STRATEGIC PLAN FOR GRADUATE AND PROFESSIONAL EDUCATION
IN CORNELL UNIVERSITY'S COLLEGE OF ENGINEERING

CHARGE: The Graduate Program Task Force was charged to review graduate education (PhD and MS) and professional studies (MEng) in the college with a focus on improving the quality and ranking of graduate level programs. We were asked to do this in the context of the following:

1. Find common themes between departments.
2. Forecast emerging academic foci and the College's ability for excellence in these areas.
3. Determine overall priorities and metrics for the graduate and professional programs.
4. Compare College's graduate and professional programs to competitors'.
5. Comment on intellectual contributions of MEng and PhD programs.
6. Develop strategic goals and metrics for graduate and professional programs.
7. Prioritize strategies to attain strategic goals.
8. Examine effects on strategic goals of new funds or reallocation of funds.
9. Write a concise summary of task force finding and recommendations.

ADDITIONAL INFORMATION: at the onset of the Committee's work, Dean Fuchs informed us that he was interested in securing $15M in new MEng fellowships, $96M in new PhD fellowships, as well as $70M in new Teaching Assistant support. With this in mind, the Committee has attempted to identify goals and create strategies that would effectively use these new funds.

Executive Summary

Prioritized Goals and Strategies for Graduate Education and Professional Programs

The goals of the College of Engineering's Graduate and Professional Programs are to recruit a diverse population of outstanding graduate students and provide a climate that will retain them by providing opportunities to have academic success, creative research experiences, formation of collegial relationships with faculty and peers, and completion of their degree programs prepared for successful careers.

Goals

- Increase the diversity of incoming graduate students, as well as new faculty, across all programs.
- Set aside special multi-year fellowships for students from diverse backgrounds.
- Increase the number of PhD degrees granted each year.
- Increase the number of PhD students per faculty from 3.5 to 4.5.
- Increase the quality of MEng students.
- Decrease the number of MEng students from 487 (2.4 MEng/faculty) to a number equal to approximately 50%of the senior class or 375 (1.4 MEng/faculty).

Strategies

1. Increase size of faculty by 50.
2. Increase PhD full Fellowships to .75 per faculty.
3. Increase the Teaching Assistant support for PhD students to 0.5 per faculty.
4. Increase Teaching Assistant support for MEng students to 0.2 per faculty.
5. Require GRE scores for all students, as well as a GPA equal to or greater than the average GPA for graduating class of the Engineering College.

Impact on rankings:

These strategies/goals will improve our US News (USN) ranking significantly, as is indicated by the changes in the following metrics:

a) increase quality/diversity of MEng students - increased GRE scores (USN weight of .09).
b) decrease our MEng acceptance rate (USN weight of 0.01)
c) increase # of PhD/ full time faculty (gain 1 PhD / faculty with USN weight of .075)
d) decrease # MS+MEng/ full time faculty
(lose 1 MEng/faculty with USN weight of .0375)
e) increase total PhD's granted per year to 15% of total PhD or increase from 73 to 168
(USN weight of .0625)
f) increase total research dollars by 25% (USN weight of 0.10)

Impact of undergraduate program:

In evaluating the total number of undergraduate and graduate students per faculty member and ratio of graduate to undergraduate students, Cornell is near the bottom of the list relative to our peers. If we expect to compete, we need to be at the median of both lists. The number of total students per faculty should move from 21 to between 17 and 18, and the ratio of graduate students to undergraduate students should change from 0.40 to near 0.50.

An increase of 50 faculty will lower our undergraduates/faculty ratio from 14 (2800/200) to 11.2 (2800/250). Currently, we have 3.5 PhD/faculty (706/200), 2.4 MEng/faculty (478/200) and 0.26 MS/faculty (52/200). An increase of 50 faculty, an increase in PhD students of 425 (700 to 1125), a reduction of MEng to 375 and the same number of MS students (50) would give us a ratio of graduate and professional students per faculty of 5.8 (1450/250). The ratio of graduate and professional students to undergraduate students would be .52 (1450/2800) instead of .44 (1236/2800) and our total students per faculty would be 17.0 (4250/250) rather than 20.2 (4043/200). Changes like these will place Cornell's metrics in the categories at the average of those of our peer institutions rather than at the bottom. In our recommendations we have assumed that the College is constrained by the requirement to maintain the total number of engineering undergraduates at the current level.[1]

If we fail to make these changes then it is highly unlikely that our ranking will improve. Certainly, no such large increase in the number of grad students (with a maintenance of their current quality) will occur without a corresponding increase in graduate student support, such as

[1] Figures based on data reported in most recent US News and ASEE reports. Part time student=0.5 Full time students

multi-year fellowships that are needed to remain competitive and to continue to attract high quality students.

