The college deans would have to oversee execution of the process.
ISSUE
Technology Transfer

INDICATOR
- Invention Disclosures
- New Patent Applications
- Patents Issued
- Licenses and Options Executed

NIU’S BENCHMARK AND COMPARISON TO COMPETITORS

Below is a summary table and bar graphs comparing NIU and its competitor group. The raw data were obtained from the Association of University Technology Managers (AUTM), or publicly available institutional reports. Selected competitors included MAC institutions, Southern Illinois University, Northern Arizona University, University of North Carolina-Greensboro, and University of North Texas. Reliable data were unavailable for Central Michigan University.

Table 3.2

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Competitors Annual Avg.</th>
<th>NIU Annual Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invention Disclosures</td>
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<tr>
<td>Patent Applications</td>
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<td>8.5</td>
</tr>
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</tr>
<tr>
<td>Licenses/Options Executed</td>
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<td>0.3</td>
</tr>
</tbody>
</table>

It is clear from these data that NIU lags behind competitors in technology transfer, both in terms of inputs (resources and workforce) and outputs (patents and licenses).

NIU ranked at the bottom of the comparison group in terms of invention disclosures. This reflects the lack of robust innovation culture at NIU, as well as the significant disparities that exist between the engineering and biotechnology research and development capacity at NIU versus the comparison group.

NIU also ranked at the bottom of the comparison group in terms of licenses and options executed; however, the university compared more favorably to

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1 Although the data for the SUNY Buffalo (UB) are shown in the appended tables, these were not used to calculate the median provided as a comparator for NIU. The University at Buffalo cannot reasonably be considered as a competitor of NIU in the context of technology transfer, because of the significant institutional differences between research expenditures—particularly in the biomedical/biotechnology space. NIH funding for UB in 2006-2008 exceeded $42M, whereas total NIH funding for NIU was $1.9M.
<table>
<thead>
<tr>
<th>Institution</th>
<th>AVG. ANNUAL DISCLOSURES – NIU VS. COMPETITORS</th>
<th>AVG. ANNUAL PATENT APPLICATIONS – NIU VS. COMPETITORS</th>
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<td>Bowling Green State</td>
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<th>Institution</th>
<th>AVG. ANNUAL PATENTS ISSUED – NIU VS. COMPETITORS</th>
<th>AVG. ANNUAL LICENSES EXECUTED – NIU VS. COMPETITORS</th>
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<td>Ball State</td>
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**Table 3.3**
competitors in terms of generating patent applications and having patents issued. These performance data are consistent with the service model favored historically by the NIU technology transfer office (TTO), where each disclosure receives equal attention and the focus is on patentability. To date, the TTO has emphasized the protection of intellectual property rather than the movement of discoveries to market. The TTO is understaffed, and there has been high turnover in its management. As a result, the TTO is poorly positioned to market technologies. Licensing revenues have diminished at the same time that patent costs have escalated.

There are definite opportunities to improve NIU’s technology transfer operations, as detailed below. It should be noted, however, that licensing revenue may never be a major income source for NIU. On average, licensing revenue comprises only 4-6% of research revenues at major research universities. There are very few highly remunerative university licenses, with < 0.7% yielding more than $1M annually.

GOAL
See Table 3.4.

<table>
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<th>Indicator</th>
<th>2006-09</th>
<th>3-yr Target</th>
<th>5-yr Target</th>
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<td>Licenses/Options Executed</td>
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Table 3.4

JUSTIFICATION FOR THE GOAL
NIU faculty and trainees develop novel ideas and technologies with the potential to impact society, but the societal benefits are not realized unless innovations are shown to have economic value. It is essential that NIU pursue patenting, licensing, and commercialization practices that maximize the further development, use, and beneficial social impact of technologies discovered and developed by members of the faculty.

A 33% increase in invention disclosures is anticipated by 2020, because of the expectation that research funding and research activity will increase sufficiently to drive this increase in innovation. An increase in invention disclosures is fundamental to the development of an entrepreneurial culture at NIU.
Less ambitious increases have been targeted for patent applications and patents issues. In terms of patent applications, the goal is not to increase the number filed, but rather to become more attuned to technology markets and to make more strategic investments in patents. The number of patents issued is a lagging indicator, because of the significant backlog at the United States Patent and Trademark Office. The time to first action is currently taking more than two years.

Licenses and options (number of deals) executed must be accepted as the leading indicator of TTO success. It is projected that NIU can significantly increase the licenses and options executed on an annual basis, going from 0-1 to 5 per year by 2020. This benchmark is believed achievable in view of the fact that Kent State University was able to sustain this level of licensing activity from 2007 to 2009. The goal was established with the assumptions that NIU will recruit more entrepreneurial faculty, and that NIU and the Northern Illinois Research Foundation (NIRF) will develop a new model for TTO operations.

