Report

Industrial Engineering Program
Review Committee
June 5, 2008

David R. Morris, Professor, Department of Biochemistry (Committee Chair)

Lucien N. Brush, Associate Professor, Department of Materials Science and Engineering

Noah S. Seixas, Professor, Department of Environmental and Occupational Health

Lawrence M. Seiford, Professor and Chair, Department of Industrial and Operations Engineering, University of Michigan

Vinod K. Sahney, Senior Vice President and Chief Strategy Officer, Blue Cross Blue Shield of Massachusetts

EXECUTIVE SUMMARY

Strengths:

- Richard Storch has been an effective administrative and academic leader for the Program
- Undergraduate program is successful and necessary
- Masters and doctoral programs are strong, but small in numbers of students
- The Visiting Committee is strongly invested in the needs of the Program
- GISE is an effective entrepreneurial effort by the Program
- The department staff is dedicated and effective

Challenges:

- Small faculty size compromises the ability to cover undergraduate and graduate courses and to fill in for faculty members on sabbatical leave. Faculty time to perform departmental service activities and to initiate new research directions is also compromised.
- There is no nationally recognized area of research focus
- Lack of contiguous space inhibits faculty interactions
- The sizes of the graduate programs need to be increased in order to increase the diversity of course offerings

Opportunities:

- A research and educational program focused on health systems engineering together with UW and Seattle-area hospitals, clinical departments in the School of Medicine and the Global Health initiative in the Schools of Medicine and Public Health will provide synergies as well as funding for the program
- A second area for subsequent focus is expansion in logistics and transportation
- Executive education/outreach

Recommendations:

The committee is proposing a bold strategy. It should be emphasized that to continue on the current path will not lead to the excellence desired by the Program and the College.

- The Industrial Engineering Program should be elevated to departmental status.
- Create a health systems engineering focus in the new department that is targeted to achieve national recognition.
- Without detracting from developing a new focus in Health Systems, one future area for development is to build on current strengths in logistics/transportation.
- Continue to pursue entrepreneurial educational programs to serve the business, industry and health care organizations in the northwestern part of the U.S.

The Review Process

The Review Committee was charged in a letter of April 14, 2008 from Vice Provost Suzanne T. Ortega and Associate Dean James Soto Antony of The Graduate School (Appendix A). The review process consisted of:

- Documents reviewed:
    - Report and response from previous review (May, 2003)
    - Departmental self-study (March 14, 2008)
    - GPSS graduate student survey results (Winter, 2008)
    - Statement from ABET review (2007) and program response (April, 2008)
- On-campus committee members met with Dean O'Donnell and Graduate School representatives.
- On-campus committee members met in advance of the site visit with Director Storch.
- On-campus site visit, May 1-2, 2008 (Agenda, Appendix B).

The information gained from these documents and activities informed the committee's findings as set forth in this document.

Director Storch, the faculty, staff and students of the Program were extremely helpful in sharing information and insights. Augustine McCaffery of the Graduate School was invaluable in providing support for the committee.

Committee Findings

The process outlined above resulted in the following findings, grouped under the headings Strengths, Challenges, Opportunities and Recommendations:

Strengths:

1. Richard Storch has been an effective administrative and academic leader for the Program. He has achieved this under conditions where the capabilities of the faculty were stretched thin because of its small size relative to the magnitude of its academic responsibilities.
2. Although the committee did not review the undergraduate program in detail, several features are apparent:
    - As the only significant program north of Berkeley and west of Minnesota, it is essential that it be retained at least at its current enrollment level.
    - There is strong demand for the program from potential employers and students.
    - The Program faculty provides adequate course offerings for the undergraduate majors.
3. The masters program attracts good students with varying backgrounds. The students are able to take courses in other disciplines and also to interact with doctoral students in both courses and projects.