These strategies will also reorient the average faculty effort between graduate and undergraduate students and between graduate and professional students as follows:

a) decrease the number of undergraduate students/faculty from 14.0 to 11.2;
b) decrease the total number of undergraduate and graduate students/faculty from 20.2 to17.8;
c) increase the number of PhD students from 700 to 1125 by increasing # of PhD / faculty member from 3.5 to 4.5 and by increasing the number of faculty members by 50;
d) increase the ratio of graduate students to undergraduates from 0.44 to 0.52

Impact of MEng Program:

These strategies include continuation of the MEng program but at a level that effectively increases the quality of MEng students while reducing their number. Ultimately, this will redistribute faculty time from MEng project advising to PhD research-oriented tasks, and bring a larger # of PhD qualified students to the MEng program which should help with recruiting by providing a larger pool of PhD applicants. This is likely to increase # of PhD students/faculty and decrease the overall acceptance rate.

The increase in MEng fellowship support and teaching assistant support will help to attract higher quality applicants, increase # of PhD/ faculty and increase the level of undergraduate teaching support.

A reduction of enrollment in the MEng program will have a significant financial impact using the current formula for distribution of MEng funds. It is anticipated that this reduction could be as much as $23,000 per student or more than $2.3 million dollars per year / per 100 students. These funds significantly influence the quality of undergraduate and MEng education and will need to be addressed by a new formula and increased MEng Teaching Assistantships and Fellowships. (Figure 3 - page 10)

Impact on Climate and Diversity

It is important to note that any increase and or enhancement in the enrollment of students and faculty of diverse backgrounds allows for a richer experience for entire university. Further, with a more diverse population, others will find Cornell an attractive place. With shifting demographics, it is important for the College to continue its recruiting/retention efforts of students and faculty from diverse backgrounds. Additionally, the College should stay attuned to the larger outreach efforts of the University, especially those led by the new Associate Provost for Outreach.

SUPPORTING MATERIALS

1. Finding common themes between departments
and
2. Forecast emerging academic foci and the College's ability for excellence in these areas.

The themes that cut across the department plans and emerging academic foci over the next 10 years include topics with the prefixes: *bio, info, enviro* and *nano*. The draft report on "Strategic Priorities: Emerging areas of Research Cornell College of Engineering" indicates similar conclusions although it includes energy together with the *nano, bio* and *enviro* and has *info* as one of three enablers. This task force agrees with the strategic priorities as expressed in the "Strategic Priorities: Emerging areas of Research Cornell College of Engineering". Further, it agrees that these priorities are indicative of common themes between departments and are emerging academic foci in which the College does have the capability to create and maintain excellence. (Appendix I)

3. Determine overall priorities and metrics for the graduate and professional programs.

The goals of the College of Engineering's Graduate and Professional Programs are to recruit a diverse population of outstanding graduate students and provide a climate that will retain them by providing the opportunities to have academic success, creative research experiences, form collegial relationships with faculty and their peers and finish their degree programs prepared for successful careers.

The metrics associated with theses goals are varied and some of them are those used by the USN for ranking. The formula for the USN ranking of graduate program is the following:

0.125 (Rating of Deans of College of Engineering/5); (Rating 5 to 1 with 5 being highest)
0.125 (Rankings of Deans of Graduate Schools/5); (Rating 5 to 1 with 5 being highest)
0.150 (Rankings of Corporate recruiters/5); (Rating 5 to 1 with 5 being highest)
0.045 (average GRE Analytical/max average GRE Analytical)
0.045 (average GRE Quantitative/ max average GRE Quantitative)
0.010 (acceptance rate/ max acceptance rate)
0.075 (Full time PhD/ Full Time Faculty)
0.0375 (Full Time MS+MENG/ Full Time Faculty)
0.075 (# of faculty in National Academy of Engineering/ Full Time Faculty)
0.0625 (# PhD Students/ maximum # of PhD Students)
0.10 (Research $ / Faculty involved in Research) /(Research $ / Faculty involved in Research)max
<u>0.15</u> (total Research $/ total Research $ max)
1.000

We believe that the quality of our graduate program is influenced by the size and demands of the undergraduate program. Therefore, we have included the size of the undergraduate program as a metric.

