

Assessment of 2005-06 Progress on Our Strategic Plan for Excellence

**College of Engineering & Applied Science
University of Colorado at Boulder**



**Robert H. Davis, Dean
September 2006**

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
RESTATED GOALS.....	2
I. INTRODUCTION	3
II. RESEARCH EXCELLENCE	3
II.1 New Research Centers and Initiatives.....	3
II.2 External Funding for Research.....	4
II.3 Corporate Partnerships and Support of Research.....	5
II.4 Faculty Research Development and Productivity	6
II.5 Discussion of Research Progress and Outlook.....	7
III. EDUCATIONAL EXCELLENCE.....	8
III.1 Courses and Curricula	8
III.2 Extracurricular Educational Enrichment.....	9
III.3 Student Recruitment and Outreach.....	11
III.4 Communications, Advising and Assessment	15
III.5 Discussion of Educational Progress and Outlook	17
IV. RESOURCE EXCELLENCE.....	18
IV.1 Faculty Resources	18
IV.2 Facility Resources	20
IV.3 Institutional Financial Resources	22
IV.4 Private Giving.....	24
IV.5 Discussion of Resource Progress and Outlook	28

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EXECUTIVE SUMMARY

Fiscal year 2006 (7/1/05-6/30/06) was the third year of implementation of a five-year strategic plan for the College of Engineering and Applied Science in the University of Colorado at Boulder. The plan has broad objectives of excellence in research, education and resources, with action items and measurable goals for each objective. While progress has been made in all three areas (research, education and resources), not all goals have been met.

Highlights in research progress during the past three years include the formation of new research centers in cybersecurity, industry/university projects, and unmanned vehicles, the launch of campus initiatives in energy biotechnology and nanotechnology, and increased university-industry collaborations. Highlights in educational programs during the past three years include establishing the Discovery Learning Program and the Earn-Learn Program, involving about one-third of our undergraduates each year in extracurricular active learning, initiating an Engineering Honors Program and a new BS degree in Chemical and Biological Engineering, and a successful accreditation review. Highlights in resource excellence during the past three years include 22 new faculty hires, of which nine are women, introduction of an engineering differential tuition and course-specific fees, expenditure of nearly \$4M for renovation of research and educational facilities, elections of George Born and Kaspar Willam to the National Academy of Engineering, selections of Frank Barnes for the NAE Gordon Prize and Kristi Anseth for the NSF Waterman Award, and establishment of nine new endowed chairs or professorships.

On the other hand, progress has fallen short of goals in several areas, and the past three years have brought new challenges and opportunities for which midcourse corrections to the strategic plan are needed:

- *After several years of budget cuts or no increases, state funding of higher education is expected to increase starting in FY07 due to a referendum passed by voters*
- *Quality for Colorado and engineering differential tuition measures have received only one of four anticipated funding steps*
- *Undergraduate enrollments of women and minorities and graduate enrollments of international students in engineering have declined nationwide*
- *Rising energy prices have fueled new interest in research on alternative energy sources*
- *The start of the next University of Colorado capital campaign has been delayed*
- *Federal grant funding has become more competitive and applications-oriented*

RESTATED GOALS

Our experiences over the first three years of the five-year strategic plan, along with the challenges and new opportunities listed in the Executive Summary, have led to midcourse adjustment in the strategic plan. In particular, the following are restated goals for the remaining two years of the plan, with a focus on leading-edge indicators (e.g., demographics of the entering class instead of all students).

1. Research

- 1.1 – Three new research centers established in FY07-FY08, in areas such as energy, environmental technology and micro/nanotechnology
- 1.2 – Increased submissions of grant proposals by 10% per year, to 525 in FY07 and 575 in FY08
- 1.3 – Increased grant awards by 10% per year, to \$38M in FY07 and \$42M in FY08

2. Education

- 2.1 – New BS degree in Chemical & Biological Engineering started in FY07, with enrollment of 60 majors by Fall 2008, and an increase in the number of Environmental Engineering majors to 60 by Fall 2008 from 39 in Fall 2006
- 2.2 – Outreach efforts targeted to Denver and Lafayette focus schools of high enrollments of underrepresented minorities (URMs), and the numbers of women and URMs in the new freshman class increased by 10% in Fall 2008 over Fall 2006
- 2.3 – Improved third-semester retention rate, from 81% to 85% for freshman entering in Fall 2007
- 2.4 – Approval in FY08 of a new PhD in Materials Science and Engineering, and overall PhD enrollments increased by 12% to 550 in Fall 2008 over Fall 2006

3. Resources

- 3.1 – Second step of engineering tuition differential approved for FY08
- 3.2 – Investment in CU-Engineering (I-CUE) process undertaken to stimulate campus and college investment and private giving for strategic needs, with \$500K in new continuing funding received starting FY08
- 3.3 – State approval of new biotechnology building in FY07, and sufficient funding received to start design in summer 2007 and construction in summer 2008
- 3.4 – Named chairs and professorships awarded increased to 22 by FY08 from 17 in FY06

In addition, the College of Engineering and Applied Science prepared a Diversity Plan in Summer 2006, with actions and goals related to expanding the pipeline of students, creating a climate of success, and engaging the faculty and staff. It may be found at <http://engineering.colorado.edu/downloads/DiversityPlan2006.pdf>.

I. INTRODUCTION

In December 2003, the College of Engineering and Applied Science at CU-Boulder published *A Strategic Plan for Excellence 2003-2008*, to provide guidance over the five-year period of FY04-FY08, so that we make wise use of limited resources and focus on high-quality education and research programs that attract additional resources. Our broad vision is to be widely recognized for excellence and leadership in research and education, with an emphasis on active, discovery and service learning. The plan includes three broad objectives for the College (see http://engineering.colorado.edu/facultystaff/Strategic_Plan.htm):

- *Through interdisciplinary research excellence, develop new knowledge at the forefront of engineering and technology that enhances the well-being of individuals and society*
- *Through active engagement in discovery and service learning, provide educational excellence to recruit and prepare students for outstanding leadership and service*
- *Through outstanding faculty and staff, and enhanced facilities and funding, build resource excellence for supporting continued advancement in research and education*

Each of these objectives is accompanied by measurable goals and by action items to achieve these objectives and goals. An assessment of progress made on the proposed action items and quantifiable goals during FY06, covering the period 7/1/05 – 6/30/06, is provided in this report, along with data from the prior years. Progress reports from the prior years may be found at the web address given above.

II. RESEARCH EXCELLENCE

Our vision of excellence in research is supported by initiatives to enhance both core and emerging areas of research distinction in four categories: (1) New research centers and initiatives, (2) External funding for research, (3) Corporate partnerships and support of research, and (4) Faculty research development and productivity. For each category, the goals and results are provided below, followed by an assessment of planned actions in support of the goals.

II.1 New Research Centers and Initiatives

Goal: *Addition of at least five interdisciplinary research centers during FY04-FY08.*

Result: Three centers have been established to date:

1. Computer and Communications Security Research and Education Center (approved June, 2003; Alex Wolf, Director)
2. Research and Engineering Center for Unmanned Vehicles (approved October 2003; Brian Argrow, Director)
3. Industry/University Cooperative Projects Center (approved May, 2006; Jack Zable, Director)

Additional centers are in the planning stages.

Goal: Establishment of three major initiatives during FY04-FY08 in areas of emerging distinction aligned with campus-wide or system-wide efforts.

Result: Three initiatives were begun during the past three years, with campus support:

Biotechnology: Under the leadership of Leslie Leinwand (MCDB), Kristi Anseth (ChBE) and Natalie Ahn (Chem & Biochem), this initiative focused in FY04 and FY05 on the hiring of five biotechnology faculty (including Melissa Mahoney in ChBE) in growth positions provided by the Provost and Deans. The program plan for a new building was approved in FY06.

Nanotechnology: Under the leadership of Roop Mahajan (ME), this initiative focused in FY04-FY06 on obtaining the first phases of federal funding (\$0.6M in FY04, \$0.3M in FY05 and \$0.7M in FY06, with another \$3.3M pending) and college and campus support (\$1.5M over FY05-FY08) to establish a Nanotechnology Laboratory and Characterization Facility in the Discovery Learning Center. In addition, a new center on micro/nano-electromechanical transducers, funded at \$1.5M/yr by DARPA, industry and CU, is being set up by Y.C. Lee.

Energy: A campus initiative in sustainable and renewable energy was announced by the Interim Provost in FY06, directed by Carl Koval (Chemistry & Biochemistry). Al Weimer and other engineering faculty are taking lead roles in this initiative.

Action Planned and Assessed: Submit campus-wide proposals to the Provost and Chancellor for support of initiatives in emerging areas. Action was taken to establish three initiatives, with Kristi Anseth taking the college lead in biotechnology and Roop Mahajan taking the lead in micro/nanotechnology. A campus initiative in sustainable energy has also been established.

