

Semi-Annual Report on Progress and Recommendations from the 10/8/04 Engineering Advisory Council Meeting

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Introduction

This report summarizes actions taken and plans made over the past six months by the College of Engineering and Applied Science at the University of Colorado at Boulder, in response to recommendations made by the Engineering Advisory Council at its previous meeting on 10/8/04. Other noteworthy items and college highlights from the past six months are also included.

Earn-Learn Challenge

The Earn-Learn Challenge issued in Fall 2004 exceeded its goal: \$234,597 was donated or pledged by EAC/RDC members and college faculty/staff, including the challenge gifts by the Andersons, Sissels, Bennetts and Davises. These donations, together with college and departmental matching funds, have allowed the Earn-Learn Program to support 70 students in Spring 2005 (up from 28 students in Fall 2004 and 15 students in Spring 2004), and they will continue to support the program for the next few years while an endowment is being built.

Development Update

John Mabley has been hired as the new Director of Development for the College of Engineering and Applied Science, and he will start at the beginning of May 2005. John has about 25 years of experience in development and advancement of higher education and other nonprofits in Canada, and is currently at Florida State University completing a PhD in Higher Education Policy. In one other personnel change, Nancy Ollanik has stepped down after more than six years as accounts and office manager. Emily Muller has recently joined the engineering development team as Nancy's replacement.

Progress is being made on the goal of increasing the number of endowed chairs and professorships in the college, with several new endowed positions established this year. Nominations for these faculty positions have been solicited, and selections will be made later this semester.

State Legislature and Higher Education

A bipartisan agreement between the governor and legislative leaders was made earlier this month to provide a temporary fix to the spending limitations of TABOR (taxpayers' bill of rights), which have led to declining state appropriations for higher education in Colorado in recent years. If passed by the voters, this bill will allow the state to spend revenues over the TABOR limit in the next five years, as opposed to providing tax

refunds, in return for a reduction in the state income tax (from 4.63% to 4.5%) after five years.

State & Federal Support Breakout Group

The original recommendations are given in *italics*, followed by a list of progress made on actions and plans for each item.

The Dean and faculty should focus on federal support, including travel to Washington, DC and large, interdisciplinary proposals and initiatives.

- 9 faculty members have received support from a new college program to travel to federal funding agencies, mainly in the Washington, DC area. The agencies visited include NSF (6 visits), DARPA (4 visits), ARO (2), AFOSR (1), and ONR (1).
- Associate Dean Stein Sture's recent trips to Capitol Hill, funding agencies and industry include NSF (late June, 2004); Boeing, Seattle (July, 2004); NSF, NASA (October, 2004); NASA/MSFC (November, 2004); ARO, US Army/ERDC (December, 2004); NASA/KSC (January, 2005); NSF, Capitol Hill (March, 2005).
- Dean Rob Davis' recent visits related to federal and corporate support include Bechtel, HP, and ChevronTexaco (California, July 2004); TiVo and Agilent (California, August 2004); Merck (New Jersey, November 2004); Amgen and Baxter (California, December 2004); Northrop Grumman, Broadcom and Balseals Engineering (California, January 2005); IBM and GE (New York, January 2005); Lockheed-Martin (Maryland, March 2005); NSF and DARPA (Virginia, March 2005); offices of Allard, Beauprez and Udall (Washington, DC, March 2005); and Cooligy (California, March 2005).
- During the first nine months of FY05 (starting 7/1/04), college faculty submitted 36 large, interdisciplinary proposals of over \$1 million each, and totaling \$123 million, to federal agencies. Many of these proposals are for new centers or initiatives and involve faculty from multiple departments and industry partners. Another 61 proposals for amounts of \$0.5-1.0 million were submitted during this same period.

CU leadership should head efforts to increase state support, and EAC members should be kept informed.

- President Betsy Hoffman has been a strong, visible leader in gaining support for state funding and tuition flexibility, with additional advocacy provided by the Chancellor, Provost, Senior Vice Chancellor, Treasurer, and CU's Office of State and Federal Government Relations.
- The Dean forwarded to EAC members President Hoffman's 3/17/05 email announcing the bipartisan agreement on the state's budget crisis.

College should communicate cooperative research and center opportunities to corporate members.

- The most recent *CU Engineering Corporate Partner* newsletter, which highlighted the Aerospace Engineering Sciences Department, included the interdisciplinary research centers related to aerospace.

- The *CUEngineering Profile* contains descriptions and contact information on all of the college research centers, and updated information will be distributed at the next EAC meeting.
- This issue may be taken up at future EAC meetings by the proposed Research and Corporate/Federal Relations subcommittee.

Link between corporate workforce needs and top-caliber talent from higher education should be emphasized.

- See legislative briefings below. We also have contacted the Office of State and Federal Government Relations to discuss having our corporate partners send a letter emphasizing the importance of this link.