- Total number of undergraduate and graduate students/ faculty member
- Total number of undergraduate students

Other metrics that measure the goals we would like to accomplish include the following:
- Number of MEng, MS, and PhD students in the program, applying, admitted and matriculating
- Number of PhD fellowships available
- Number of Teaching Assistantships available for MEng, MS, and PhD students
- Number of Teaching Assistantships/ Faculty member
- GRE and GPA of MEng, MS and PhD student when they matriculate
- Funding metrics. How do our offers compare with our peer institutions
- Climate and Diversity metrics
- Retention, time to completion of degree

4. Compare College's graduate and professional programs to competitors. (See Appendix II)

The top 13 schools as ranked by USN were the following:
1. MIT
2. Stanford
3. Berkeley
4. University of Illinois @ Urbana
5. Georgia Institute of Technology
6. University of Michigan @ Ann Arbor
7. California Institute of Technology
8. University of Southern California
9. Purdue University
   University of Texas
11. Carnegie Mellon University
    Cornell University
    University of California - San Diego

We considered the top 9 (excluding USC) as our peer institutions based upon ranking by Deans & Recruiters.
1. MIT
2. Stanford
3. UC Berkeley
4. University of Illinois @ Urbana
5. Georgia Institute of Technology
6. University of Michigan @ Ann Arbor
7. California Institute of Technology
8. Purdue
9. Texas

If we look at the total number of undergraduate and graduate students per faculty for these schools and the ratio of graduate to undergraduate students, we find the following:

		Total	Ratio
		UG+Grad	Grad/UG
MIT	1	13.10	1.62
Stanford	2	15.70	3.24
UC Berkeley	3	19.50	0.54
University of Illinois @ Urbana	4	18.90	0.45
Georgia Institute of Technology	5	18.00	0.64
University of Mich. @Ann Arbor	6	22.70	0.51
Cal Tech	7	9.40	1.47
Purdue	9	29.4	2.84
Texas	9	30.1	2.56
Cornell	11	20.2	0.44

The metrics for the USN rankings appear as follows:

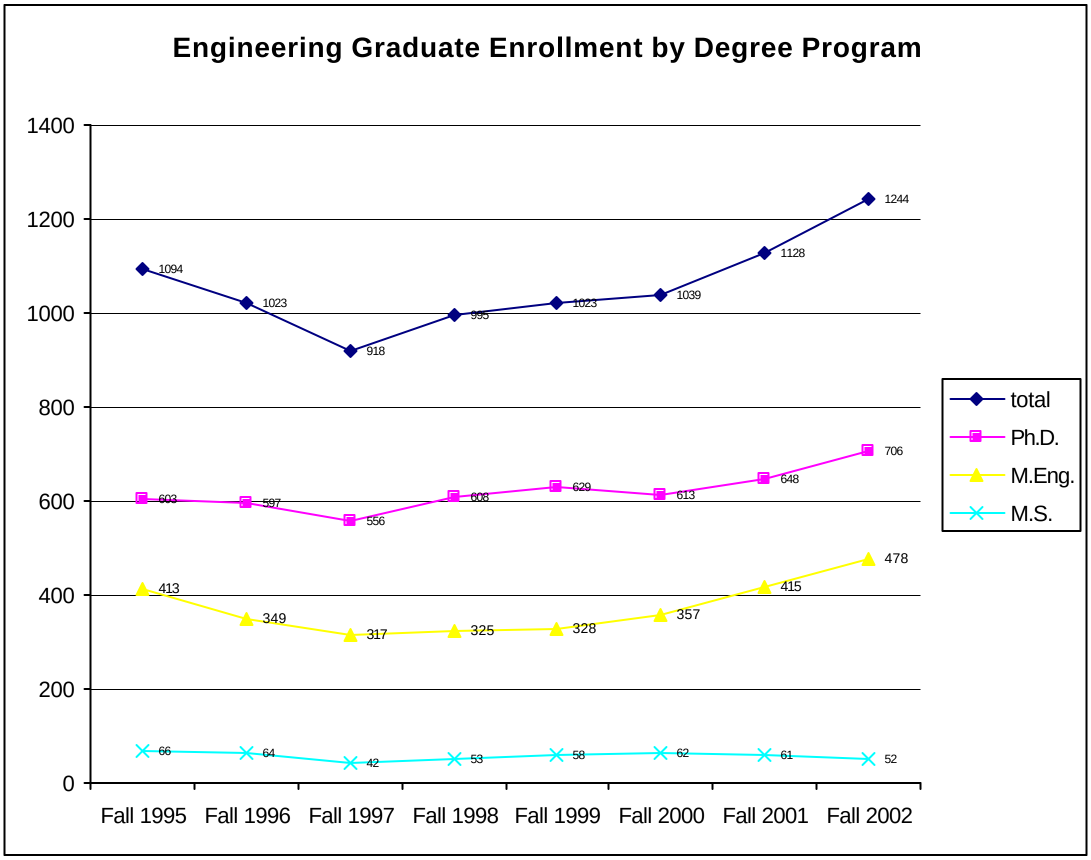
	US News	Peer	Recru	GRE Q		GRE A		Accep Rate	
	Rank	Rank	Rank	score	rank	score	rank	score	rank
MIT	1	1	1	774	3	716	6	23.6	5
Stanford	2	2	2	781	2	725	2	28.7	8
UC Berkeley	3	3	4	785	1	744	1	16.1	3
Univ of Ill @ Urbana	4	5	5	773	4	722	3	13.3	2
Georgia Institute of Tech	5	7	6	755	13	683	12	32	3
U. of Mich @ Ann Arbor	6	7	6	772	5	714	7	32.4	9
Cal Tech	7	3	3	762	9	722	3	8.6	1
Purdue	9	9	8	756	12	688	11	22.5	4
Texas	9	8	8	761	11	696	10	25.5	6
Cornell	11	8	8	765	8	700	9	26.9	7