Action Planned and Assessed: Provide seed funding of \$10K each for new interdisciplinary research centers. This action was taken by the College to help form the three new centers noted above.

II.2 External Funding for Research

Goal: Increased contract and grant awards by 10% per year, to \$60M by FY08.

Result: This goal for increased contract and grant awards was exceeded in FY04, with a record of \$42.8M in new funding, but new contracts and grants awarded declined substantially in FY05 and FY06:

FY03: \$37.5M (baseline) contract and grant awards

FY04: \$42.8M (+14%) contract and grant awards

FY05: \$39.1M (-9%) contract and grant awards

FY06: \$34.8M (-11%) contract and grant awards

These funds include only contracts and grants rostered in the College, and not those rostered in other units but involving college faculty, and it does not include private gifts or awards.

Action Planned and Assessed: Increase total number and value of research grant proposals by 10% per year, from the FY03 baseline of 554 proposals for \$273M. The number and total value of proposals increased in FY04, but by less than the goal, and then decreased in FY05 and FY06:

FY03: 554 (baseline) proposals totaling \$273M (baseline)
FY04: 577 (+4%) proposals totaling \$274M (+ 0.4%)
FY05: 553 (-4%) proposals totaling \$255M (-7%)
FY06: 478 (-14%) proposals totaling \$137M (-46%)

Action Planned and Assessed: Increase multi-investigator grant proposals of \$1M or more by 10% per year, from the FY03 baseline of 57 proposals. The number and total value of grant proposals of \$1M or more have decreased substantially:

FY03: 57 (baseline) proposals totaling \$160M (baseline)
FY04: 53 (-7%) proposals totaling \$146M (-9%)
FY05: 45 (-15%) proposals totaling \$132M (-10%)
FY06: 24 (-47%) proposals totaling \$42M (-68%)

Action Planned and Assessed: Fund a new college program at up to \$35K per year for faculty travel to funding agencies. This program was established in FY04 to support faculty travel to funding agencies. It is undersubscribed but growing:

FY04: 8 awards totaling \$3400
FY05: 13 awards totaling \$6900
FY06: 19 awards totaling \$12,900

II.3 Corporate Partnerships and Support of Research

Goal: Increased contracts and grants from industry by 10% per year, to \$6M in FY08.

Result: Substantial progress toward the goal of \$6M in annual corporate support was made in FY04, and then the goal was exceeded in FY05 and FY06:

FY03: \$4.2M (baseline) contracts and grants from industry
FY04: \$4.7M (+12%) contracts and grants from industry
FY05: \$6.4M (+36%) contracts and grants from industry
FY06: \$6.8M (+6%) contracts and grants from industry

Action Planned and Assessed: Host at least 15 corporate visits per year to enhance partnerships and interdisciplinary research. The number of corporate visits to campus, each involving the Dean's office and/or Engineering Development, exceeded the target in FY04 and increased even further in FY05 and FY06:

FY04: 20 corporate visits
FY05: 51 corporate visits

FY06: 42 corporate visits

The FY06 corporate visits to the College include Agilent Technologies (2x), Amgen, Boeing (4x), BP (2x), Chevron (2x), Gambro BCT, General Electric, Hewlett-Packard (2x), Lexmark, Lockheed Martin (3x), Maxtor (2x), McData, Microsoft, Mortenson, Motorola, National Instruments, National Semiconductor, Northrop Grumman (2x), QualComm, Raytheon (2x), Shell (3x), Specialty Products, SpectraLink, Sun (3x), Texas Instruments, Xcel.

II.4 Faculty Research Development and Productivity

Goal: *Increased faculty involvement in research, as measured by increases of 10% per year in the numbers of regular faculty with over \$50K, and over \$150K, in annual research expenditures.*

Result: The results for faculty involvement in funded research in 2004 show substantial improvement over 2002 and 2003, but there was a decline for 2005, with 55% of the tenured and tenure-track faculty (not including those rostered in institutes) having over \$50K in research expenditures and 33% having over \$150K in research expenditures:

2002: 86 of 168 over \$50K (baseline), and 49 over \$150K (baseline)
2003: 82 of 160 over \$50K (-5%), and 53 over \$150K (+8%)
2004: 97 of 164 over \$50K (+18%), and 62 over \$150K (+17%)
2005: 91 of 165 over \$50K (-6%), and 54 over \$150K (-13%)

Goal: *Average number of peer-reviewed publications increased by 5% per year, from 2.4 journal papers and 2.0 proceedings papers per faculty member in 2002 to 3.0 and 2.5, respectively, in 2007.*

Result: Good progress toward the publication goal was made in 2005 (publications are counted on a calendar-year basis, as part of the annual faculty review):

2002 averages: 2.39 journals (baseline) and 1.99 proceedings (baseline)
2003 averages: 2.32 journals (-3%) and 1.93 proceedings (-3%)
2004 averages: 2.70 journals (+16%) and 2.28 proceedings (+18%)
2005 averages: 2.66 journals (-1%) and 2.65 proceedings (+16%)

Goal: *Annual PhD degrees increased by 10% per year, to 100 by FY08.*

Result: The number of PhD degrees awarded increased in FY04, but then decreased in FY05, before increasing again in FY06:

FY03: 71 (baseline) PhD degrees
FY04: 74 (+4%) PhD degrees
FY05: 69 (-7%) PhD degrees
FY06: 76 (+10%) PhD degrees

Action Planned and Assessed: *Develop a culture of excellence, with expectations and incentives for increased faculty research productivity.* In FY04, written expectations and guidelines on meritorious and excellent performance were provided to the faculty, along with updated procedures for annual and promotion reviews. A Faculty Excellence Program was established in FY05, and it includes \$75,000 budgeted annually for Dean's Faculty Fellowships, Dean's Performance Awards, and Dean's Seed Fund for Novel Ideas.

Action Planned and Assessed: *Recruit faculty leaders in strategic research areas.* While most searches in the past three years focused on junior candidates, more experienced candidates were considered where needed, leading to two senior and three mid-career hires:

- David DiLaura, Professor, Civil, Environmental & Architectural Engineering, Lighting (previously Senior Instructor)
- Al Gasiewski, Professor, Electrical & Computer Engineering, Environmental Technologies & Sensors (previously at NOAA)
- Diane Sieber, Associate Professor, Herbst Program of Humanities, Spanish Literature (transfer from Spanish & Portuguese)
- Jeff Thayer, Associate Professor, Aerospace Engineering Sciences, Remote Sensing (previously at SRI International)
- Hanspeter Schaub, Associate Professor, Aerospace Engineering Sciences, Spacecraft Control (previously at Virginia Tech)

II. 5 Discussion of Research Progress and Outlook

Good progress had been made in the past three years on launching new research centers in cybersecurity and unmanned vehicles, as well as an education and research center for cooperative projects with industry, and campus-wide initiatives in biotechnology, energy and nanotechnology. However, these entities are in their early stages and will need nurturing and growth. Additional centers and initiatives are in their planning stages and need brought to the implementation stage.

New research grants and proposals were up in FY04 but declined in FY05 and FY06, falling well short of the goal of 10% annual growth. With increasing competition for external funding, and a shifting of some federal agencies from fundamentals to applications, meeting the stated goals will be difficult. Faculty will need to diversify their efforts and seek more partnerships with industry, government labs, and other academic institutions. Large increases in corporate visits to the College and in the amount of contracts and grants from industry are positive steps in this regard. Other measures of progress are increases in the number of peer-reviewed publications per faculty member and in the number of PhD degrees granted.

New guidelines were established on faculty recruitment and evaluations, to enhance quality, and a Faculty Excellence Program was developed. In FY06, a major focus of the Research and Corporate/Government Relations Subcommittee of the Engineering Advisory Council and of the Faculty Research Council was to promote industry-university collaboration in support of major proposals. This activity is paying off, with at least two new centers with industry and federal sponsorship expected to be established in FY07. Also, college leadership worked with campus leadership on a revised graduate tuition policy to help with graduate recruitment, and

the Administrative Council of the College has added financial incentives to encourage recruitment of PhD students; the new policy and incentives have been implemented for FY07.

III. EDUCATIONAL EXCELLENCE

Our vision of excellence in education is supported by initiatives to enhance student learning in four categories: (1) Enhanced courses and curricula, (2) Extracurricular educational enrichment, (3) Student recruitment and outreach, and (4) Improved communications, advising and assessment. For each category, the goals and results are provided below, followed by an assessment of planned actions in support of the goals.

III.1 Courses and Curricula

Goal: *Enriched curricula so that all undergraduate students take at least two courses in which oral and written communication constitutes a significant learning objective, two courses where team-based learning is emphasized, and a meaningful capstone design experience, in addition to humanities and core subjects in math, science, and engineering.*

Result: All 11 undergraduate degree programs, except Engineering Physics, reported in FY04 that they have at least two required courses where communication is emphasized, at least two required courses where team-based learning is emphasized, and at least one required course with a capstone design experience. In addition, courses across the College are making increased use of the OWL (Online Writing Laboratory), directed by the Herbst Program. OWL provides a mechanism for engineering students to obtain prompt written feedback on the quality of writing in papers written for engineering courses. See <http://engineering.colorado.edu/HOMER/owl.htm>.

