Purdue Engineering

Self-Assessment Study to Inform our Strategic Plan

2004
# Table of Contents

1. Our Purpose  
3. The Big Picture  
6. Our People  
8. Our Environment  
10. Moving Forward  
11. Appendix: About the Self-Assessment Study
Our Purpose

In our strategic plan, Purdue Engineering articulates the most ambitious vision statement in our history – to grow from excellence to preeminence by becoming the engineering program of choice for students and academicians; the premier source of engineering talent for the academic, technical, and business communities; and the preferred partner for creating new opportunities and areas of investigation. Our strategic plan commits our greatest energies to recruiting top faculty, students, and staff and building the infrastructure and financial base for leading research areas that will enable us to achieve our vision.

To gauge our baseline position, we have recently completed a comprehensive self-assessment study. The objective of the study was both simple and significant. We sought to determine how we and our colleagues in academe, federal and corporate research sectors, and the professions define premier university-level engineering education today and to understand how Purdue is currently evaluated against these standards. Viewing the findings from external audiences alongside those from our own faculty, students, staff, and alumni gives us rich insight into how to move forward to achieve our strategic goals.

The purpose of this publication is to distill the findings from the self-assessment study in terms of the execution of our strategic plan. The goals and action steps laid out in our strategic plan in many ways anticipated the findings – unsurprising considering the positions our own faculty, staff, and advisors hold in the influential environments from which our respondents were drawn. At the same time, the study findings cast light on some particular challenges and opportunities Purdue Engineering now faces. In addition to painting a “big picture” of where Purdue stands today in the views of peers, the study provides a look into the specific perspectives of our separate constituent groups.

This information will be of great value for developing communications and outreach to better engage these groups with our institution. But we should also remember what the external study was not intended to do. It was not designed to give directives with respect to programs and areas of specialization or to set our strategic priorities. This remains our most critical collective
work, reflective of our educational values, our service responsibilities, and our research aspirations.

Respondent Groups
More than 5,400 respondents participated in our study’s surveys and in-depth interviews.

<table>
<thead>
<tr>
<th>Surveys</th>
<th>Benchmark faculty</th>
<th>N=283</th>
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<tbody>
<tr>
<td></td>
<td>Purdue Engineering faculty and staff</td>
<td>N=262</td>
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<td>Graduate student applicants</td>
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<td>Undergraduate student applicants</td>
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<tr>
<th>Interviews</th>
<th>Federal research sponsors</th>
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<tr>
<td></td>
<td>Corporate research sponsors</td>
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<tr>
<td></td>
<td>“Resigned” faculty</td>
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<tr>
<td></td>
<td>“Declined” faculty</td>
<td>N=8</td>
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<tr>
<td></td>
<td>Corporate recruiters</td>
<td>N=10</td>
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Benchmark Institutions
Selected for comparison by Purdue leadership and faculty

- Carnegie Mellon University
- Cornell University
- Georgia Institute of Technology
- Massachusetts Institute of Technology
- Pennsylvania State University
- Stanford University
- University of California, Berkeley
- University of Illinois, Urbana-Champaign
- University of Wisconsin, Madison
- University of Michigan
- University of Texas, Austin
The Big Picture

There is much to celebrate in the self-assessment study findings. As has been the case for generations, Purdue is considered to be in the nation’s top tier of engineering schools, with a strong reputation among academicians and research partners alike. In particular, Purdue Engineering is acknowledged for accomplished faculty in many fields, for established and reliable relationships with the corporate sector (in applied research and professional placement), and for the preparation of excellent engineers, especially at the undergraduate level.

Among our constituent groups, applicants and enrolled students hold Purdue in highest esteem, as do engineering alumni across the nation and world. These members of Purdue’s extended family consider Purdue Engineering to be in a league with rankings-leaders MIT, Stanford, and Berkeley. Our wide network of Purdue Engineering supporters is a powerful asset for our institution, one that we can leverage as we seek to communicate about our strengths today.