School	US News	PHD/Fac		% Fac NAE		Total $ $M		$/Fac $K		PHD Granted	
	rank	score	rank	score	rank	score	rank	score	rank	score	rank
MIT	1	3.7	8	13.4	4	219.0	1	623.9	6	229	1
Stanford	2	5	3	17.1	2	113.6	9	732.8	3	191	4
UC Berkeley	3	5.3	1	20.6	1	114.9	8	510.8	9	170	6
Univ. of Ill@ Urbana	4	3.9	6	3.7	11	176.8	3	491.0	11	194	3
Georgia Institute of Tech	5	4	5	4.7	10	183.5	2	408.7	13	188	5
U. of Mich @ Ann Arbor	6	3.7	8	3.6	12	130.2	5	455.1	12	195	2
Cal Tech	7	5	3	13.8	3	48.3	13	514.3	8	52	13
Purdue	9	3.7	8	2.7	13	156.0	4	709.2	5	132	7
Texas	9	3.3	13	9.4	7	98.7	11	495.8	10	130	8
Cornell	11	3.5	12	7.9	9	88.9	12	728.8	4	73	10
If you use a faculty number of 200 rather than 122 for Cornell, $/Faculty decreases significantly								444.5	12		

5. Ignoring the potential budget implications, comment on the relative intellectual contributions of the MEng and PhD programs.

Our college performs excellently in *3, large-scale, degree missions*: *undergraduate*, through the BS degree, *professional*, through the MEng degree, and *research,* through the MS/PhD degrees. We define large-scale here not only with respect to the total number of degrees produced per AY, Figure 1, but, more importantly with respect to the effort measures defined by the US News and World Report ranking mechanisms, Table 1. Some of our higher-ranked competitors have only 2 of these missions (ie. no MEng program), and some have only one large-scale mission (eg. Cal Tech). What are the implications of this situation if we want to rise in the rankings? Should we increase faculty size to accommodate all three more comfortably? Should we change our professional degree mission? Can "intellectual merit" be the only basis for answering these questions at Cornell?

Figure 1. Enrollment in each of our degree mission areas.