Goal: *Increased number of instructor ratings (by students via the Faculty Course Questionnaire) above 3.0/4.0 and decreased number of instructor ratings below 2.0/4.0, to more than 75% above 3.0 and less than 3.5% below 2.0 by FY08.*

Result: The fraction of instructor ratings above 3.0 has increased since FY03, and that below 2.0 has decreased, as desired, though the goal is not yet met (see table below). It is interesting to note that the average class size in FY05 of courses in which instructors were rated below 2.0 is 77 students, whereas the average size of all classes is only 31 students; the corresponding numbers for FY06 are 46 and 31, respectively.

Year	FY03	FY04	FY05	FY06	FY07	FY08
# rated	578	667	632	699		
>3.0	397 (68.7%)	469 (70.3%)	444 (70.3%)	485 (69.4%)		
<2.0	27 (4.7%)	23 (3.4%)	26 (4.1%)	27 (3.9%)		

Note: FY includes summer, fall and spring courses

Action Planned and Assessed: *Enhance student learning by design of curricula enriched in the humanities, writing, ethics, hands-on learning, team-based projects, and capstone design. GEEN 1400 “Engineering Projects,” in which team-based, open-ended design projects are the norm, continues to be taken by approximately two thirds of our freshman class. This course has had a demonstrable positive impact on retention, particularly for women and students of*

color (see <http://itll.colorado.edu/GEEN1400/index.cfm?fuseaction=RetentionStudy>). In addition, all departments in the College continue to offer discipline-specific, project-oriented courses. The laboratory course fees that were approved in FY05 and became effective Fall 2005 have provided significant funding to departments and the Integrated Teaching and Learning Laboratory for maintaining and improving educational infrastructure. In FY06, the Undergraduate Education Council undertook a critical review of the options available to engineering undergraduates to meet their humanities and social science elective requirements. The result of this review was a substantial revision of the Humanities and Social Science requirements, which became effective for students entering in Fall 2006. Instead of an ad hoc list of courses, courses approved for humanities and social science credit are now drawn from the Arts and Sciences Core Curriculum. In addition, students are strongly encouraged to develop a coherent plan of study for meeting the H&SS requirements. Additional details can be found at http://engineering.colorado.edu/Advising_Guides/HSS.pdf.

Action Planned and Assessed: *Establish a faculty subcommittee to consider the appropriate role of biology in the undergraduate curriculum, and make recommendations to the college faculty for implementation.* While a College Committee on Bioengineering has been established, it was decided to not make a college-wide recommendation on the role of biology in the undergraduate curriculum at this time, but instead to leave this issue to the individual departments. The Department of Chemical and Biological Engineering in FY04 established a course in Biology for Engineers, which is required for its majors and elective for other majors, and a new elective course in Foundations of Bioengineering, starting in FY05. During FY06, a new major, B.S. in Chemical and Biological Engineering, was proposed and approved.

Action Planned and Assessed: *Establish a New Faculty Program and Faculty Excellence Program to assist faculty in teaching and research.* The New Faculty Program was established in FY04, and the Faculty Excellence Program was established in FY05.

III.2 Extracurricular Educational Enrichment

Goal: *Expanded opportunities for extracurricular enrichment experiences, with the fraction of undergraduate students participating in discovery, professional or service learning each year reaching one-third by FY08.*

Result: FY04 was the first year that metrics for extracurricular enrichment were determined, with 23% of undergraduates participating. Participation increased to 37% in FY05 and then declined to 31% in FY06 (most of the contraction is in service learning and can primarily be traced to a tightening of the reporting method). The College also introduced the Active Learning Award during FY05. This award is given at graduation to those students who can demonstrate their participation in all three forms of extracurricular active learning (discovery, professional and service) during their undergraduate years. The first award was made to one student graduating in December 2004. At the May 2005 commencement, 21 students received the award, while 25 students received this award in FY06.

Year	FY04	FY05	FY06	FY07	FY08
Discovery Learning	492	636	617		
Professional Learning	137	357	325		
Service Learning	265	488	337		
Total Participating	618	1014	855		
Total Undergraduates	2667	2736	2739		
% Participation	23.2%	37.1%	31.2%		

The total participating is less than the sum of discovery, professional and service learning, because students participating in two or more activities are counted only once in the total.

Action Planned and Assessed: *Establish a college-wide Discovery Learning Initiative to expand undergraduate research.* The Discovery Learning Program operated during the 2005-2006 academic year with 22 apprentices, but has been expanded for the 2006-2007 academic year to support 35 apprentices. The program is now a year-long opportunity. The change from a semester-long program has been well-received by both apprentices and professors, who appreciate the opportunity to perform more in-depth research than can be accomplished in a single semester. Overall, 69% of the students and 84% of the faculty have rated the experience as very good or excellent. The Dean's Fund for Excellence continues to support the program by paying 60% of the student's funding (up to a total of \$900/semester); the other 40% is covered by the hiring faculty member. To date, four Discovery Learning Symposia on undergraduate research have been held (April 2004, December 2004, April 2005 and April 2006); the next one is planned for April 2007.

Semester	# of Projects Offered	# of Students Applied	# of Students Accepted
Spring 2004	26	46	12
Fall 2004	21	28	12
Spring 2005	38	28	22
AY 2005-06	37	48	23
AY 2006-07	56	65	35

Action Planned and Assessed: *Establish a college-wide Service Learning Initiative to expand undergraduate involvement in K-12 outreach, Engineering for Developing Communities, course assistance, etc.* Since piloting the Earn-Learn Program in Spring 2004 with 15 students, this program to support student employment in service to the College was expanded to support nearly twice as many students during Fall 2004 (24), more than doubled in Spring 2005 (60), and continued at this level for the 2005-06 academic year, helping to catalyze service learning in the College. Students in the Earn-Learn Program receive half of their support from the hiring department or program, with the remainder coming from contributions from donor or Dean's funds. Overall, 83% of the students and 80% of the faculty rated the experience as very good or excellent. Since hired as Program Coordinator in February 2005, Robyn Sandekian has further supported service learning through Engineering for Developing Communities (EDC) and curriculum development, including a new undergraduate track for civil engineering majors in Engineering for Developing Communities.

Action Planned and Assessed: Establish a college-wide Professional Learning Initiative to expand professional opportunities (internships, co-op, etc.) and career advising for students and to better prepare them for engineering practice. Three departments (AES, ECE and ChBE) in the College have active co-op programs and have appointed co-op coordinators to oversee these programs. A Co-op Committee has been established and has developed a strategic plan for advancing co-op opportunities throughout the College.

Action Planned and Assessed: Establish and fill a new position: Director of Academic Programs and Assessment. A Director of Academic Programs and Assessment, Terry Mayes, was hired in February 2004 to coordinate discovery, service and professional learning.

Action Planned and Assessed: Establish a college-wide Engineering Honors Program. In FY05, an ad-hoc committee consisting of faculty and students met over a period of several months and developed a detailed outline for the Engineering Honors Program. In late Spring 2005, this outline was presented to the Undergraduate Education Council, the Administrative Council, and the Engineering Advisory Council. A full draft of the proposal, taking into account the feedback received, was approved in FY06, and the Engineering Honors Program started in Fall 2006. Professor Scot Douglass has been selected as its Faculty Director.

III.3 Student Recruitment and Outreach

Goal: Number of undergraduate applicants increased by 5% per year, without increased enrollments, and with improved quality of the entering class.

Result: The Fall 2003 baseline data for undergraduate enrollments are shown below, as well as data for Fall 2004, Fall 2005, and Fall 2006. While the number of applicants declined for Fall 2005, and the fraction admitted was reduced proportionately to maintain admission standards, the percentage of students who accepted the offers of admission increased. Quality measures of the entering class declined slightly in Fall 2004 and Fall 2005, but increased in Fall 2006. Not shown in these data are large changes in the distribution of students among majors, which has led to some departments (AES and ME, in particular) having large classes and overcapacity laboratories. An enrollment management plan has been implemented to help limit the swings in major distribution.

Year (Fall)	2003	2004	2005	2006	2007
Tot. BS students	2667	2736	2739	2755	
# applied	2154	2212	2022	2107	
# offered adm.	1890	1956	1781	1805	
# new enrolled	610	633	669	654	
Avg. HS gpa ¹	3.69	3.72	3.71	3.75	
Avg. class rank	84%	85%	82%	84%	
ACT Math	29	29	29	29	
ACT English	28	28	27	27	
SAT Math	670	660	650	660	
SAT Verbal	610	600	590	590	

¹Weighted grade-point-average with a maximum of 4.0

Goal: Increased PhD enrollments by 5% per year, to 600 by Fall 2007, with MS enrollments holding steady, and improved quality measures of incoming graduate students to 3.6 average undergraduate GPA and 765 average quantitative GRE, while increasing applicant pool so that 30% or less are offered admission.