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To provide a context for this picture of Purdue Engineering’s strengths, we must consider what engineering education constituencies hold to be the most important criteria for excellence. The study tells us that among academic audiences (faculty at our own and at peer institutions, federal funders, and prospective graduate students), these criteria are world-class research, highest-quality faculty, top-notch facilities, and then – slightly lagging in significance – engineering school reputation and university reputation. What might be deemed third-party endorsements (rankings and NAE membership) and contract research for external partners (whether government or industry) are viewed as important “proofs” of faculty and research excellence, but are not seen as the most important indicators in themselves.
The Leaders
According to internal and external faculty

- MIT, the University of California-Berkeley, and Stanford were universally considered the premier leaders
- Georgia Tech, the University of Illinois, the University of Michigan, and Cornell compose the peer leader group
- Purdue tended to be grouped with true peers such as Carnegie Mellon, Penn State, the University of Wisconsin, and the University of Texas

How is Purdue Engineering perceived to perform on the most important criteria, those demonstrating peer-to-peer evaluation of quality of academic research, faculty, and facilities? Here the study uncovered that while Purdue is well regarded, it is not considered to be leading among the premier set of engineering institutions. Purdue’s own faculty and staff rated their institution similarly to faculty at benchmark institutions – in some cases, as with facilities, giving Purdue lower ratings than did outside observers.

Must Haves
As per benchmark and Purdue faculty, graduate applicants and students, federal research sponsors

- World-class research
- High-quality faculty
- Top-notch facilities
- Excellent engineering reputation
- Excellent university reputation

To augment our understanding of what defines world-class research and the work of top faculty, our self-assessment study included extensive interviews with research sponsors and with select engineering faculty not affiliated with Purdue (those who left Purdue or who declined invitations to join us). Both external interviewees and Purdue faculty emphasized a newer paradigm of multi-disciplinary joint-investigation endeavors, with a concomitant increased emphasis on graduate
education, which has supplanted the traditional model of field-specific, “application-centered” engineering education and research. For some commentators Purdue has thus far not demonstrated sufficient organizational agility and openness to change to succeed in the new paradigm.

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The survey data support this commentary; faculty at the benchmark institutions, and Purdue faculty and staff, did not significantly associate Purdue Engineering with qualities of being “leading edge,” “interdisciplinary,” and “proactive.” The interviews revealed, and our strategic plan acknowledges, that Purdue Engineering must enhance its facilities, address bureaucratic and infrastructural obstacles, and ensure the health of our collegial environment to fully nurture the next generations of research and teaching.

The “big picture” from the study thus challenges us to strike a balance. We must sustain the historic strengths that define our institutional character, and serve our loyal and satisfied constituents, as we anticipate a radically evolving global environment for engineering research and education.

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Our overarching strategy puts people at the forefront, recognizing that the highest-ability faculty, students, and staff will continue to be our most important resource and the architects of our future success.

We should be proud that graduate and undergraduate applicants and students believe Purdue to be in a league with the very top engineering institutions in the nation. The self-assessment study revealed that on almost all features and attributes associated with leading engineering universities, students rated Purdue on par with its benchmark set.

A couple of caveats should be kept in mind. The study queried only those students who actually applied to Purdue; it did not sample from the universe of those considering top engineering schools. Also, the study findings cannot lead us to conclude that students are entirely satisfied with their experience at Purdue, only that they are affirmative of Purdue on the questions tested. While undergraduates overwhelmingly agreed that Purdue is distinguished for its co-op and internship opportunities, for example, the surveys did not ask about the quality of the classroom teaching or about job placement.

Our strategic plan gives great weight to the need to diversify our community – at present we have among the lowest percentage of minority undergraduate students in our peer set – and it is rewarding that our current graduate and undergraduate applicants and students consider Purdue to be a good place for minorities and women. It is particularly reassuring that minority and women undergraduates rate Purdue highly on these measures. But since our goal is to broaden our applicant pool to include a more diverse population, the fact that our current applicants and students are satisfied should not lead us to conclude that our work is done on this important dimension.