Undergraduate Enrollment

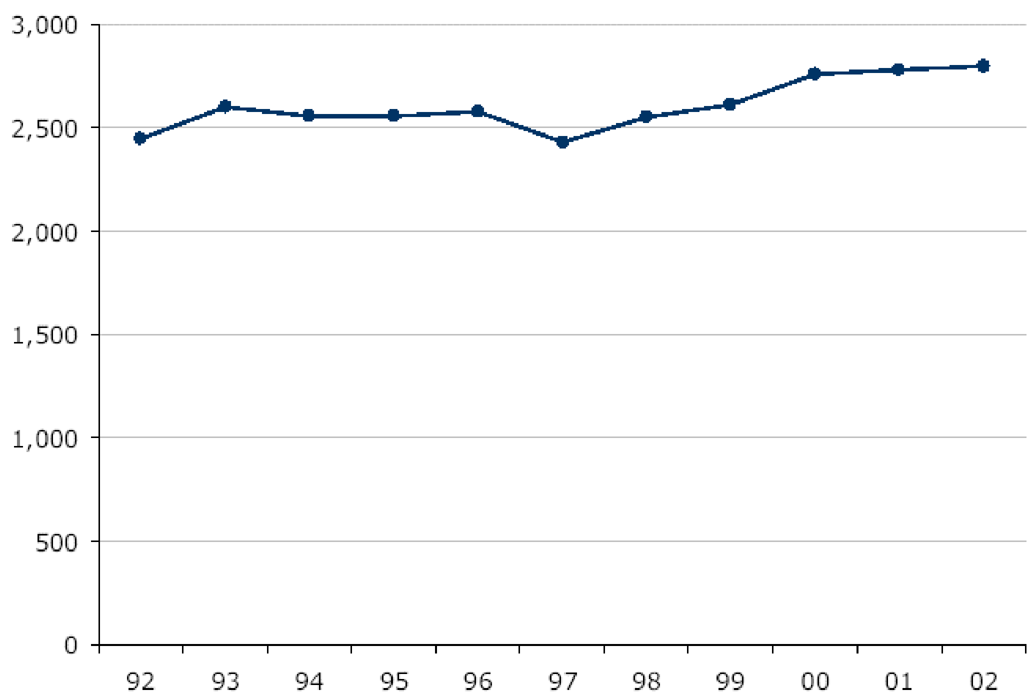


Table 1. Comparison of Degree-Effort Measures Used by USN for Selected Schools Ranked above Cornell in Spring, 2003

School	# of UG Degrees/Faculty	# of MS-MEng Degrees/Faculty		# of PhD Degrees/Faculty
MIT	5	MS	4.0	3.7
		MEng		
Stanford	3.7	MS	5.4	5
		MEng		
CalTech	3.8	MS	0.5	5
		MEng		
Berkeley	12.7	MS	1.5	5.3
		MEng		
Illinois	13	MS	2.0	3.9
		MEng		
Michigan	15	MS		3.7
		MEng	4.4	
Georgia Tech	11	MS	3.4	4
		MEng		
Cornell	***15***	***MS***	***.25***	***3.5***
		MEng	***2.4***	

Table 1 shows that Cornell appears to have a representative MS-MEng degree effort. Masked by these measures, however, is the fact that Cornell's MEng degree program is significantly more faculty-time-intensive than those of many of our competitor schools. We require significant, faculty-mentored design/research projects of each MEng student while, in most cases, the MEng programs of our competitors are not nearly as demanding of extra faculty time. The excellence and size of our MEng program comes at the expense of, *inter alia*, some number of PhD's not produced, some increased teaching load, and some amount of research funding not obtained.

The implications of this observation can be addressed through Table 2 that shows the factors and weighted values used by USN Graduate School ranking in spring, 2003. One could conclude by analysis of Table 2 that the MEng program at Cornell negatively impacts our ratings in 6 of 10 categories, while having a clearly positive impact in perhaps only 2. An open question is to what degree our MEng program positively influences the opinions of the Deans participating in this ranking process. Their opinion is the highest weighted factor. Would they rank us higher if we had a smaller MEng program, but produced more PhD students, had lighter teaching loads, and had higher total research expenditures?

What we might have here is a clash of cultures and a murky financial structure with which we have to come to grips. On the one hand, we have a wonderful and admired tradition of excellence in professional education. On the other hand, we are subject to a ranking system that appears to place relatively little value on this tradition Further complicating this situation are the considerable financial implications of any change to our MEng program. We are financially reliant on our MEng program. With the financial structure currently in place, Figure 2,

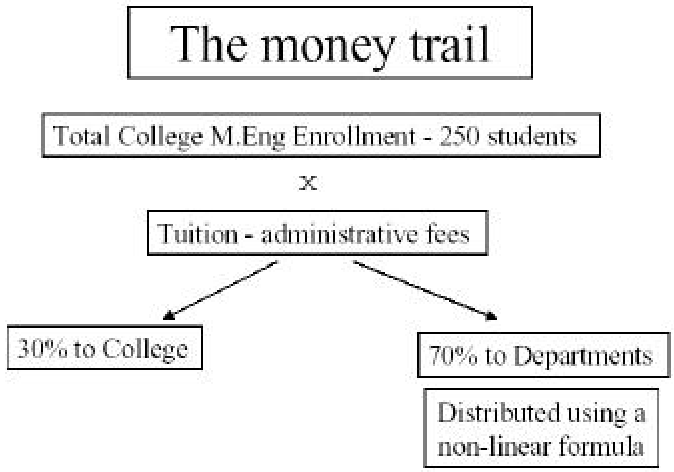


Figure 2. Current MEng money trail.

a global change in the program, like capping it or eliminating it, would require fundamental financial reprogramming for the college. Even if a local change was sought, like the elimination of the program in one department, there would be repercussions to all other departments that would have to be accommodated.

A reduction of enrollment in the MEng program will have a significant financial impact using the current formula for distribution of MEng funds. It is anticipated that this reduction could be as much as $23,000 per student or more than $2.3 million dollars per year / per 100 students. These funds significantly influence the quality of undergraduate and MEng education and will need to be addressed by a new formula and increased MEng Teaching Assistantships and Fellowships.