Result: The recent data for graduate enrollments are given below. The Fall 2004 data show a 3% increase in PhD students, but then there are slight decreases in Fall 2005 and Fall 2006. The number of MS students also decreased. The number of new graduate students declined in Fall 2004 but has now recovered, likely due at least in part to a new tuition policy where in-state tuition is changed for all graduate students on appointments. Of particular concern are the large decrease in the size of the applicant pool and the increase in the fraction offered admission. The percentage of graduate students who are from foreign countries declined from 36% in Fall 2003 to 27% in Fall 2005, reflecting a national trend. It is expected that this trend will be reversed by the new tuition policy.

Year (Fall)	2003	2004	2005	2006	2007
Tot. PhD students	485	500	491	488	
Tot. MS students ¹	461	461	399	388	
# applied ¹	2087	1666	1358	1477	
# offered adm. ¹	1149	931	840	902	
# new enrolled ¹	289	244	265	299	
Avg. ugrad. gpa ¹	3.45	3.54	3.43	3.51	
Avg. quant. GRE ¹	753	757	744	756	
# Prof. Study MS	N/A	197	165	215	

¹Data do not include professional studies students, primarily in Eng. Man. & Telecom, or BS/MS students

Goal: Increased diversity of student population by 10% per year, to 7.5% and 10% underrepresented minorities (black, Hispanic, Native American) and 30% and 25% women at the graduate and undergraduate levels, respectively, by Fall 2007.

Result: The Fall 2003 baseline data for diversity metrics are shown below, along with corresponding data for diversity of regular faculty (tenured/tenure-track faculty in the College, including those budgeted elsewhere). Also provided are data for Fall 2004, Fall 2005, and Fall 2006, which generally show increases in diversity of both faculty and students. National trends show a slight decline in the diversity of engineering undergraduates.

Year (Fall)	2003	2004	2005	2006	2007
% women ugrads	17.5%	17.2%	16.9%	17.7%	
% female new fr	14.1%	17.3%	18.0%	18.2%	
% female grads ¹	23.6%	21.8%	23.1%	24.1%	
% minority ugrads	7.3%	7.1%	7.4%	7.4%	
% minority new fr	5.7%	7.2%	9.0%	7.5%	
% minority grads ¹	5.0%	5.6%	4.4%	5.4%	
% female faculty	11.2%	11.6%	14.3%	15.8%	
% minority faculty	5.3%	4.6%	5.1%	5.1%	

Minority refers to black, Hispanic, and Native American

¹Data do not include professional studies students, primarily in Eng. Man. & Telecom, or BS/MS students

Action Planned and Assessed: *Improve student recruiting efforts to enhance the quality and diversity of entering students, through a proactive role of college personnel.* As in the three prior years, a survey of students offered admission to the Fall 2006 class was performed in the summer of 2006. Adequacy of financial aid was cited as the area needing the most improvement by students who did not come to CU. Efforts to increase financial aid for both undergraduate and graduate students are part of the resource portion of the Strategic Plan. A database of prospective students is now in use by all departments and programs to track and manage undergraduate recruiting efforts, and will be updated during Fall 2006 to make the use of the database more efficient and effective for all users. This database is currently updated weekly using data from the Office of Admissions. We have taken a more strategic approach to our merit-based scholarship awards, increasing both the award amounts and the award durations, and offering them earlier. Most awards are now for four years, depending upon continued academic achievement. Twice in FY06, representatives of the College (Bennett, Sherman and Finau-Starkey) traveled to selected cities around the country as part of campus recruitment efforts. These visits will be repeated in FY07. In March 2006, "Explore CU Engineering Day" was held for admitted students and their parents. This event was a major success. Of the 218 prospective students who attended (about 350 family members and friends also attended), 77% overall confirmed their intent to enroll in CU Engineering, 70% of the women who attended confirmed, and 77% of the non-Asian minority students who attended confirmed. Additional undergraduate recruiting efforts, particularly those undertaken by our Integrated Teaching and Learning Laboratory, Multicultural Engineering Program, and Women in Engineering Program, were integrated with K-12 outreach programs and are described below.

Action Planned and Assessed: *Establish an Engineering Outreach Program to K-12 students and teachers.* The key K-12 outreach programs of the College during FY06 are listed below. In addition, Jackie Sullivan, Co-Director of the ITLL, and other college personnel were instrumental in the recent creation of a pre-collegiate division of the American Society for Engineering Education. Since the student diversity measures have not increased substantially, and have declined in some cases, a process to review our outreach programs was continued in FY06, with the goal of tracking individual students over time and determining the fractions of participants in different programs who later apply to and enroll in the College. For example, 230 (34% female, 6% underrepresented minority) high school students with June 2006 graduation dates attended our High School Honors Institute in Summer 2004 or Summer 2005. Of these students, 105 applied to our college and 61 (31% female, 8% underrepresented minority) enrolled in the College for Fall 2006.

- Admitted Students Day (Spring 2006), 218 high-school (HS) students
- Boettcher Scholars Day (Spring 2006), 4 HS students (3 confirmed for Fall 2006)
- Butterfly Hope Educational-Enrichment Program (Summer 2006, 4 days over 4 weeks), 24 2nd through 5th grade students
- Colorado Space Grant Consortium (Summer 2006, one day each), 51 students ages 6-14
- Dragon Discovery Engineering Program at Sanchez Elementary School (Summer 2006, 3 weeks), 54 students
- Engineer for a Day - part of the CU Student for a Day Program (AY 2005-2006), approximately 300 HS students

- Engineering Career Day for Women (Spring 2006), 100 HS students
- Engineering Open House (Fall 2005, one day), 289 HS students
- Girl Scout Badge Days (AY 2005-2006, one day each), over 500 female K-12 students
- High School Honors Institute (Summer 2006, one day each), 269 HS students
- IBM Exploring Interests in Technology and Engineering (EXITE) Camp (Summer 2006, one week), 24 female middle school (MS) students
- Lafayette ES Robotics Engineering Camp in Lafayette (Summer 2006, 2 weeks), 36 K-5th grade students
- MESA Fall Fling (Fall 2005, 2 days), 144 HS students
- MESA Mark (AY 2005-2006, one day), 71 science and math teachers
- Pre-Collegiate Engineering Summer Programs in the ITLL (Summer 2006, 5 weeks), 15 12th grade students
- Ryan ES Engineering Camp in Lafayette (Summer 2006, 2 weeks), 30 2nd-5th grade students
- Starting Student Space Hardware Programs Workshop (AY 2005-2006, 5 days), 66 teachers
- Success Institute (Summer 2006, two separate sessions of one week each for rising 9th-12th grade students), 74 students
- Summer Bridge (Summer 2006, 5 weeks), 26 HS minority students
- Teach Engineering Digital Library, coordinated by ITLL to develop standards-based K-12 engineering curricula accessible on the web (ongoing)
- Teacher workshop in K-12 Engineering Curricula (Summer 2006, 2 days), 10 teachers
- Technology and Engineering to Advance Math and Science (TEAMS), (AY 2005-2006), 1865 students in grades 3-12 at Lafayette schools and DSST in Denver
- Upward Bound NanoSatellite Course (Summer 2006), 40 Native American students entering 10th grade

Totals: 4063 students, 147 teachers

To help support these programs, external grants and private gifts have been received from J.D. Abrams (Upward Bound NanoSatellite Course), CU Continuing Education (Upward Bound NanoSatellite Course), Lockheed Martin (Upward Bound NanoSatellite Course), DesignNet Engineering (Upward Bound NanoSatellite Course), Bechtel (rural outreach), NSF (GK-12 Track II grant, Teach Engineering Digital Library), Daniels Fund (Teach Engineering Digital Library), U.S. Department of Energy (Success Institute), Gates Family Foundation (Teacher Workshops, TEAMS), NASA (Colorado Space Grant Consortium), U.S. Air Force (CSGC SHOT Workshop), and NASA grant to S. Palo (partnership on major award to develop MESA Curriculum Modules).

Action Planned and Assessed: *Establish and fill a new position: Director of Outreach and Education.* A Director of Outreach and Education, Kristin Germain, was hired in October 2003 to coordinate college outreach and recruiting efforts. She subsequently left Colorado and was replaced by Lelei Finau-Starkey in September 2005.

Action Planned and Assessed: *Increase graduate training support by submitting at least ten graduate training proposals per year.* In FY04, six proposals were submitted for graduate training programs, defined as programs that provide financial support (including stipend and tuition) and education and research training of a group of graduate students in a common area. The number of proposals was increased to 11 in FY05 and 10 in FY06, meeting the target. Four of seven proposals in FY06 to the U.S. Department of Education's Graduate

Assistantships in Areas of National Need program were successful, which is significantly better than the average success rate of less than 10% for this program.