SUGGESTIONS FOR HOW NIU MEETS THE GOAL

- Encourage disclosures by increasing faculty awareness of TTO, federal and university policies related to technology transfer. This could be accomplished in part by networking and training events. Recruitment of entrepreneurial faculty with industry connections would also further this objective.

- Increase industrial funding for research and development. NIU research and technology transfer will be enhanced by diversification of funding sources, particularly increased industrial collaborations. Recruitment of entrepreneurial faculty with industry connections would also further this objective.

- Reduce turnover in TTO management. NIU needs to realize the value added by having consistent TTO leadership who can develop long-term relationships with inventors, industry and other professionals engaged in technology transfer and commercialization of intellectual property.

- Grow research in areas that contribute to technology transfer.

  University licensing activity is not evenly distributed across research fields and technologies. Nationwide in 2009\(^2\), life sciences accounted for 52.2% of licensing activity, followed by materials science (11.9%), software (9.3%), electronics (7.5%) and chemicals (4.0%); write-in categories represented in the national survey were engineering (9.3%) and other (5.4%). During 2006-2009, technology transfer metrics

\(^2\) 2009 survey of technology transfer offices by Feldman (UNC School of Public Policy) and Bercovitz (UIUC), cited in Managing University Intellectual Property in the Public Interest (National Academies of Sciences, 2010)
at NIU reflected these trends to an extent; patent filings arose from the College of Engineering and Engineering Technology (30.3%), the Department of Chemistry and Biochemistry (42.4%), the Department of Biological Sciences (15.1%), the Department of Computer Science (6.1%) and the Department of Physics (6.1%). These data suggest that NIU has opportunities to grow life sciences research in the Department of Biological Sciences, the Center for Biochemical and Biophysical Studies, and the College of Health and Human Sciences. The College of Engineering and Engineering Technology (CEET) has contributed significantly to innovation at NIU, despite a relatively small amount of competitive federal funding, the absence of a doctoral program, and a high ratio of undergraduate students to faculty\(^3\). Presumably, alleviating these resource and workload challenges in CEET would also increase technology transfer.

- Increase manpower in the TTO. According to the Milken Institute\(^4\), median TTO FTE was 3.7 in 1996 and 8.2 in 2003; universities receive $6 of licensing income for every $1 invested in TTO staff. The NIU TTO currently has 2.0 FTE, and is significantly understaffed. Increasing the number of full-time employees may not be feasible in the current fiscal climate; however, manpower could be increased immediately at minimal cost through the implementation of an internship/fellowship program and/or employment of graduate assistants. Other public research universities have increased TTO manpower and student engagement through deployment of business and law students in the TTO.

- Develop inter-institutional agreements/collaborations focused on technology transfers and commercialization. The expertise and infrastructure available to support NIU inventors can also be increased through strategic partnerships with larger institutions (research universities, federal laboratories, incubator-accelerators) that have complementary research strengths. It is more cost effective to utilize the existing innovation ecosystem than to replicate services already available in the region.

- Outsource selected activities (legal counsel, marketing) to private entities with appropriate skills and contacts that are focused in relevant technology fields or markets. This should be done only to the extent necessary to maintain productivity of the TTO to more fully exploit commercially attractive NIU technology and increase

\(^3\) The Dean of CEET reports that the NIU ratio is 26.4, among the highest across 198 engineering colleges (2007).

\(^4\) Mind to Market: A Global Analysis of University Biotechnology Transfer and Commercialization (Sept 2006).
efficiency of technology transfer. External partners should be selected on the basis of their expertise and networks to advantage commercially attractive NIU technologies. For example, ideally, the legal counsel engaged to assist with the management of intellectual property should have not only the expertise necessary to prosecute a patent, but also the experience and network necessary to assess the specific market opportunity and to estimate the potential return on the investment in patent protection.

ORGANIZATIONAL OR POLICY CHANGES REQUIRED
For NIU to achieve the articulated goals, it will be necessary for the institution to increase the resources (funding base and workforce) that support inventors and the commercialization process. Organizational and policy changes generally necessary to promote external funding for research are discussed in detail elsewhere by this Vision 2020 working group. Increasing the human resources and scope of services associated with the TTO can be achieved in the most cost-effective fashion through establishment of new intra- and inter-institutional relationships, and the outsourcing of certain TTO functions. NIU’s ability to form such collaborations would be enhanced if the TTO operations were moved under the Northern Illinois Research Foundation to provide the TTO with more freedom to operate.