Representing our community outside the quads and around the world, Purdue Engineering alumni are among our most important ambassadors. Here the self-assessment study confirmed what we have regularly experienced in our contact with alumni: they are extremely proud of their institution and its reputation. The self-assessment study also raises interesting questions concerning how much they know about Purdue Engineering today, what they would like to hear from us, and what we need to do to convince them to aid in our strategic projects. For instance, alumni did not strongly associate Purdue Engineering with government research and federally funded centers. Are they insufficiently aware of our accomplishments – a problem that can be addressed in communications?
In another important example, alumni were less likely to agree that the student body is diverse and that students receive ample out-of-class support. Are alumni reflecting on their own experiences, and can they help us develop solutions, or are they simply less familiar with Purdue today? Further investigation is called for as we develop our alumni engagement programming.

Our Leadership
Where our constituents see us leading the benchmark

- Alumni, student applicants, and current undergraduates rate Purdue with MIT as leading on overall reputation
- Current faculty and staff rate Purdue highest on reputation among corporate recruiters
- Graduate applicants rate Purdue as leading on *U.S. News & World Report* rankings, time to degree completion, and being a good place for minorities
- Undergraduate applicants rate Purdue as leading for co-op and internship opportunities
- Excellent university reputation

When it comes to faculty and staff, the self-assessment study findings show us that these most important stakeholders affirm our quality. Our faculty and staff give Purdue Engineering strong ratings on many attributes – particularly the reputation of the undergraduate program and our reputation among corporate recruiters. Asked what accounts for Purdue Engineering’s ongoing preeminence, many faculty and staff mentioned the quality of teaching, the quality and dedication of faculty, and Purdue’s engineering reputation.

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Yet faculty and staff also see room for improvement. They rate Purdue lower than they do peer institutions on a number of attributes — and it is worth repeating that external faculty rate Purdue *higher* on many measures than do our own faculty and staff. Describing Purdue’s current challenges, a number of respondents want to improve Purdue’s record in hiring and retaining top faculty, promote more opportunities for interdisciplinary work and collegial interaction, and maintain high standards in undergraduate education (rectifying the high student-to-faculty ratio, for example). It is clear from this commentary — both positive and negative — that faculty and staff feel a deep commitment to our institution and seek to maintain its historic strengths while addressing its challenges.
Our Environment

The strategic plan commits us to significantly increase the number of faculty and research staff, to cultivate eight multi-disciplinary signature research areas, and to eliminate impediments to undertaking field-redefining work. We must ensure that the environment at Purdue Engineering and the University fully supports these interlinked ambitions, with environment defined as our collective culture, our facilities, and our relationship to the city of West Lafayette.

Discussions with faculty who left or declined our invitation to join Purdue Engineering provided special insight into environmental issues. These academicians defined their primary criteria when considering a position to be the quality, collegiality, and collaborative efforts of faculty, institutional support and facilities, and congenial lifestyle factors. All remarked on the quality of Purdue’s faculty in their fields. Importantly, none of those interviewed mentioned salary or start-up packages as obstacles. And though some external faculty noted facilities in need of improvement – also a concern of our current faculty and staff – they recognized that Purdue Engineering is in the process of extensive planned new building and renovation. But our institution was perceived less positively on some “cultural” dimensions related to Purdue Engineering, the University, and West Lafayette.

“Resigned” and “declined” faculty members were looking for greater evidence of interdisciplinary collaboration and collegial interaction in the Engineering schools. They noted that the University seemed especially bureaucracy-laden. And they were concerned that West Lafayette lacked the intercultural, educational, and entertainment opportunities they expected for themselves and their families.

In our strategic plan, we dedicate ourselves to addressing institutional barriers and to cultivating a nurturing and creative environment for teaching, learning, and research; in this we must take direction from the assessment findings and the contributions of our own community members. We must also work with the University to involve our institution even more fully in the development of West Lafayette to ensure that newcomers will find the city as congenial as do longer-term citizens.
Finally, external faculty and research sponsors cautioned us to be prudent in our growth. They suggested that very large engineering programs with a full complement of traditional disciplines do not necessarily signify academic strength today. Federal research funders indicate that they are looking for institutions that are unique leaders in highly specialized research areas. Faculty considering appointments want to see substantial evidence of commitment to their particular field and the presence of colleagues and resources throughout the institution dedicated to related endeavors. As we develop our eight signature research areas, we must be mindful to show that we are not spreading our resources too thin.