III.4 Communications, Advising and Assessment

Goal: *Full accreditation of undergraduate engineering programs, with effective assessment strategies and continued improvement, including preparation for professional licenses where appropriate.*

Result: Several standardized measurement tools have been developed and implemented at the college level to assist in our assessment efforts, including senior and alumni surveys. In addition, the College has implemented a standardized method for reporting the results of the Fundamentals of Engineering exam. Our Environmental Engineering major was accredited in FY04, so that 8 of 11 undergraduate majors are now accredited by the Accreditation Board for Engineering Technology (ABET). The exceptions are Applied Mathematics, which is not eligible for accreditation through ABET, and Computer Science and Engineering Physics, which have not sought accreditation. In the prior ABET general review (FY99), one program received accreditation until the next general review (best), two were required to submit interim reports, three were required to have interim visits, and one required a show-cause visit (worst). All of the ABET-accredited degree programs in the College underwent a General Review during the 2005-2006 academic year. Each degree program prepared and submitted a comprehensive self-study report in support of this review. A college-wide document providing an overview of the College was also submitted. The Director of Academic Programs and Assessment, Terry Mayes, was hired in Spring 2004 and oversaw preparations for the ABET accreditation visit. The visit was very successful, and all eight programs received full accreditation until the next general review.

Goal: *Improved ranking of our undergraduate program to the top 30 in 2005 and the top 25 in 2007.*

Result: Using the *U.S. News & World Report* undergraduate program rankings, the initial goal was achieved in FY04, but the rankings subsequently slipped:

- 8/02 Undergraduate Program Ranking: 31 (17 among publics)
- 8/03 Undergraduate Program Ranking: 29 (17 among publics)
- 8/04 Undergraduate Program Ranking: 33 (18 among publics)
- 8/05 Undergraduate Program Ranking: 36 (21 among publics)
- 8/06 Undergraduate Program Ranking: 34 (19 among publics)

Goal: *Improved ranking of our graduate program to the top 30 in 2007 and the top 25 in 2009.*

Result: Good progress was made toward the initial goal for our graduate program, using the *U.S. News & World Report* rankings, but the most recent ranking slipped:

- 4/03 Graduate Program Ranking: 37 (21 among publics)
- 4/04 Graduate Program Ranking: 33 (19 among publics)

4/05 Graduate Program Ranking: 33 (19 among publics)

4/06 Graduate Program Ranking: 39 (22 among publics)

Goal: *Improved quality of undergraduate advising, as measured by surveys of graduating seniors, with a goal of 100% rating their advising experiences as satisfactory or better within three years.*

Result: In addition to continuing our measurement of several key dimensions of our graduating seniors' advising experience (including advisor availability, accuracy, awareness of opportunities, advisor interest in the student, and quality of career advice), we are now asking our graduating seniors to rate their overall advising experience. All of these dimensions are measured for both staff and faculty advisors. The following chart demonstrates that the evaluations have improved from AY2004-2005 to AY2005-2006 in essentially all categories. Staff advisors continue to score higher than faculty advisors. Career advising by both faculty and staff advisors offers the most opportunity for improvement.

Dimension of Advising	Satisfactory or Better		Mean Score	
	AY05	AY06	AY05	AY06
Availability of staff advisor	91%	96%	4.03	4.25
Accuracy of staff advisor	90%	93%	4.03	4.21
Staff advisor's awareness of opportunities	77%	85%	3.52	3.78
Staff advisor's interest in the students	86%	92%	3.96	4.27
Career advising provided by staff advisor	62%	73%	3.04	3.40
Overall satisfaction with staff advisor	N/A	94%	N/A	4.16
Availability of faculty advisor	86%	87%	3.73	3.85
Accuracy of faculty advisor	85%	84%	3.65	3.84
Faculty advisor's awareness of opportunities	74%	80%	3.34	3.55
Faculty advisor's interest in the students	79%	82%	3.55	3.76
Career advising provided by faculty advisor	64%	74%	3.04	3.33
Overall satisfaction with faculty advisor	N/A	81%	N/A	3.69

Action Planned and Assessed: *Establish a college-wide Engineering Advising Program.* The undergraduate advisors continue to meet monthly as they focus on methods to improve college advising. New advising guides were developed during 2005-2006 for all eleven undergraduate degree programs, which include clearly stated expectations and standard wording on several topics. The college now offers all students, except those in Civil and Architectural Engineering, the opportunity to use an on-line degree audit system in evaluating their progress towards meeting degree requirements. Advisors are now agreeing upon a set of standard reporting tools which will be used by all staff advisors to monitor student progress towards a degree and allow them to respond quickly to requests for information. In the coming year, the focus of the staff advisors will be on ways to improve "Staff advisors' awareness of opportunities" which was one of the staff dimensions rated the lowest by students. In addition, a plan must be developed and undertaken for improving faculty advising, especially with respect to career advising.

Action Planned and Assessed: *Develop effective marketing tools for the College to its constituents.* In addition to ongoing publications (such as *CUEngineering*, *Alumni Focus*, and *Corporate Partner*), several new or revised marketing tools were introduced in FY06:

- Undergraduate Program Brochure printed and put into use in Fall 2005
- Graduate Reputational Fliers (7 fliers updated in Fall 2005, including one for each department and the College as a whole, sent to deans and department chairs in advance of the annual ratings survey)
- CU Engineering Signature (new brochure highlighting what is unique about the College developed in summer 2006 for donors and upcoming reputational mailing to deans)
- Miscellaneous (new marketing flier developed on renewable and sustainable energy initiative and 18 other marketing fliers on college programs and initiatives updated; glossy brochure developed for Industry/University Cooperative Projects Center in mechanical engineering)
- Web Site (18 more profiles of alumni, students, and faculty added for a total of 36 now on the web site; new web site developed for Nano Sciences and Engineering initiative; online networking tool developed for alumni with total overhaul of alumni/donors and industry web sites under way for Fall 2006 rollout)

III.5 Discussion of Educational Progress and Outlook

The full accreditation of all eight undergraduate degree programs reviewed during FY06 was a major accomplishment, for which we are grateful to the many dedicated staff and faculty who worked very hard to prepare for the review. The Engineering Honors Program and a new BS degree in Chemical and Biological Engineering were approved in FY06, for Fall 2006 starts, and they are expected to help attract and retain diverse students of high quality. Moreover, the support programs in the College (ITLL, Herbst, MEP, WIEP, CSGC) underwent extensive review during FY06, and the resulting recommendations are expected to further strengthen our undergraduate programs. Active and team-based learning has been included throughout the curricula, starting with engineering projects in the freshmen year and continuing through capstone design in the senior year, with significant facilitation by the Integrated Teaching and Learning Laboratory. Piloting of the Discovery Learning Program and the Earn-Learn Program in FY04 was very successful, and these programs have helped catalyze extracurricular active-learning experiences for our students. In each of the past two years, approximately one-third of our undergraduates participated in one or more discovery, professional and service learning experiences.

Initiatives on undergraduate advising have led to improved survey results on student satisfaction with advising. These surveys also point to the need for improved faculty advising and career advising, which will be an emphasis in the coming years.

Undergraduate enrollments have increased slightly, even though the number of applications has declined. Recruitment and communication efforts have contributed to the increased acceptance rate of students offered admission. However, diversity measures of our student population have shown only modest change. While it is expected that our increased K-12 outreach efforts to strengthen the pipeline of young students with interests in math, science and engineering may take several years to show results, especially for students from groups

traditionally underrepresented in these areas, assessment will be needed to focus efforts on the most successful programs. Another concern is that the College's undergraduate program rankings have slipped in 2004 and 2005, which is also true of the campus as a whole and may be tied to negative publicity; the small improvement in 2006 is encouraging.

In looking ahead, major educational undertakings over FY07 and FY08 include launching the Engineering Honors Program and BS degree in Chemical and Biological Engineering, and strengthening and growing our interdisciplinary BS degree program in Environmental Engineering. Action will also be taken on a new Diversity Plan for the College, including strengthened advising and targeted recruitment and outreach efforts with Lafayette and Denver schools with engineering and technology foci and high enrollments of underrepresented students; improvements in first-year curricula and courses are also planned, to help support students from diverse academic backgrounds.

IV. RESOURCE EXCELLENCE

Our vision for resource excellence is to facilitate the ambitious goals and plans for educational and research excellence, by generating the necessary supporting resources and employing these with wise stewardship in four categories: (1) Faculty, (2) Facilities, (3) Institutional funds, and (4) Private giving. For each category, the goals and results are provided below, followed by an assessment of planned actions in support of the goals.

IV.1 Faculty Resources

Goal: Hiring of outstanding faculty, with increased diversity and competitive salaries and startup packages.