4. The doctoral program recruits nationally and internationally. The students have varied backgrounds from multiple different masters programs, not just from the UW. All students are funded. The students have opportunities available for internships. The students' supervisory committees take an active role in their progress.
5. The Visiting Committee is strongly invested in the activities and the future of the Program. They play important roles in fund-raising, the mock interview program, and the student internship program**.**
6. The new certificate program, Global Integrated Systems Engineering (GISE) is one of the few entrepreneurial educational efforts that have been undertaken by the Program. This course was initiated with funding from Boeing and has just completed its first offering. The Program intends to start expanding the certificate program more broadly.
7. The Program staff is dedicated, motivated and effective. The skill of the staff helps to make up for the deficit in faculty size.

Challenges:

1. The small faculty size is a dominating challenge. This influences almost everything the Program does. It challenges the ability of the Program to cover its undergraduate and graduate courses, resulting in limited offerings from the perspective of the graduate students. It compromises the ability to cover the teaching responsibilities of faculty members on sabbatical leave. The faculty members have limited time to perform departmental service roles and to initiate new research activities.
2. There is no recognized area of research focus that provides a national presence for the Program.
3. The lack of contiguous space inhibits day-to-day communication, as well as research and academic collaborations across the Program. The Program faculty and administration are currently spread over 4 different locations.
4. The sizes of the graduate programs should be increased in order to create a larger local and national presence. The ability to achieve this is compromised by the small faculty size.

Opportunities:

1. A number of opportunities are presented by the presence of one of the major health science centers in the country. The UW hospitals, as well as other health care organizations in the area provide many opportunities in systems, logistics, quality, and safety improvements. The clinical departments in the School of Medicine provide opportunities for joint research undertakings. The Global Health initiative, joint between the Schools of Medicine and Public Health, is a potentially fruitful opportunity for collaborative research undertakings. We recommend this area as our first choice due to a high probability of research support.
2. Logistics and transportation are existing strengths of the Program that could be exploited to generate additional research initiatives, particularly with addition of new faculty.
3. GISE represents a good start in developing entrepreneurial executive education and outreach initiatives. The committee perceives that this is an area with unfilled needs in the region.

Recommendations:

The Review Committee was convinced that the Industrial Engineering Program can evolve into a department of elevated national prominence. This can be achieved through targeted hiring of additional high-profile research leaders 1) to develop new research activities with applications having large impact potential and 2) to expand or align existing research efforts. With these goals in mind, the Committee puts forward the following recommendations:

1. The Industrial Engineering Program should be elevated to departmental status. The Program is already a quasi-department in everything but name. The current designation as a program gets in the way of essentially all the activities of the unit.
2. Richard Storch should continue as administrative and academic leader of the Department.
3. A health systems engineering focus should be created in the new department. This should be undertaken in a manner that will achieve national recognition for the department. It should take the form of a center or division within the Department of Industrial Engineering. The Dean of Engineering and the Department should involve national leaders in health systems engineering, medicine, public health and global health in creating a vision for this initiative. Outlined below is a list of possible external invitees who could help craft a vision for the Health Systems Engineering component of the Department:
    a. Prof. David Gustafson, PhD, University of Wisconsin, Madison, WI (Industrial Engineering)
    b. Prof. Steve Roberts, PhD, North Carolina State University, Raleigh, NC (Industrial Engineering)
    c. Prof. Jim Benneyan, PhD, Northeastern University, Boston, MA (Industrial Engineering)
    d. Dr. Donald Berwick, M.D., CEO, Institute for Healthcare Improvement, Cambridge, MA
    e. Dr. Paul Batalden, M.D., Director of Health Care Improvement, Dartmouth Medical School, Dartmouth, NH
    f. A. Blanton Godfrey, Ph.D, Dean, College of Textiles, North Carolina State University, Raleigh, NC, former CEO, Juran Institute
    g. Dr. Gary Kaplan, CEO, Virginia Mason Medical Center, Seattle, WA
    h. Dr. Barbara Silverstein, Director, SHARP, Department of Labor and Industries, Olympia WA
4. An internationally recognized, mid-career expert in health systems engineering should be recruited as leader of this effort. Several new junior faculty members should also be recruited directly into the health systems engineering area. When possible, these recruitments should be undertaken jointly with appropriate units in the Health Sciences.
5. After developing a viable and functioning health systems focus, as described above, it is recommended that the Department build on and supplement current strengths in logistics and transportation.
6. The Department should aggressively pursue entrepreneurial educational programs. These could include expansion of the GISE program, as well as executive education, evening graduate courses and distance learning.