So many of us have thrived in the Engineering community at Purdue — launching or cementing distinguished careers, making ground-breaking discoveries along with Purdue peers, living in great neighborhoods, and fulfilling our personal dreams — that it is our special responsibility to ensure that newcomers are inspired to do the same. And we must illustrate for our peers inside and outside Purdue that we are not only a large institution, but one whose size, complexity, and intellectual diversity is producing premier engineering research and teaching.

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Moving Forward

In the coming weeks and months we will be meeting with faculty in all disciplines to discuss the detailed results of the self-assessment study and to determine how the implementation of our strategic plan can be shaped by what we have learned. We will also be engaging alumni, staff, and students in this most important work. We welcome the participation of all members of our community as we move forward to lead in a time of unprecedented opportunity in engineering education and research.

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Purdue Engineering’s self-assessment study was conducted in conjunction with the higher education consulting firm Lipman Hearne, providing a guarantee of objectivity and methodological soundness. As with the strategic plan itself, the study involved the full Purdue Engineering community.

Early in 2003, we completed Phase I of the project, which focused on determining the questions that the study should answer and the ultimate value it should bring. For this phase of work Lipman Hearne staff conducted a number of individual interviews and discussion groups on campus, including meetings with the leadership team, five groups of faculty, six groups of graduate students, five groups of undergraduate students, research staff, and staff with responsibility for development and communications. Discussion topics included Purdue Engineering strengths and challenges, conceptions of what defines premier engineering research and teaching, peer institutions, and perspectives on the Purdue Engineering environment and experience.

Based on the outcomes of Phase I, Lipman Hearne and Purdue project counterparts developed survey instruments and interview question sets to use during Phase II of the assessment study. Phase II, beginning in the Spring of 2003, consisted of telephone and online surveys, and in-depth individual interviews, with a wide range of constituents. Purdue staff continued to monitor the project throughout the execution of the study.

**Phase II Objectives**

The primary objectives of Phase II of the study, reflected in all survey and interview instruments used, were to:

- Identify features and attributes associated with premier engineering schools
- Assess Purdue’s and benchmark universities’ performance on these features and attributes
- Determine the image and reputation of Purdue and benchmark universities, and the degree to which these institutions are meeting constituent expectations of a premier college of engineering
Study Components

In total, Lipman Hearne surveyed or interviewed over 5,400 alumni, staff, faculty, students, and colleagues. Specific components of the study were as follows:

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<th>Component</th>
<th>Response Details</th>
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<tr>
<td>An online survey completed by 283 faculty from benchmark institutions.</td>
<td>broadcast to 650 benchmark faculty, generating a response rate of 43 percent</td>
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<tr>
<td>An online survey completed by 262 Purdue engineering faculty and staff.</td>
<td>broadcast to all faculty and staff, generating a response rate of 36 percent</td>
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<tr>
<td>An online survey completed by 1,152 alumni.</td>
<td>broadcast to 3,700 alumni – representative of this population’s distribution among decades of graduation, degree obtained, and departmental affiliation – generating an aggregate response rate of 31 percent</td>
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<tr>
<td>An online survey and telephone survey with 732 graduate student applicants.</td>
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<td>A telephone survey of 400 undergraduate applicants representing honors, minority, and female segments of this population.</td>
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<tr>
<td>An online survey completed by 611 new and returning graduate students.</td>
<td>broadcast to all graduate students, generating a response rate of 32 percent</td>
</tr>
<tr>
<td>An online survey completed by 1,974 new and returning undergraduate students.</td>
<td>broadcast to all undergraduates, generating a response rate of 30 percent</td>
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<td>In-depth, individual interviews with 7 resigned faculty members, 8 faculty members at other institutions who declined our position offers, 12 federal research sponsors, 6 corporate research sponsors, and 10 corporate recruiters.</td>
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