Result: During FY04-FY06, 22 regular faculty were hired, including nine women and seven persons of color. The average starting salary for the 17 Assistant Professors is \$75K (compared to the national average of \$75K in FY05), and the average startup package is \$310K (national data not available). Two of the hires are part of the campus-wide nanotechnology initiative, and three are part of the campus-wide biotechnology initiative.

Goal: Retention of top faculty, with competitive salaries, endowed positions, and at least one-half of retention offers accepted.

Result: Faculty raise pools in the College of 2.6% for raises effective in FY04, 2.8% for FY05, 3.3% for FY06, and 3.6% for FY07 have outpaced inflation (1.9% for 2002, 1.1% for 2003, 0.1% for 2004, and 2.1% for 2005), despite reductions in state funding. The average faculty salaries in the College exceeded the AAU averages in FY06 by 2.7% at the Assistant Professor level, but lagged by 2.7% and 3.7% at the Associate and Full Professor levels, respectively. Our top faculty continue to receive attractive offers from other institutions. During FY04-FY06, 12 retention offers were made, with six accepted, and six faculty moving to other institutions. To help with retention, nine new endowed chairs and professorships were established and awarded in FY05 or FY06.

Goal: At least three faculty elected to the National Academy of Engineering in the next five years, and at least one major national or international society award received by a faculty member in each department each year.

Result: In FY04, two faculty (George Born and Kaspar Willam) were elected to the National Academy of Engineering (NAE) and one or more major awards (not including several NSF CAREER and other new investigator grants) were received by faculty in five of the six departments. The Gordon Prize to Frank Barnes and the Waterman Award to Kristi Anseth are of particularly high distinction. In FY05, and also FY06, there were no college faculty elected to NAE, and major awards were received by faculty in four of the six departments (see below). In addition, Jackie Sullivan (co-director of the Integrated Teaching and Learning Laboratory) received the 2005 Lifetime Achievement Award from the K-12 Engineering Division of the American Society for Engineering Education. In FY06, Fred Glover (previously elected to the NAE) was appointed to the faculty in Electrical and Computer Engineering.

Selected Faculty Awards in FY06

Aerospace Engineering Sciences

Eric Frew, AIAA Rocky Mountain Young Engineer of the Year

Kristine Larson, American Geophysical Union (AGU) Geodesy Section Award

Chemical and Biological Engineering

Janet deGrazia, ASEE Rocky Mountain Outstanding Educator

Melissa Mahoney, MIT Technology Review Top 35 Young Innovators

Ted Randolph, AIChE Professional Progress Award

Alan Weimer, U.S. Department of Energy Hydrogen Program R&D Award

Civil, Environmental and Architectural Engineering

Bernard Amadei, World Federation of Engineering Organizations (WFEO) Hassib J. Sabbagh Award

Ross Corotis, International Association for Structural Safety and Reliability (IASSR) Senior Research Prize in System Reliability and Optimization

Roseanna Neupauer, ASCE Walter Huber Prize and New Faculty Excellence in Teaching Award

Joseph Ryan, U.S. EPA National Notable Achievement Award

Electrical and Computer Engineering

Frank Barnes, International Telecommunications Education and Research Association (ITERA) Distinguished Researcher Award

Zoya Popovic & Regan Zane, IEEE Microwave Theory and Techniques Society Microwave Prize

Action Planned and Assessed: *Form an Engineering Awards Committee, in addition to departmental awards committees, and actively nominate top faculty for campus and national awards.* In FY04, awards liaisons were identified for each department, and the Dean's office provided information on various opportunities to these liaisons. Starting in FY05, the Faculty

Research Council is serving in the role of an awards committee. However, nomination of faculty for appropriate awards remains non-uniform across the departments.

Action Planned and Assessed: *Develop a culture of excellence through high standards in hiring, annual reviews, reappointment/promotion/tenure reviews, and post-tenure reviews, and by establishing a New Faculty Program.* Faculty search committees and the Dean's office carefully review all finalists for faculty openings, with offers made only to those showing excellent potential in both teaching and research. The performance standards for annual faculty reviews were revised in FY04 by the Administrative Council. The updated document on *Policies, Procedures and Criteria for Reappointment, Promotion and Tenure* was approved by the Administrative Council in Fall 2003, and in revised form in Fall 2005, and a new document on *Advice for Reappointment, Promotion and Tenure* was issued by the Dean's office in Spring 2004. A New Faculty Program was also established in FY04 and includes workshops on career planning mentoring, research, teaching, and reappointment, promotion and tenure.

IV.2 Facility Resources

Goal: *Expansion of the Engineering Center by 40,000-60,000 square feet by FY08.*

Result: Feasibility studies for two wing expansions (CS and ChBE) were completed in FY04, but funding and approval to proceed have not been secured. A feasibility study is also underway for expansion of the AES wing. Given the length of time required for planning, design and construction, it appears unlikely that the goal will be met by FY08. However, as noted below, a biotechnology building on east campus has been proposed and would include at least one department in our college.

Goal: *More effective use of current building, with at least \$500K per year spent on renovations.*

Result: \$1.5M in FY04, \$1.4M in FY05, and \$1.0M in FY06 were spent on renovations of the current building. These expenditures exceed the goal due to the decision by college leadership to invest in making more effective use of available space while expansion plans are on hold due to the lack of state funding, and due to partial funding of these renovations by campus.

Goal: *At least two college research facilities established by FY08.*

Result: Renovations have been completed to establish a Nanotechnology Laboratory and Characterization Facility, and they are underway for a High Performance Computing Facility, well in advance of FY08. However, only about half of the \$5 million goal for nanotechnology equipment has been raised to-date.

Action Planned and Assessed: *Develop feasibility assessments, program plans, and fundraising efforts to expand at least three wings of the Engineering Center by 10,000-30,000 sq. ft. each.* Formal feasibility studies were done in cooperation with Facilities Management in FY04 for two wing expansions (CS and ChBE). The cost estimates are much higher (\$400-\$500 per square foot) than expected. An alternative of building on the east campus (about a

half mile away) at about 25% less cost per square foot was proposed. The CS Department has expressed a strong preference to stay on the main campus, while the ChBE Department has expressed a desire to move to the east campus along with the campus biotechnology initiative. In FY06, a feasibility study and a program plan were approved for an interdisciplinary biotechnology building on the east campus. A feasibility study for expansion of the AES wing will be done in FY07.

Action Planned and Assessed: *Request proposals and allocate funds annually to renovate research and educational space in the Engineering Center for more effective use.* Proposals for renovation projects have been requested each year, and \$3.9M was allocated in the past three years by the College (including campus and departmental matching funds) for a total of 61 remodeling and renovation projects. The 21 FY06 projects totaling \$1.0M include

- Program plan for new biotechnology building
- Mobile lidar laboratory for AES
- Active learning classroom for CEAE/MEP/WIEP
- CS numerical lab remodeling and furniture
- ECE Center for Environmental Technology lab
- ChBE laboratory equipping for new BS degree
- ME Durning teaching lab
- ITLL manufacturing center

Action Planned and Assessed: *Complete needs assessment and plans for at least two college research facilities.* In FY04-FY06, progress was made on two college research facilities:

- *Nanotechnology Laboratory and Characterization Facility*--Construction of the new laboratory facility in the DLC sub-basement, was completed in FY06, and several new pieces of equipment are in operation and being used by university personnel. \$1.6M in federal earmarking and \$0.9M in university costsharing have been received during FY04-FY06 for this facility. The equipment includes a low-vacuum scanning electron microscope (LVSEM) used for general high-resolution imaging and for imaging biological samples, a field-emission scanning electron microscope (FESEM) used for very high resolution imaging and advanced materials analysis, and a scanning laser confocal microscope (SLCM) used for fluorescent imaging of biological samples. The LVSEM currently has 19 certified users. The FESEM currently has 3 certified users. A certification course is being developed for this microscope to increase usage. The SLCM has just recently been become operational, and certification procedures for this microscope are also being developed. There have been several contacts from industry people about using the facility, and a plan will be developed to provide industry access and to get revenue from the usage.
- *High-Performance Computing Facility* – During FY04, plans were made to remodel 1400 sq. ft. of the ECE sub-basement (ECEE 2B80) as a college research computing facility, with the necessary power, cooling and security. \$200K for remodeling has been provided by the college and campus, and another \$100K will be requested to

expand the capacity. This facility is currently under construction and expected to open in Spring 2007.

Action Planned and Assessed: Move two college tenants to the nearby Exabyte building. In June 2004, the Center for Advanced Decision Support for Water & Environmental Systems (CADSWES) and the Hydroclimate Laboratory from CEAE moved to 7000 sq. ft. of remodeled space in the Exabyte building (about one mile northeast of the main campus). In addition, Unix Ops was moved from the Engineering Center to 1500 sq. ft. of remodeled space in the Stadium.