Consider a legislative briefing on College and include student presentations in the briefing.

- We are working with the Provost and Vice Chancellor for Research on offering CU-Boulder legislative breakfasts, including topics such as biotechnology, renewable energy, water resources, and Engineers Without Borders, which will involve college faculty and students; the first one is scheduled for 7 April 2005.

Undergraduate Outreach and Recruiting Breakout Group

The original recommendations are given in *italics*, followed by a list of progress made on actions and plans for each item. Below that, a more detailed list of accomplishments, progress and plans is provided on outreach, recruiting and education.

Develop PR strategy to market programs and include a catalog of successful alumni.

In addition to ongoing PR efforts (*CUEngineering* magazine, *Corporate Partner* newsletter, *Alumni Focus* newsletter, *Colorado Engineer Magazine*), which profile successful alumni, we initiated this year reputational fliers on our undergraduate and graduate programs and sent them to deans and others who rank colleges. We also continue to update our web site, especially for prospective students, and are planning to add this summer a catalog of successful alumni to this web site.

Improve the environment by increasing faculty diversity, including minority students in publications and outreach, and moving the DEAA photo wall.

Our 12 new faculty hires this past year include five women and three minorities (two Asian, one Hispanic), and 74% of the student photos in this year's publications (listed above) includes women and/or minorities. The DEAA wall has not yet been moved, as we are still considering alternative locations where it can be shown to awardees, their families, and other visitors.

Provide prospective-student contacts monthly to EAC/RDC members for calling.

Twelve EAC/RDC members are helping this year with calls to prospective students, up from four last year. Current students, faculty and staff have also increased contacts with prospective students, with preliminary data showing that projected enrollments of new freshmen in engineering is down only 4% from this time last year, compared to 12% for the rest of campus.

Benchmark best-in-class universities.

Benchmarking against best-in-class universities is being used as we develop new and improved programs (such as Fellows and Honors Programs, enrollment management, preparation for reaccreditation, and expansion of research and graduate programs).

Continue brainstorming with breakout group via email.

At the 4/22/05 EAC meeting, we will discuss the formation of subcommittees, including one on Education and Outreach, to provide a structure for ongoing interactions, brainstorming, and progress in key areas.

Additional progress/plans in education and outreach:

- The prospective-student database is now in use by all departments and programs to track and manage undergraduate recruiting efforts. This database is updated weekly from admissions data.
- In addition to surveying students who declined our offer of admission, this year we also surveyed all students who accepted admission and came to CU. These data are being used to improve recruiting methods.
- We have significantly increased contact with high school science and math teachers, and with college counselors.
- We are continuing to solicit funding for new initiatives such as the Rural Engineering K-12 Program.
- We continue to offer a large number of targeted programs and activities related to outreach and recruitment, including with schools having large minority populations.
- On 12 March 2005, we hosted the first ever “Explore CU Engineering Day” for admitted students, which was attended by more than 550 prospective engineering students and their parents.
- We have taken a more strategic approach to our merit-based scholarship awards, increasing both the award amounts and the duration of the award. Most awards are now for four years, depending upon continued academic achievement.
- Bennett, Sherman and Germain are traveling to selected cities around the country with Admissions to meet with admitted (but not confirmed) prospective students in the next few weeks. This visit is a follow-up to visits that occurred last fall.
- We are nearly done with the design of the new Honors Program, which will help us attract and retain truly outstanding students.
- We are completing the development of a strategy for dealing with fluctuating enrollments that will allow departments to better manage enrollment over time.
- We continue to seek to increase our endowments for student scholarships and support.
- We plan to work with the campus administration to create opportunities for reduced tuition for students from neighboring states. This effort has been delayed by recent budget-related events at the state level.
- We have investigated the possibility of retaining a PR firm to help reach more of our target population, but have postponed this effort due to cost constraints.
- We have submitted a proposal for engineering course fees that will help cover the equipment and consumables required to offer up-to-date courses.

- We are actively preparing for the ABET visit next fall, including a “mock visit” by a former ABET reviewer this spring.
- We are working to measure everything that we do, including the development of advising surveys, senior surveys, and alumni surveys.
- We have placed major emphasis on improving our offerings in the areas of active, discovery and professional learning, including expansion of the Earn-Learn and Discovery Learning Programs.
- At the graduate level, we have worked to promote cross-department interdisciplinary collaboration and recruiting, including a joint graduate student recruiting day, held 11 March 2005.
- We have instituted mandatory (at college expense) spoken language intelligibility testing and training for non-native speakers who serve as teaching assistants.

Technology Transfer Breakout Group

The original recommendations are given in *italics*, followed by a response under each item prepared with the assistance of the CU Technology Transfer Office. In general, tech-transfer activities continue to increase, with preliminary projections for CU showing a 15% increase this year in licenses and an 80% increase in invention disclosures.