Tuition (2003-2004)	$28,630.00
Graduate School Service Fee	19.6%

	Per student (above 250)	**478 Students (228 above minimum)**	**375 Students (228 above minimum)**
College of Engineering	$23,018.52	$5,248,222.56	$2,877,315.00

Reduction by 100 students in FY04 = ($2,300,000.00)
Reduction by 100 students in FY05 = ($2,415,000.00) -- 5% annual increase

Figure 3.

Table 2. Factors and Weighted Values used by USN
in Spring, 2003, and Surmised Impact of Cornell's MEng Program on Ranking

Factor	**Weighted Value**	Effect of MEng Program
Deans' Opinion	0.25	?
Recruiters' Opinion	0.15	positive
GRA Scores	0.09	negative[a]
Selectivity	0.01	negative[b]
# of PhD's/Faculty	0.075	negative
# of MS's/Faculty	0.0375	positive
% of NAE Members	0.075	?
Total # of PhD's	0.0625	negative
Total Research $	0.15	negative
Research $/Faculty	0.1	negative
Total Wgtd Value	**1.00**	

[a] At Cornell, average GRE scores for MEng students, where they are required by departments, are lower than those for MS/PhD students.

[b] At Cornell, selectivity for MEng (842/1369 in 2002) students is far lower than that for MS/PhD students (470/3515 in 2002). USN uses the combination of these in our ranking.

In our review of recent Master of Engineering Committee Reports on the MEng program, there is only one item that addresses intellectual contributions of MEng program. This item is called innovation and the reports list the following findings and recommendations:

FINDINGS
a) The program provides a valuable incubator for new academic directions in the college (e.g. systems engineering, financial engineering, information technology, the Lockheed Martin ELDP program and potentially biotechnology and others).
b) The program is consistent with Cornell's Land Grant mission.
c) New courses and options will attract additional students and build stronger industry support.
d) Summer courses and short course can be used to augment the Program.
e) Option-specific enrollments are not being measured on a College-wide basis.

RECOMMENDATIONS
a) Develop a strategy for developing additional options (and retiring those which have run their course).
b) Consider mechanisms to enhance the value of compatibility with the Land Grant mission through extension activities at the State, National and International level.
c) Incorporate existing and new summer courses in to the program where appropriate (e.g. extend financial engineering to a full year for non-OR undergrads, to make room for advanced electives).

d) Systematically track option enrollments and placement.

There are unique intellectual and program opportunities provided by the MEng program. It is the task force's opinion that operation of the program with more qualified students and at a slightly reduced level will not impede any of these intellectual or program opportunities.

6. Develop strategic goals and metrics for graduate and professional programs.
and
7. Prioritize strategies to attain strategic goals.

Prioritized Goals and Strategies for Graduate Education and Professional Programs

Goals

- Increase the diversity of incoming graduate students, as well as new faculty, across all programs.
- Set aside special multi-year fellowships for students from diverse backgrounds.
- Increase the number of PhD degrees granted each year.
- Increase the number of PhD students per faculty from 3.5 to 4.5.
- Increase the quality of MEng students.
- Decrease the number of MEng students from 487 (2.4 MEng/faculty) to a number equal to approximately 50%of the senior class or 375 (1.4 MEng/faculty).

Strategies

1. Increase size of faculty by 50.
2. Increase PhD full Fellowships to .75 per faculty.
3. Increase the Teaching Assistant support for PhD students to 0.5 per faculty.
4. Increase Teaching Assistant support for MEng students to 0.2 per faculty.
5. Require GRE scores for all students, as well as a GPA equal to or greater than the average GPA for graduating class of the Engineering College.

Impact on rankings:

These strategies will improve our US News ranking significantly, as is indicated by the changes the following metrics:

a) increase quality of MEng students - increased GRE scores (weight .09)
b) decrease our acceptance rate (weight 0.01)
c) increase # of PhD/ full time faculty (gain 1 PhD / faculty with weight of .075)
d) decrease # MS+MEng/ full time faculty (lose 1 MEng/faculty with weight of .0375)
e) increase total PhD granted per year to 15% of total PhD or increase from 73 to 168 (weight .0625)
f) increase total Research dollars by 25% weight 0.10)

Impact of undergraduate program:

In evaluating the total number of undergraduate and graduate students per faculty member and ratio of graduate students to undergraduate student, Cornell is near the bottom of the list relative to our peers. If we expect to compete, we need to be at the median of both lists. The number of total students per faculty should move from 21 to between 17 and 18 and the ratio of graduate students to undergraduate students should change from 0.40 to above 0.50.