IV.3 Institutional Financial Resources

Goal: Increased continuing annual institutional support to the College by \$7M by FY08 (from \$23M in FY03, after a 6% cut), requiring 5-6% growth per year.

Result: As seen in the table below, we have made good progress toward this goal to-date, though the future outlook is unclear because of uncertainties in state funding of higher education and in future tuition increases. The state appropriation to CU-Boulder was flat for FY04-FY06, after being cut by approximately one third in FY03. The continuing budget for FY04 increased by 5.7% from that at the end of FY03 (after cuts), with about one-third of the increase being a change in accounting for the nonresident tuition differential for graduate teaching assistants. As a result of large tuition increases, however, the continuing budget to the College increased by another 5.7% for FY05, in part due to the first step of an engineering differential tuition. A second step in differential tuition was deferred in FY06, because of large increases in the base tuition. However, a suite of course-specific fees (primarily for laboratory and design courses) was approved for the College of Engineering and Applied Science, starting in FY06, helping to increase the budget by 5.9%.

FY03: \$23,179,295 (baseline, after cuts) continuing institutional support

FY04: \$24,499,249 (+5.7%) continuing institutional support

FY05: \$25,896,905 (+5.7%) continuing institutional support

FY06: \$27,420,397 (+5.9%) continuing institutional support

Goal: \$1.0M in new continuing annual institutional funds by FY08 for an average of two faculty growth lines per year during FY04-FY08.

Result: Progress toward this goal is on track, using a combination of new funding from the campus and reallocation of funds within the College. One faculty growth line was added starting in FY04 (in AES). For FY05, three growth positions were added (one in ChBE, one in CS @ 50%, and one in Herbst). For FY06, two growth lines were added in the Mechanical Engineering Department.

Goal: \$1.5M in new continuing annual institutional funds by FY08 for faculty startup support.

Result: As shown in the table below, the requirement for startup support per new faculty member for equipment, research student support, etc. is rising, though the number of new faculty hired for FY04 is low due to state budget cuts. Campus funding for startups has been

essentially flat for the past three years, and so the additional burden has fallen on the College and departments. To help meet the need, the College has more than doubled the amount it provides per new faculty member, and \$125K in new continuing institutional funds were allocated by the College in FY05 for startup support (\$75K from the engineering differential tuition, and \$50K from internal reallocation of operating funds).

Year Started	# New Faculty	New Startup Required	Amount from Campus	Amount from College	Amount Req'd by Departments
FY03	14	\$2,240,518	\$532,378	\$207,622	\$1,500,518
FY04	3	\$663,000	\$400,000	\$204,405	\$58,595
FY05	11	\$2,390,000	\$406,008	\$878,694	\$1,105,298
FY06	7	\$2,449,834	\$503,089	\$811,200	\$1,135,545
FY07					
FY08					

Goal: \$1.0M in new continuing annual funds (post inflation) by FY08, to provide for competitive faculty salaries, requiring annual raise pools of inflation plus 1.5%.

Result: As seen in the table below for tenure-track faculty, the annual raise pools in FY04-FY06 (for faculty raises effective at the start of the following fiscal year) exceed inflation by the 1.5% goal. Despite tight budgets, the campus leadership and the College are making long-term investments in faculty quality.

Year	FY03	FY04	FY05	FY06	FY07	FY08
Base \$	\$15.1M	\$15.1M	\$15.9M	\$16.1M		
Raise %	2.6%	2.8%	3.3%	3.6%		
Inflation %	1.9%	1.1%	0.1%	2.1%		
Gross Increase	\$390K	\$420K	\$520K	\$580K		
Net Increase	\$110K	\$260K	\$510K	\$240K		

Goal: \$300K in new continuing annual institutional funds by FY08, to provide a doubling of matching funds for research equipment and proposals.

Result: No new continuing funds have been obtained for this purpose. Nevertheless, the college changed in FY04 its policy on providing equipment matching funds to ¼ college, ¼ department, ½ graduate school (from 1/6 college, 1/3 department, ½ graduate school). The amount of institutional matching funds provided from just the college portion is given below.

FY03: \$290,464 matching funds

FY04: \$286,075 matching funds (includes \$75,000 for nanotech lab)

FY05: \$408,450 matching funds (includes \$116,667 for nanotech lab)

FY06: \$294,557 matching funds (includes \$100,000 for nanotech lab)

Goal: \$800K in new continuing annual institutional funds for FY08 for curriculum-based program enhancements, including support for instructional faculty and teaching assistants

(\$400K), laboratory equipment and materials (\$300K), Engineering Honors Program (\$25K), and Engineering Advising Program (\$75K).

Result: In FY04, \$225K in new continuing annual funds were provided toward this goal for teaching assistants (\$75K stipend, \$150K tuition). In FY05, \$296K in new continuing annual funds were provided for teaching assistants (\$183K), lab equipment and materials (\$70K), and instructors (\$43K). In FY06, \$465K in new continuing annual funds were allocated from course fees for lab equipment and materials, and \$14K were reallocated for the Engineering Honors Program.

Goal: *\$700K in new, continuing annual institutional funds by FY08 for extracurricular student programs, including Discovery Learning (\$325K), Service Learning (\$175K), Professional Learning (\$50K) and Outreach (\$150K).*

Result: No new funds were allocated for these programs in FY04, but \$120K was reallocated within the College to hire directors to lead these programs. In FY05, new continuing annual funds were provided from differential tuition for discovery learning (\$9K) and service learning (\$39K).

Goal: *\$300K in new continuing annual institutional capital funds to combine with existing funds to invest a total of \$2M by FY08 for renovations of teaching and research space.*

Result: While no new continuing funds were received for this purpose in FY04, \$1.5M in existing and temporary funds were allocated for college space renovations in FY04, another \$1.4M and \$1.0M were allocated in FY05 and FY06, respectively. Also, in FY05, \$36K of new continuing annual funds from differential tuition were budgeted for renovations of teaching space, and another \$100K in new continuing annual funds from differential tuition were budgeted for future major building projects.

Action Planned and Assessed: *Request an engineering differential tuition and course-specific lab fees, in addition to promoting Quality for Colorado and other campus initiatives for additional institutional resources.* A differential-tuition proposal, originally submitted for FY03, was resubmitted in FY04. The first (and apparently only) installment of Quality for Colorado was approved for FY04, representing a campus-wide tuition increase of \$140 (per year) for each resident student and \$300 for each nonresident student. Quality for Colorado was not approved for FY05, but the first installment of \$300 per student per year for differential tuition in the College of Engineering and Applied Science was approved for FY05. The University of Colorado was also granted enterprise status, starting in FY05, so that its tuition increases are no longer subject to the state spending limits. A suite of course-fee proposals for laboratory and design courses was submitted in FY05 and approved for implementation starting in FY06. The second step in engineering differential tuition was postponed for both FY06 and FY07: the plan is for four steps totaling \$1400 per year.

IV.4 Private Giving

Goal: *Increase private gift support to \$12M per year (not including in-kind donations), a 50% increase from the prior campaign.*

Result: This goal has proven to be too ambitious, during the current period of economic uncertainty and between campaigns. The total amount of gift support received in FY05 (\$5.7M) is up 20% from FY04 (\$4.7M). Moreover the \$4.7M in new commitments through the CU Foundation (not including another \$1.7M through the CU Treasury) is the highest of any school or college at CU-Boulder.

Year	Support from Prior Pledges	New Support	Total Received	New Pledges	Total New Commitment
FY03	\$1,045,396	\$2,856,032	\$3,901,428	\$215,000	\$3,071,032
FY04	\$83,260	\$3,576,168	\$3,659,428	\$1,907,159	\$5,051,838
FY05	\$1,331,822	\$3,412,450	\$4,744,272	\$761,511	\$4,173,761
FY06	\$768,571	\$4,891,729 ¹	\$5,660,300 ¹	\$1,571,725	\$6,463,454 ¹
FY07					
FY08					

Note: these numbers do not include in-kind donations of ~ \$5M/yr

¹Including \$50,404 (Burger) and \$1,682,820 (Schelke) through CU Treasury

Goal: \$20M in additional faculty endowment gift funds by FY08, including two full chairs @ \$4M, four partial chairs @ \$1.5M, eight professorships @ \$500K, and eight faculty fellowships @ \$250K, with at least half of these funds received by FY08 versus pending as bequests or pledges.

Result: In FY04, \$151K was received toward endowed chairs or professorships. The amount was increased to \$1644K in FY05 and \$2321K in FY06 (including \$1601K for Schelke Chair through CU treasury). These funds plus current funds given by donors who have endowed bequests have allowed the college to award five new chairs and professorships starting in FY06 and four new chairs and professorships starting in FY07.

Goal: \$10M in new endowed student gift support by FY08, for undergraduate scholarships (\$6M), graduate fellowships (\$2M), and earn-learn apprenticeships (\$2M).