CU's opening proposal to companies that might license intellectual property should not be offensive - consider hiring an individual with experience in such negotiations.

Initial contact of potential licensees fall into two classes: 1) cold calls to industry members and 2) follow-up calls to faculty provided leads. It is important to note that 70% of successful licensing comes from the faculty members themselves as a result of their networking in technical meetings and with former students. The intent of initial contacts is to assess the voracity of industrial interest in the technology. We use one-page summaries and follow-up contact to assess industrial response to and interest in the technology. Sensitive financial terms enter discussions during the detailed license negotiation and not in the initial sequence of contacts.

Develop an organized process for exploiting technology once it is developed and patented.

Our processes for commercialization are frequently executed prior to the completion of the patenting process. Substantial effort is made during the patent application process to complete licensing of the technology. Commercialization within the CU system includes the following: 1) licensing to existing firms, 2) licensing to start-ups, and 3) licensing to firms pursuing SBIR grants from federal agencies. Our basic licensing approach includes the licensee being liable for patent costs. If we are unable to identify a licensee for a technology as patenting decisions must be made, we must then make cost-risk decisions regarding the continued pursuit of patent protection. The least frequent commercialization efforts involve granted patents. As those cases arise, the approaches to licensing are quite similar to the approach for patent-pending technologies described previously.

CU's legal expenditures are low (\$0.2 million) compared to peers (\$1.1 million) - use top firms".

Through an RFP process, the TTO has a continually evolving approved list of intellectual property firms. The firms are not restricted by geography or firm size. We strive to match the IP firm attorney/agent with our faculty inventors. As our client, the satisfaction of the faculty inventor is of primary importance to the TTO. We have strong relationships with Townsend & Townsend & Crew, Patton Boggs, Hogan and Hartson, and Sheridan Ross, to name a few national firms.

Resource Development Committee Breakout Group

The original recommendations are given in *italics*, followed by a summary of progress made on actions and plans for each item.

Make a DVD to market the Earn-Learn Program.

We decided to not make a DVD, as the development team felt personal visits to prospective donors would be most effective in the next fundraising phase to build endowments for the Earn-Learn Program.

Create a link for on-line giving.

The CU Foundation has established on-line giving at www.cufund.org/giveonline. This site is now linked to the college website (www.colorado.edu/engineering) under information for alumni and donors.

Integrate Engineering for Developing Communities with the Dean's priorities, and form a PR subcommittee for Engineering for Developing Communities.

Engineering for Developing Communities (EDC) fits well with the Dean's priorities of hands-on experiences and the integration of research, education and service. He met with EDC leadership in January 2005 to discuss the vision of EDC to become a college-wide program, fundraising needs and strategies, and the formation of an internal advisory committee to help with curriculum development and expanding EDC beyond the Civil, Environmental and Architectural Engineering Department. The Dean also recommended the formation of an external advisory committee, including several EAC/RDC members, which will assist with PR and fundraising; this committee is scheduled to have its first meeting in April 2005.

Other Noteworthy Items

Faculty Awards

Bernard Amadei of civil, environmental, and architectural engineering has been selected to receive the 2005 Norm Augustine Award from the American Association of Engineering Societies. The award recognizes "those rare individuals who can speak with passion about engineering--its promise as well as its responsibility--so that the public may have a better understanding of engineering and a better appreciation for how engineers improve our quality of life."

Dan Frangopol of civil, environmental, and architectural engineering will be awarded the 2005 Nathan M. Newmark Medal by the American Society of Civil Engineers. The

award is made each year to an ASCE member who has helped substantially to strengthen the scientific base of structural engineering through contributions in structural mechanics.

Ryan Gill of chemical and biological engineering and Scott Palo of aerospace engineering sciences received National Science Foundation CAREER awards this spring. Ryan also received a K25 Mentored Career Development Award from the National Institutes of Health, for a total of more than \$1.15 million in research support over five years.

Michael Lightner of electrical and computer engineering has been elected 2005 president-elect of the Institute of Electrical and Electronics Engineers. The IEEE is the world's largest technical professional society, with over 360,000 members in approximately 150 countries.

Chris Bowman of chemical and biological engineering has been selected to receive the U.S. Society for Biomaterials 2005 Clemson Award for his exceptional contributions to literature in the field of dental materials.

Ken Gall of mechanical engineering has been selected to receive the 2005 Bradley Stoughton Award for Young Teachers given by ASM International, the society for materials engineers and scientists. The award recognizes his ability to impart knowledge and enthusiasm to students.

George Born of aerospace engineering sciences received the NASA Group Achievement Award for his contributions to the ICESat Mission Development Team. The citation reads, "For sustained, creative, and persistent effort in preparing the NASA Science community's most ambitious orbital laser mission for flight."