Appendix A

Charge to Committee

Appendix A

UNIVERSITY OF WASHINGTON
The Graduate School
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April 14, 2008

Industrial Engineering Review Committee
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Vinod K. Sahney, Senior Vice President and Chief Strategy Officer, Blue Cross and Blue Shield of Massachusetts, 401 Park Drive, Boston, MA 02215-3326

RE: Charge to Review Committee for the Industrial Engineering Program

Dear Review Committee Members:

Thank you once again for agreeing to serve on the committee to review the Bachelor of Science in Industrial Engineering (BSIE), the Master of Science in Industrial Engineering (MSIE), and the Doctor of Philosophy (PhD) degrees offered by the Industrial Engineering Program at the University of Washington (UW). Now that the members of the review committee have had the opportunity to meet with the administrators involved with this review, we are writing to present you with a more detailed charge for the review process.

First, the specific action needed at the end of your review is a recommendation regarding the continuation of the Program's undergraduate and graduate degree programs. The committee's possible recommendations range from suspension of student entry into the BSIE, MSIE and PhD degree programs, to a recommendation for continuing status with a subsequent review in 10 years. Shorter terms can be recommended if you deem it appropriate. Equally important to this status recommendation, your review can offer the Program and the administration an independent assessment of the "health" of the Program and advice on how it can be improved.

In our experience, the review is most likely to be successful if the necessary tasks are divided among the committee members. We suggest that the external reviewers be relied upon as content experts who can evaluate the quality of the Program from a national perspective. They are also likely to be able to comment on recent developments in the field and their incorporation into the Program. The internal members may conduct assessments and interviews with stakeholders on campus in advance of the site visit, if deemed appropriate. We encourage you to communicate with Professor Richard Storch, Director of the Industrial Engineering Program, so that he knows your interests and expectations, particularly for the site visit.

The site visit on **May 1-2, 2008**, will include meetings with administrators, faculty, students, and key staff. The review committee's meeting with graduate students during the site visit will include a Graduate and Professional Student Senate (GPSS) representative. The GPSS representative will lead off the discussion with questions for students and will voice any feedback received from graduate students in advance of the meeting. After the site visit, the GPSS will submit a separate report on its findings. In general, the GPSS works closely with the UW Graduate School across a wide range of

student matters and participates routinely in the program review process. The GPSS President also serves as an ex-officio member of the Graduate School Council.

The site visit will culminate with an exit interview, divided into two portions. The Dean and Associate Dean of the Graduate School, the Dean of the College of Engineering, the Associate Dean from the Office of Undergraduate Academic Affairs, and the Executive Vice Provost for Academic Affairs and Planning will participate in both parts. The first portion of the exit interview will include the Program Chair and other faculty he may invite, while the second portion, the executive session, will include only the review committee and administrators. We will request your formal recommendation regarding the continuance of the degree programs early in the second portion of the exit interview. We will also ask you to describe your plan for completing the written report in a timely manner.

We request that your committee submit its written report within 6 weeks of the site visit at the latest. Specifically, the **written report is due June 13, 2008**. A written response will then be provided by the Program by **October 3, 2008**. When the response is available, the internal members of the committee will be asked to attend a meeting of the Graduate School Council to present review committee findings and to discuss how to implement the recommendations from your report. A letter summarizing the Council's recommendations for implementation will be forwarded to the Provost for her consideration and action.

Please note that upon completion of program reviews, the primary review documents become public and are placed on the UW's accreditation web site. These documents include the self-study, the review committee report, the Program's response to the report, and the Graduate School letter to the Provost describing the Graduate School Council's recommendations on the review.

The most important objective of your review is an assessment of the academic and educational quality of the Program. Important questions include:

1) Are they doing what they should be doing?
2) Are they doing it well?
3) How can they do things better?
4) How should the University assist them?