An increase of 50 faculty will lower our undergraduates/faculty ratio from 14 (2800/200) to 11.2 (2800/250). Currently, we have 3.5 PhD/faculty (706/200) , 2.4 MEng/faculty (478/200) and 0.26 MS/faculty (52/200). An increase of 50 faculty, an increase in PhD students of 425 (700 to 1125), a reduction of MEng to 375 and the same number of MS students (50) would give us a ratio of graduate and professional students per faculty of 5.8 (1450/250). The ratio of graduate and professional students to undergraduate students would be .52 (1450/2800) instead of .44 (1236/2800) and our total students per faculty would be 17.0 (4250/250)rather than 20.2 (4043/200). Changes like these will place Cornell's metrics in the categories at the average of those of our peer institutions rather than at the bottom. In our recommendations we have assumed that the College is constrained by the requirement to maintain the total number of engineering undergraduates at the current level.

If we fail to make these changes then it is highly unlikely that our ranking will improve. Certainly, no such large increase in the number of grad students (with a maintenance of their current quality) will occur without a sudden increase in graduate student support, such as fellowships that we all agree we need just to remain competitive.

These strategies will also reorient the average faculty effort between graduate and undergraduate students and between graduate and professional students.

a) decrease the number of undergraduate students/faculty from 15 to 12.
b) decrease the total number of undergraduate and graduate students/faculty from 21 to 17.8.
c) increase the number of PhD students from 700 to 1125 by increasing # of PhD / faculty member from 3.5 to 4.5 and by increasing the number of faculty members by 50.
d) increase the ratio of graduate students to undergraduates from 0.41 to 0.48.

Impact of MEng Program:

These strategies will also continue the MEng program but at an elevated level that increases the quality of MEng students while reducing the number of MEng students. This will free up faculty time from project advising to do research, bring a larger # of PhD qualified students to the MEng program which should help with recruiting by providing a larger pool of PhD applicants. This is likely to increase # of PhD students/faculty but decrease the overall acceptance rate.

The increase in fellowship support and teaching assistant support will help to attract higher quality applicants, increase # of PhD/ faculty and increase the level of undergraduate teaching support.

Impact on Climate and Diversity

It is important to note that any increase and or enhancement in the enrollment of students and faculty of diverse backgrounds allows for a richer experience for entire university. Further, with a more diverse population, prospective students and faculty will find Cornell an attractive place. With shifting demographics, it is important for the College to continue its recruiting/retention efforts of students and faculty from diverse backgrounds. Additionally, the College should stay attuned to the larger outreach efforts of the University, especially those led by the new Associate Provost for Outreach.

APPENDIX I:

Forecasting (10yrs) emerging acad. foci and accessing CE's grad & prof programs ability to maintain excellence in these

Regarding the first two points on our charge, the recent memo from Deborah Cox (on emerging areas of research from the strategic planning and advisory council) essentially pre-empts any necessity for much further effort on our part in distilling themes and foci from the departmental plans.

Future research/faculty hiring foci extracted from the department strategic plans:

AEP:
biological physics
nanoscale science and technology
optical physics
advanced materials and instrumentation

BEE:
industrial biotechnolgy
agricultural biotechnology
environmental biotechnology
(with nanotechnology as enabler)

CBE (expansion areas):
biomolecular engineering
microfluidics/microchemical systems

CS (growth areas):
systems
complexity
computational biology

ECE (current hiring targets):
nanotechnology
computer engineering
large scale complex systems

OR:
business, finance, and entrepreneurship
information systems engineering
systems engineering

CEE ("mission areas"):
civil infrastructure
environment
engineering systems and management

EAS ("immediate goals"):
biogeochemistry
solid earth tectonics

MAE ("focal themes"):
biomechanical engineering
energy and the environment
engineering materials (micro and nano scale)
intelligent machine systems

MSE ("strategic focus areas"):
nanotechnology
communications and information technology
biotechnology and life sciences
energy and environmental systems

TAM ("new hires in the next 5 years"):
systems biology
micro- and nano-mechancis of materials and actuation
biomolecular mechanics

Appendix II
Comparison of Cornell's College of Engineering Competitors

MIT
Number of Departments & Programs: 10
Aeronautics and Astronautics
Chemical Engineering
Civil and Environmental Engineering
Electrical Engineering and Computer Science
Materials Science and Engineering
Mechanical Engineering
Nuclear Engineering
Ocean Engineering
Biological Engineering Division
Engineering Systems Division

Number of faculty: 351
Total number of PhD (full time): 1300
PhD/faculty: 3.7
Fellowships: Only a few internal fellowships
Faculty percentage in Nat. Acad.: 13.4%
Standing in 1993:

Stanford
Number of Departments & Programs: 9
Aeronautics & Astronautics
Bioengineering
Chemical Engineering
Civil & Environmental Engineering
Computer Science
Electrical Engineering
Management Science & Engineering
Materials Science and Engineering
Mechanical Engineering