BUDGETARY CONSIDERATIONS
At the present time, the TTO’s costs for patenting exceed the income from royalties. This is not sustainable over the long term. Efforts need to be focused on maximizing the return on the investments made in patenting NIU technology, and these efforts are already being undertaken by the Vice President for Research and the NIRF. NIU’s current patent portfolio needs to be assessed, and ineffective investments need to be abandoned so that resources can be refocused on licensing promising technologies. This can be accomplished relatively quickly by NIRF using a combination of paid and unpaid consultants, but the immediate cost saving will be relatively limited. The escalating costs of patenting need to be controlled, and the number of deals that produce revenue need to be increased. More appropriate outsourcing of selected activities and more aggressive marketing of patented technology are needed. Opportunities for cost-sharing technology transfer costs with the originating units should be explored.

NIU needs to attract and retain entrepreneurial faculty in targeted areas. To this end, NIU must develop a strategy for offering new hires space and start-up funding comparable to that offered by competitors.
Long-term sustainability of the TTO may require additional up-front investment in order to allow development of technology transfer, licensing and commercialization practices that create a more competitive portfolio, and a more robust royalty stream. Ultimately, the TTO should strive to yield in excess of $1 revenue for each $1 of TTO expense.

PLANNING DOCUMENTS THAT ADDRESS THE ISSUE

NIU faculty members who participated in planning sessions associated with the NIU Great Journeys Strategic Plan have reported that there was discussion about creating a research park and otherwise strengthening the infrastructure available to support innovation and technology transfer. However, these ideas were not captured in the documents published to the website.

GROUP(S) IN CHARGE OF APPROVING OR IMPLEMENTING THE GOAL

- Research and Graduate Studies
- Northern Illinois Research Foundation (NIRF)
ISSUE
Sponsored Research and Artistry – Research Expenditures

INDICATOR
Research Expenditures
• Total research expenditures (unit = $)
• Federal research expenditures (unit = $)
• Total NIH funding (unit = $)

NIU’S BENCHMARK AND COMPARISON TO COMPETITORS
See Table 3.5 below. The comparison group for these benchmarks include: MAC institutions, The Illinois Institute of Technology, Wichita State University, University of Northern Arizona, University of North Texas, and University of North Carolina, Greensboro. Excluded from the MAC institutions are SUNY Buffalo

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Table 3.5

5 Note that total and federal expenditure data are captured from the most current NSF statistics, which report data from 2008. These data, which are used in benchmark comparisons with peer institutions, always contain a three-year lag.
and Temple as their research portfolios include levels of National Institutes of Health (NIH) awards ($42 million and $29 million, respectively) that diminish their usefulness for benchmarking; both of these institutions include three schools of health professions. Among the 17 institutions in the comparison group, for the latest reporting period (2005 – 2008), NIU has ranked 10th in total research expenditures in each year. Throughout this period, NIU’s federal research expenditures place it consistently in the second tier group of institutions with expenditures between $10 and $15 million and a ranking of 6-9 among the comparators.

The NIH is the largest provider of federal research funding, making it a critical source for additional research support. As reported in Table 3.6, NIU ranked 8th of the 17 institutions in the selected comparison group during 2003-2005, and 10th for the period 2006-2008.

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Table 3.6

The university should aspire to place consistently among the first tier with expenditures between $16 and $25 million in annual research expenditures; this goal is reflected in the benchmarks presented next.
GOAL\textsuperscript{6}

3-YEAR TARGET: 10\% ABOVE CURRENT LEVELS

Research Expenditures

• Total research expenditures: $16,500,000
• Federal research expenditures: $12,760,000
• NIH research expenditures: $704,000

5-YEAR TARGET: 15\% ABOVE CURRENT LEVELS

Research Expenditures

• Total research expenditures: $17,250,000
• Federal research expenditures: $13,340,000
• NIH research expenditures: $736,000

BY 2020: 30\% ABOVE CURRENT LEVELS

Research Expenditures

• Total research expenditures: $19,500,000
• Federal research expenditures: $15,080,000
• NIH research expenditures: $832,000

JUSTIFICATION FOR THE GOAL

Funding from external sources is necessary to support the research mission of the university, to maintain an adequate research environment for our doctoral and other graduate programs, to ensure our ability to attract and retain quality faculty, staff, and students, and to sustain our capacity to serve as a generator of regional economic growth and community development. This funding continues to be exceptionally competitive and this trend is only expected to worsen in the coming years as the pool of available federal dollars decreases and the number of institutions pursuing those funds increases. However, a range of opportunities exist for increasing NIU’s competitive position, which should enhance our ability to obtain external funding. A 2020 target of a 30\% increase in research represents a realistic balancing of the competitiveness of the funding pool with the real opportunities the university has to increase its research capacity. With regard to NIH funding, as NIH is the largest source of federal research funding, attaining an overall goal of a 30\% increase will only be possible if NIU is also able to increase its share of NIH funding.