In deciding how to prioritize issues, we suggest considering how important each one is in relation to scholarship or education. Listed below are several issues that emerged from an initial review of the Program's self-study and from discussion in the charge meeting. This list is not intended to restrict your review. You should consider all issues that you deem important.

<u>General, Faculty, and Staff</u>

1) What is the general quality of the Program, its faculty and students? How does it compare with its peers nationally and internationally?
2) The 2003 Review Committee Report (Attachment 1) contained a number of recommendations in the following areas. What efforts have the Program faculty made to address these issues?
    a. Restructuring of the undergraduate curriculum,
    b. stronger and narrower topic focus,
    c. faculty hires related to areas of focus,
    d. mentoring of junior faculty,
    e. development of a strategic plan,
    f. increased collaboration with the Business School,
    g. revision of the graduate program curriculum to include courses in mathematics and statistics,
    h. contiguous space for faculty, staff and graduate students,
    i. development of criteria to become a department.
3) Should the Industrial Engineering Program become a department? What is needed for the unit to transition to departmental status and gain national stature?
4) Is there opportunity for the Program to collaborate with other academic units to form a different academic structure to have national impact?
5) What opportunities exist with the School of Medicine that Industrial Engineering might pursue to develop further?

6) What opportunities exist for the Program to leverage and improve linkages with industry?
7) The self-study lists three major challenges the Program currently faces and includes the small faculty size, space and the need for external funding, and the related issue of faculty retirements (page 7). Do the Program and/or the College have specific plans to address these concerns?
8) Does the Program have a plan for the development of future leadership?
9) How is membership determined for the Program's committees (pages 10-11)? Are students adequately involved in governance of the Program?
10) Does the Program's strategic plan include plans for development?
11) What is the nature of the Program's collaboration with other academic units and the impact of this collaboration on faculty research and teaching?
12) How well have diversity programs in the Program been institutionalized?
13) What mechanisms does the Program use to encourage staff development? Do these mechanisms meet staff needs for their development?

Existing Degree Programs (BSIE, MSIE, PhD)

1) What is the general quality of the Program's degree programs? How do these degree programs compare with those of peers nationally and internationally?
2) What are the student learning objectives for these degree programs?
3) The program implemented a new Internship Program for undergraduate students (page 3). Is the online program process effective in connecting students with prospective internships? Do students have access to the Visiting Committee overseeing the program if problems occur or questions arise? Does the Program and Visiting Committee have a monitoring plan in place to determine the Internship Program's effectiveness in meeting student's needs?
4) Are the PhD and MSIE programs optimally configured?
5) What opportunities exist for distance learning?
6) Are the Program's mechanisms to measure the impact of faculty teaching effective in assessing student learning?
7) What is the quality of applicants to the graduate degree programs? Are recruitment and retention rates appropriate? Are recruitment and admissions procedures optimally designed to attract high quality and diverse cohorts of students into the Program?
8) Have the graduate degree programs met or exceeded students' expectations?
9) The qualifying exam is offered once per academic year for PhD students. Do students find this annual exam offering sufficient for their programs of study?
10) Do graduate students have a clear understanding of the informal grievance process? Has the lack of a formal process been an impediment to students pursuing a grievance?
11) Should the Program consider eliminating the MSIE thesis option?
12) Does the process for the research advisory selection work adequately for graduate students?
13) How do graduate students evaluate the voluntary peer mentoring program?
14) How has the Program established formal measures to assess graduate student learning?
15) Are the graduate students provided equitable opportunities to serve as RAs and TAs (page 33)? How might other funding sources be used to support graduate students?
16) Are MSIE and PhD students provided opportunities for professional development?
17) How might undergraduate research be supported and grown by the Program?

Resources

1. Obtaining new resources for programs is always a challenge for all universities. Assuming that we must work within the current budget, has the current funding been used optimally? Would the Program benefit from more strategic prioritization of goals vis-à-vis use of financial resources?
2. If limited new state resources were available, what would be the best strategic investment to meet the Program's current goals and to position this Program to be at the cutting edge of its discipline in the future?
3. As a result of your review, have you identified any features of the Program that could, and should, be leveraged in ways that might attract outside investment (e.g., from granting agencies, foundations, or individual donors)? If so, what would be your specific recommendations?