Result: The total gifts of \$1013K received in FY04 for new or existing student endowment accounts represent about half of the annual amount required to meet the goal, with most of the support focused on undergraduate scholarships. Not included in this total are approximately \$100K raised by the Resource Development Committee in current funds to establish the Earn-Learn Program and \$150K in current funds received from Agilent for graduate fellowships. In FY05, \$824K in new endowed gifts were received for student support (primarily undergraduate scholarships), in addition to \$271K in current funds raised for the Earn-Learn Program. In FY06, \$877K in endowment gifts were received for student support.

Year	FY04	FY05	FY06	FY07	FY08
Scholarships	\$933,475	\$778,748	\$856,564		
Fellowships	\$29,234	\$15,600	\$15,450		
Earn-Learn	\$50,000	\$30,000	\$5,000		
Total	\$1,012,709	\$824,348	\$877,014		

Goal: Doubling of the annual giving support for the Dean’s Fund for Excellence, to \$500K in FY08.

Result: Annual giving to the College for the Dean’s Fund increased by 28% in FY04, primarily due to hiring a firm to coordinate mail and phone solicitations, and then held steady in FY05 and increased another 22% in FY06, showing good progress toward the \$500K annual goal:

FY03 Annual Giving: \$232,155
 FY04 Annual Giving: \$296,769
 FY05 Annual Giving: \$297,189
 FY06 Annual Giving: \$361,230

Goal: \$10M in current and endowment gifts over the next five years for educational and research support.

Result: Not including the Dean’s Fund for Excellence and the endowed faculty and student support noted above, \$1,549,721 in current gifts and \$526,518 in endowment gifts were received in FY04 for educational and research support of departments and programs, exceeding the annual goal of \$2M. Slightly lower totals of \$1,482,496 in current gifts and \$464,443 in endowment gifts were received in FY05, and \$1,369,566 in current gifts and \$599,880 in endowment gifts were received in FY06.

Goal: 10% increase per year in number of alumni or friends donating time or funds to the college.

Result: The number of donors increased by 10% from FY03 to FY04, at least in part due to expanded efforts in the annual fund campaign, and then contracted a small amount in FY05 and FY06. The number of volunteers increased by 11% from FY04 to FY06.

Year	FY03	FY04	FY05	FY06	FY07	FY08
# donors	2664	2935 (+10%)	2,889 (-2%)	2,769 (-4%)		
# volunteers	n/a	591	622 (+5%)	654 (+5%)		

Action Planned and Assessed: Intensify private fundraising efforts by adding three development staff, making 1500 face-to-face contacts, 40 dean/leadership visits to donors, and 12,000 mail/email/phone contacts with alumni each year, targeting efforts toward foundation and corporations, and assigning a development officer and setting fundraising goals for each department and program. Development team staffing returned to full strength in 2005-2006 with the addition of Ann Scott and Dorea Atwood as development officers. Also, Peter Gudlewski joined the team at the end of the fiscal year as administrative assistant. Continuing staff includes John Mabley, Director of Development, Pat Sullivan, Director of Corporate and Foundation Relations, and John Quigley, Development Officer.

Energized contact activity with the College’s valued alumni and friends increased in 2005-2006 with a focused effort on restaffing. Personal visit activity by the engineering development staff increased 34% and selected contact by mail, telephone, and email increased

29%. In addition to personal visits by development team members, the Dean also logged 183 personal visits with supporters, several in collaboration with development team members. Volunteer members of the College's Resource Development Committee, chaired by Gary Anderson (ME '69), provided valuable strategic counsel for the development program and hosted and/or participated in events in Colorado, as well as St. Louis, MO.

Year	FY04	FY05	FY06	FY07	FY08
# pers. visits	201	294	393		
# sig. other cont.	n/a	212	274		

The College is a partner with other Boulder campus units in an annual fund outreach that reached 26,146 of the College's alumni by mail and 17,799 by follow-up telephone call placed by CU students. In 2005-2006 CU Foundation board chair, Engineering alumnus, and Distinguished Engineering Alumni Award honoree George Sissel (EE '58) ably served as volunteer spokesperson for Engineering's annual appeal, as he had in 2004-2005.

***Action Planned and Assessed:** Cultivate alumni involvement through advisory boards, development visits, alumni events, project and seminar courses, and professional-learning opportunities.* In FY06, the College had 18 advisory boards, with a total of 291 members, and another 363 volunteers participated in other college activities. These volunteers participated in a total of 1014 volunteer activities with the College. Alumni events in FY06 included:

- High School Honors Institute Dinner (7/26/05, Boulder, 6 alum, 35 total)
- Dean's suite at football game (9/10/05, Boulder, 10 alum, 18 total)
- Scholarship dinner (9/23/05, Boulder, 35 alum, 208 total)
- EAC/RDC dessert reception (10/6/05, Davis residence, Boulder, 10 alum, 25 total)
- CU-UT pre-game party (10/14/05, Abrams' residence in TX, 5 alum, 50 total)
- Event to honor Jon Hall (10/19/05, Tucson, 21 alum, 26 total)
- AIChE Annual Meeting (10/31/05, Cincinnati, 20 alum, 150 total)
- College's Holiday Party (12/2/05, Boulder, 10 alum, 151 total)
- CU Holiday Music Festival (12/2/05, Boulder, 10 alum, 24 total)
- ChBE Graduation Banquet (12/15/05, 2 alum, 53 total)
- Dinner preceding concert (2/25/06, Davis Residence, Boulder, 9 alum, 17 total)
- Engineering alumni event at Rockies game (3/25/06, Tucson, 20 alum, 42 total)
- MEP Awards Banquet (4/7/06, Boulder, 10 alum, 270 total)
- Lunch with St. Louis alumni (4/11/06, St. Louis, 4 alum, 6 total)
- EAC/RDC dessert reception (4/20/06, Davis residence, Boulder, 10 alum, 25 total)
- Engineering Awards Banquet (4/21/06, Boulder, 51 alum, 161 total)
- Bill Waite's retirement party (4/28/06, Boulder, 25 alum, 87 total)
- ChBE Graduation Banquet (5/11/06, Boulder, 5 alum, 219 total)
- Mechanical Eng Graduation Banquet (5/11/06, Boulder, 28 alum, 233 total)
- Golden Reunion Lunch (5/11/06, Boulder, 17 alum, 31 total)

Totals: 309 alum, 1831 total

IV.5 Discussion of Resource Progress and Outlook

Faculty hiring was successful in the past three years, with both high quality and diversity, though some positions remain unfilled. A culture of excellence is being promoted through a New Faculty Program established in FY04. A Faculty Excellence Program (aimed at helping faculty at all levels with teaching, research, and leadership) was piloted in FY05. New resources were provided for faculty startup funds, equipment matching, seed grants, travel to funding agencies, and performance awards. Nevertheless, research infrastructural support for faculty startup, graduate fellowships, equipment, and specialized facilities remains low, and new investment by the campus will be needed for the College to be competitive with top research schools. Significantly, nine new endowed chairs and professorships were established in FY05 and FY06, which have helped in the retention of outstanding faculty. Other faculty highlights of the past three years include two college faculty members elected to the National Academy of Engineering and college faculty members receiving the prestigious NAE Gordon Prize and NSF Waterman Award. On the other hand, several outstanding faculty members have left for other academic institutions.

Good progress has been made in the past three years on improved use of the current building, by undertaking over 60 remodeling projects totaling nearly \$4 million, initiating shared research facilities in computing and nanotechnology, and moving three programs to space outside of the main Engineering Center. Moreover, the State of Colorado has started again this year to fund capital projects, which may include college building projects in the near future.

Progress during the past three years on increasing the financial resources of the College has been mixed. Approval of the first year of the campus-wide Quality for Colorado tuition increase for FY04, of enterprise status and the first year of an engineering differential tuition increase for FY05, and of engineering course fees starting in FY06, represents the important first steps in increased institutional funding to enhance quality of our educational and research programs. However, state funding was flat during this time, after experiencing a major cut in FY03. Together with a decline in nonresident enrollments for the campus, a large increase in the base resident tuition (28%) was needed to meet the campus budget in FY06, and so a second step in engineering differential tuition was postponed. Thankfully, the voters approved a referendum to relax prior constraints on state tax spending, and an increase in funding for higher education has been received for FY07. As a result, the campus has asked the schools and colleges to make new budget requests for the first time in five years. In preparation, the College has put in place *Investment in CU-Engineering (I-CUE)*, to reallocate college funds and raise private funds as matching for new educational, research and outreach initiatives that will be proposed to campus.

The private fundraising goal has proven too ambitious for the past three years, but an increase in funds received in FY05 and FY06 and the recent hiring of new staff are encouraging. In FY07, opportunities and fundraising will continue to be investigated for one or two major expansion projects, including a new biotechnology building shared by faculty from our college and faculty from the biosciences. Also, considerable effort will be made in laying the groundwork for a much-needed capital campaign.