\textsuperscript{6} The single most dominant factor in increasing research expenditures is the overall availability of funds from federal, state, and other sources. The goals established here assume only very modest increases in the availability of funds from federal and state sources.
SUGGESTIONS FOR HOW NIU MEETS THE GOAL

- Increase strategic investment of recovered sponsored research overhead (also known as facilities and administrative costs or F&A) and other available funding in NIU’s research mission. This investment strategy could include increasing the size and scope of competitive intramural grants; increasing the size of the start-up packages offered to faculty in disciplines with strong potential to attract extramural funding to reflect the current market; offering competitive retention packages to research active faculty who have demonstrated success at NIU; enhancing research facilities and infrastructure; incentivizing strategic partnerships with well-funded, high research activity institutions to facilitate collaborative projects.

- Strategic/coordinated hiring practices to support research mission (hiring to promote growth of NIH-fundable programs where opportunities exist [biology, HHS]; targeted hires in areas of national interest/NIU strength [e.g., environment, energy and NSF priorities etc]; facilitating and encouraging hiring of research personnel).

- Structuring faculty rewards and incentives to encourage research activity. Discussions about implementation of this recommendation will need to include faculty and administrators from the various decanal units, as well as the university leadership. Topics for consideration could include enhancing merit-based pay, supporting differential teaching loads, adjusting research and teaching responsibilities across units in a manner that leverages the value of external funding preferential assignment of technical support, trainee support and travel support to active scholars.

- Make strategic investments in facilities, equipment, and equipment-support personnel in areas of existing or potential research strength.

- Invest in the targeted hiring of tenured faculty with existing research funding and strong track records of past research funding as center directors and senior mentors. Such faculty would constitute investments in a number of ways. They would immediately bring with them grant-funded projects and the overhead (F&A) funds that go with them, which could be used to improve start-up packages for new faculty, and to meet other research-related needs. Their presence would strengthen their department’s or center’s capacity to bring in additional funding. Presumably, they would also continue to write successful grants and be productive researchers. In addition, they would increase the potential for talented but less-experienced faculty members to procure funding through mentorship and collaboration.
ORGANIZATIONAL OR POLICY CHANGES REQUIRED

REDUCE BARRIERS TO SUSTAINED FACULTY RESEARCH SUCCESS:

• Enhance the capacity of service units (GFA, Travel, Accounting, Procurement, etc.) to operate through a more customer service orientation (review staffing, training, operations);

• Remove real and perceived barriers to hiring research faculty through revision and alignment of existing APPM and HR regulations and procedures.

• Engage the Vice President for Research and Graduate Studies (VPRGS) more directly in the faculty hiring process, by seeking input during development of position descriptions, by providing the opportunity for the VPRGS to meet with faculty candidates during the interview process, and by asking the VPRGS to comment on and contribute to start-up packages.

• Strengthen our capacity to handle the sub-awards and sub-contracts that allow inter-institutional collaborations through proper staffing, training, procedures, and the creation and use of approved templates.

• Explore the utilization of the NIU Research Foundation (NIRF) to streamline the handling of some research-related administrative processes.

ENHANCE THE RESEARCH DEVELOPMENT FUNCTION OF THE DIVISION OF RESEARCH AND GRADUATE STUDIES:

• Develop the in-house capacity to facilitate the process of creating cost-accounting-based core research and service centers on campus. This would make research support facilities and services more accessible and more affordable for faculty members submitting proposals, and also enhance the ability of the centers to capture income from off-campus clients.

• Establish a methods core service center to assist faculty with statistical and other methodological and technical aspects of their research (e.g., grant writing, project implementation, and publishing).

• Provide additional supports to faculty grant-seeking efforts (e.g., enhancing research development specialists’ abilities, hiring grant writers, enhance computer systems for research administration, proposal development, multidisciplinary collaboration, multinstitutional collaboration, award tracking and reporting, and routing of approval forms).
BUDGETARY CONSIDERATIONS

- Funding more competitive start-up packages for new faculty may require additional contributions from academic units, as well as central administration.
- Strategic planning funds for 2011 are available to address costs related to core facilities.
- Increased utilization of NIRF will require NIU to develop appropriate administrative models to support the transition including service agreements with budgetary implications.