Thank you again for your time and effort. Please contact Augustine McCaffery, Senior Academic Program Specialist, at 206-221-3628 or at amccaf@u.washington.edu with questions you may have about the review.

Sincerely yours,

Suzanne T. Ortega
Vice Provost and Dean

James Soto Antony
Associate Dean for Academic Programs

c: Douglas J. Wadden, Executive Vice Provost for Academic Affairs and Planning, Office of the Provost
Matthew O'Donnell, Dean, College of Engineering
John D. Sahr, Associate Dean, Office of Undergraduate Academic Affairs
Richard L. Storch, Professor and Director, Industrial Engineering Program
Augustine McCaffery, Senior Academic Program Specialist, Office of Academic Programs, The Graduate School

Appendix B

Site Visit Agenda

Appendix B

UNIVERSITY OF WASHINGTON
The Graduate School

Industrial Engineering Program Review Site Visit
May 1-2, 2008

AGENDA

Wednesday, April 30

6:00 p.m.	Review Committee Dinner – **Wild Ginger Asian Restaurant** 1401 3rd Ave., Seattle -- Phone: 206-623-4450

Thursday, May 1

8:30 a.m.	Richard Storch, Professor and Director – ***MEB G9** Undergraduate Program Coordinator
9:30 a.m.	Professor Adam Bruckner, Chair, Aeronautics and Astronautics – **MEB G9** Professor Steve Gloyd, Director, International Health Program Associate Professor Pete Johnson, Environmental Health Professor Ted Klastorin, Business School
10:15 a.m.	Professor Zelda Zabinsky – **MEB G9** Graduate Program Coordinator
10:45 a.m.	**Break**
11:00 a.m.	Professor Tom Furness – **MEB G9**
11:30 a.m.	IE Program staff – **MEB G9** Erin Peinado, Academic Advisor Kellus Stone, Administrator Jennifer Wallace, Assistant to the Fluke Chair Peggy Remlinger, Secretary
12:00 p.m.	Lunch with Matthew O'Donnell, Dean, College of Engineering – **Loew 355**
1:15 p.m.	Visiting Committee – **MEB G9** Jeff Alberts, Boeing, Chair Brian Kuttner, Computer Tool and Die Trish Larson, Forest Ridge School of the Sacred Heart Ric Norby, United Parcel Service Ed Starbird, Fluke Corporation
2:00 p.m.	Review Committee Executive Session
2:30 p.m.	Professor Kailash Kapur – **MEB G9**
3:00 p.m.	Associate Professor Christina Mastrangelo – **MEB G9**
3:30 p.m.	Associate Professor Benita Beamon – **MEB G9** Acting Graduate Program Coordinator
4:00 p.m.	Professor Cindy Atman – **MEB G9**
4:30 p.m.	Assistant Professor Archis Ghate – **MEB G9**

UNIVERSITY OF WASHINGTON
The Graduate School

Industrial Engineering Program Review Site Visit
May 1-2, 2008

AGENDA

Friday, May 2

9:00 a.m.	Student Advisory Board – **MEB G9**
9:30 a.m.	Undergraduate Students – **MEB 105**
10:00 a.m.	Master's Program Students – **MEB B14**
10:30 a.m.	PhD Program Students - **MEB B14**
11:15 a.m.	Review Committee Lunch and Executive Session – **MEB G9**
2:00 p.m.	Exit Interview – **Loew 355** Review Committee with the following faculty: Richard Storch, Zelda Zabinsky, Industrial Engineering Program Matthew O'Donnell, Dean, College of Engineering John Sahr, Associate Dean, Undergraduate Academic Affairs Tom Gething, Interim Associate Dean, Office of Academic Programs, The Graduate School James Antony, Associate Dean, Office of Academic Programs, The Graduate School Augustine McCaffery, Senior Academic Program Specialist, Office of Academic Programs, The Graduate School
3:00 p.m.	Exit Interview (continued) - **Loew 355** Review Committee and Deans
4:00 p.m.	Review Committee Debriefing – **Loew 355**

*MEB = Mechanical Engineering Building