Number of faculty: 193
Total number of PhD (full time): 972
PhD/faculty: 5.0
Fellowships: 300 three-year fellowships across Science and Engineering
Faculty percentage in Nat. Acad.: 17.6%
Standing in 1993:

Cal Tech
Number of Departments & Programs: 13
Aeronautics
Applied and Computational Mathematics

Applied Mechanics
Applied Physics
Bioengineering
Civil Engineering
Computational and Neural Systems
Computer Science
Control and Dynamical Systems
Electrical Engineering
Environmental Science & Engineering
Materials Science
Mechanical Engineering

Number of faculty: 94
Total number of PhD (full time): 472
PhD/faculty: 5.0
Fellowships: Moore Fellowships > 100(?) four-year fellowships
Faculty percentage in Nat. Acad.: 13.8%
Standing in 1993:

Univ. of California at Berkeley
Number of Departments & Programs: 8
Bioengineering
Chemical Engineering (College of Chemistry)
Civil & Environmental Engineering
Electrical Engineering & Computer Sciences
Industrial Engineering & Operations Research
Materials Science & Engineering
Mechanical Engineering (ME)
Nuclear Engineering (NE)

Number of faculty: 243
Total number of PhD (full time): 1295
PhD/faculty: 5.3
Fellowships: Some 5-year graduate Fellowships
Faculty percentage in Nat. Acad.: 20.6%
Standing in 1993:

Univ. Illinois
Number of Departments & Programs: 12
Aeronautical and Astronautical Engineering
Agricultural Engineering
Chemical and Biomolecular Engineering
Civil and Environmental Engineering
Computer Science
Electrical and Computer Engineering
General Engineering

Materials Science and Engineering
Mechanical and Industrial Engineering
Nuclear, Plasma, and Radiological Engineering
Physics
Theoretical and Applied Mechanics

Number of faculty: 405
Total number of PhD (full time): 1594
PhD/faculty: 3.9
Fellowships: not extensive
Faculty percentage in Nat. Acad.: 3.7%

Georgia Tech
Number of Departments & Programs: 9
Aerospace Engineering
Biomedical Engineering (GT/Emory)
Chemical Engineering
Civil & Environmental Engineering
Electrical & Computer Engineering
Industrial & Systems Engineering
Materials Science & Engineering
Mechanical Engineering
Textile & Fiber Engineering

Number of faculty: 449
Total number of PhD (full time): 1778
PhD/faculty: 4.0
Fellowships: not extensive
Faculty percentage in Nat. Acad.: 4.7%

Univ. Michigan
Number of Departments & Programs: 13
Applied Physics
Aerospace Engineering
Atmospheric, Oceanic and Space Sciences
Biomedical Engineering
Chemical Engineering
Civil and Environmental Engineering
Electrical Engineering and Computer Science
Industrial and Operations Engineering
Macromolecular Science and Engineering
Materials Science and Engineering
Mechanical Engineering
Naval Architecture and Marine Engineering
Nuclear Engineering and Radiological Sciences

Number of faculty: 306
Total number of PhD (full time): 1123
PhD/faculty: 3.7
Fellowships: numerous
Faculty percentage in Nat. Acad.: 3.6%

Univ. Texas at Austin
Number of Departments & Programs: 7
Aerospace Engineering and Engineering Mechanics
Biomedical Engineering
Chemical Engineering
Civil Engineering (includes Architectural and Environmental Engineering)
Electrical and Computer Engineering
Mechanical Engineering
Petroleum and Geosystems Engineering

Number of faculty: 233
Total number of PhD (full time): 776
PhD/faculty: 3.7
Fellowships:
Faculty percentage in Nat. Acad.: 9.4%

Carnegie Mellon
Number of Departments & Programs: 7 (w/o CS, which is a separate School)
Biomedical Engineering
Chemical Engineering
Civil and Environmental Engineering
Electrical and Computer Engineering
Engineering and Public Policy
Materials Science Engineering
Mechanical Engineering

Number of faculty: 190
Total number of PhD (full time): 693
PhD/faculty: 3.6
Fellowships: Does not appear to be available on large scale
Faculty percentage in Nat. Acad.: 8.4%

Cornell
Number of Departments & Programs: 11
Applied Physics
Biomedical Engineering
Chemical and Biomolecular Engineering
Civil and Environmental Engineering
Computer Science

Earth and Atmospheric Science
Electrical and Computer Engineering
Operations Research
Systems Engineering
Materials Science and Engineering
Mechanical and Aerospace Engineering
Theoretical and Applied Mechanics

Number of faculty: 191
Total number of PhD (full time): 675
PhD/faculty: 3.7
Fellowships:
Faculty percentage in Nat. Acad.: 7.9%