PLANNING DOCUMENTS THAT ADDRESS THE ISSUE

The issue of core user facilities was addressed in the initial NIU Great Journeys Strategic Plan; the model for core user facilities and services presented here has evolved from that effort. The suggestions related to increasing faculty productivity are consistent with faculty feedback reflected in the minutes from meetings of the two faculty advisory groups to the Vice President for Research (the Research and Graduate Studies Development Council and the Research, Instruction, and Public Service Advisory Council).

GROUP(S) IN CHARGE OF APPROVING OR IMPLEMENTING THE GOAL

Success depends on collaboration among the colleges in collaboration with the Office of the Provost and the Division of Research and Graduate Studies.
ISSUE

Targets for submissions and awards of external funding for research, public service, and instruction

INDICATOR

- Proposals submitted to competitive programs (units = # proposals submitted and $ value of proposals)
- Total awards received via competitive grants and contracts (units = # awards; $ value of awards)
- Competitive federal awards (units = # awards; $ value)7
- State and local awards (units = # awards; $ value of awards)
- Corporate awards (units = # awards initiated; $ value of awards)
- Public/non-profit (units = # awards initiated; $ value of awards)
- REU awards (units = # awards initiated; $ value of awards)

NIU’S BENCHMARK AND COMPARISON TO COMPETITORS

2010 SUBMISSION AND AWARDS DATA

- Proposals submitted to competitive programs (units = # proposals submitted and $ value of proposals) 383; $87,267,000
- Total awards received via competitive grants and contracts (units = # awards; $ value of awards) 335; $30,065,000
- Competitive federal awards (units = # awards; $ value)7 129; $25,500,000
- State and local awards (units = # awards; $ value of awards) 24; $7,693,000
- Corporate awards (units = # awards initiated; $ value of awards) 71; $1,275,000
- Public/non-profit (units = # awards initiated; $ value of awards) 103; $4,168,000
- REU awards (units = # awards initiated; $ value of awards) 0; $0

See Bar Graph 3.7 on next page. See also, Table 3.5 from the Research Expenditures benchmark.

7 Earmarks not included.
**GOAL**

Increase awards and submissions in order to increase total awards and submissions by 33% by 2020, with emphasis on increasing both federal and corporate awards.

**3-YEAR TARGET:**
- Proposals submitted to competitive programs: 425; $95,700,000
- Awards received via competitive grants and contracts: 370; $33,000,000
- Competitive federal awards (units = # awards; $ value of awards) 143; $28,000,000
- State and local awards (units = # awards; $ value of awards) 26; $8,500,000
- Corporate awards (units = # awards initiated; $ value of awards) 78; $1,375,000
- Public/non-profit (units = # awards initiated; $ value of awards) 113; $4,500,000
- REU awards: 1; $200,000

**5-YEAR TARGET:**
- Proposals submitted to competitive programs: 450; $100,500,000
- Awards received via competitive grants and contracts: 385; $34,500,000
• Competitive federal awards (units = # awards; $ value of awards) 148; $29,325,000
• State and local awards (units = # awards; $ value of awards) 28; $8,850,000
• Corporate awards (units = # awards initiated; $ value of awards) 81; $1,466,000
• Public/non-profit (units = # awards initiated; $ value of awards) 118; $4,800,000
• REU awards: 2; $400,000

BY 2020:
• Proposals submitted to competitive programs: 500; $113,000,000
• Awards received via competitive grants and contracts: 445; $40,000,000
• Competitive federal awards (units = # awards; $ value of awards) 171; $34,000,000
• State and local awards (units = # awards; $ value of awards) 32; $10,250,000
• Corporate awards (units = # awards initiated; $ value of awards) 94; $1,700,000
• Public/non-profit (units = # awards initiated; $ value of awards) 137; $5,550,000
• REU awards: 4; $800,000

JUSTIFICATION FOR THE GOAL
Regarding REU site awards, these NSF-funded awards are very prestigious and create a direct linkage between university research and undergraduate students. They also represent a clear marker of an institution’s general research infrastructure and capacity. See also, the Research Expenditures benchmark.

SUGGESTIONS FOR HOW NIU MEETS THE GOAL
Increase the number of NIU faculty submitting proposals by 5% per year. See also, Research Expenditures benchmark.

ORGANIZATIONAL OR POLICY CHANGES REQUIRED
See Research Expenditures benchmark.

BUDGETARY CONSIDERATIONS
See Research Expenditures benchmark.
PLANNING DOCUMENTS THAT ADDRESS THE ISSUE
See Research Expenditures benchmark.

GROUP(S) IN CHARGE OF APPROVING OR IMPLEMENTING THE GOAL
See Research Expenditures benchmark.