Student Awards

Ashley Moore, an undergraduate double majoring in applied math and aerospace engineering sciences and President of the University of Colorado Engineering Council, has been selected to receive a prestigious Goldwater Scholarship next year. She is one of three CU-Boulder students chosen to receive the scholarship, worth \$7,500.

An undergraduate team was one of the 14 Outstanding Winners of the 2005 Mathematical Contest in Modeling, which is sponsored by the Consortium for Mathematics and its Applications. The team, comprised of CU students Brian Camley, Brad Klingenberg and Pascal Getreuer, developed and analyzed a model to determine the optimum number of tollbooths at a toll plaza. The team also was named an Outstanding Winner in last year's contest.

Computer science students Thomas Strohmman, Eric Faller, and Dominik Scheder were successful in solving all eight problems in the regional ACM programming competition last fall, coming in fourth in the entire Rocky Mountain region. A portion of the competition was held at CU-Boulder.

Three undergraduate students were recognized with awards at the college's Discovery Learning Research Symposium on Dec. 3. Awards were given based on the quality of the students' presentations and poster boards, which displayed the results of the research they conducted this fall as discovery learning apprentices. Winners are:

- Andy Lin, computer science - \$300 award (1st place)
- Edwin Eng, electrical engineering - \$150 award (2nd place)
- Luke Hollenkamp, mechanical engineering - \$75 award (3rd place)

Jeffery Parker, a PhD candidate in aerospace engineering, was co-author of a paper that won the Best Paper Award for the 2004 AIAA/AAS Astrodynamics Specialists Conference. The paper, titled "Unstable resonance orbits near Earth and their application in planetary missions," was ranked best out of 115 papers.

Todd Francis, a graduate student in chemical and biological engineering, received First Place at the AIChE's Particle Technology Forum Poster Session for his poster on "Dispersion of Solids Using Spinning Wheel Feeders." The \$300 award is given on the basis of fundamental understanding, poster presentation, author presentation, and contribution to particle technology. Co-authors included Chris Gump, Brian Stephens-Hotopp, and Al Weimer.

Distinguished Engineering Alumni Awards

The Engineering Advisory Council's DEAA Selection Committee has selected the following individuals to receive the 2005 Distinguished Engineering Alumni Award:

- James D. Abrams (CivEngr'49) - Private Practice
- Peter J. Balsells (MechEngr'52) - Industry & Commerce
- Linda A. Capuano (ChemEngr'76, MS Chem'77) - Industry & Commerce
- Michael S. Francis (AeroEngr'69, MS'70, PhD'76) - Government Service
- David Haussler (PhD CompSci'82) - Research & Invention
- Eugene Myers (PhD CompSci'81) - Research & Invention
- Jill S. Tietjen (EAC/RDC member) - Special

College Rankings

U.S. News & World Report released its annual graduate school rankings on April 1. The College of Engineering and Applied Science was ranked 33rd among the top engineering schools in the nation. Specialty programs rankings include: Aerospace (13), Chemical (19), Civil (20), Electrical Engineering (29), Computer Engineering (35), and Mechanical Engineering (41). The magazine did not rank computer science programs this year.

Publications and Outreach

The communications team developed seven graduate program informational fliers, which were mailed to deans, associate deans, and department chairs across the country last fall, preceding the annual *U.S. News & World Report* survey of graduate programs. The communications team also developed a new undergraduate program flier this spring, which was mailed to deans and associate deans across the country in advance of the undergraduate survey.

Kristin Germain organized a new visitation program this spring for prospective students who have been admitted to the college. "Explore CU Engineering Day" was held on March 12 – the same day as WIEP's Engineering Career Day for Women – and drew more than 550 students and parents. Admitted students were invited to tour the college and attend overview sessions on the departments and majors, financial aid and scholarship opportunities. A society fair also was held with representatives of the student societies available to answer questions.

About 200 high school students and their math/science teachers participated in the CU MESA Fall Fling Nov. 18-19 on the Boulder campus. Sponsored by MEP and Colorado MESA, this two-day event brought students and teachers from 21 high schools to campus to learn about engineering through two fun, team-based engineering competitions.

Looking to defend its 2002 title, the University of Colorado's Solar Decathlon team is developing a new building system from curbside wastepaper and soy for the U.S. Department of Energy's second solar home competition, Oct. 7-16, 2005. CU is one of 18 university teams competing in the international competition to design, build and operate a solar-powered home on the National Mall in Washington, D.C. About 30 undergraduate and graduate architecture and engineering students are collaborating on the project with professors Julee Herdt of architecture and Michael Brandemuehl of engineering serving as advisers.

The *TeachEngineering* digital library collection, which is part of the National Science Digital Library initiative of the National Science Foundation, was launched in January. Located at TeachEngineering.com, the digital library is a searchable collection of standards-based K-12 engineering curricula that use engineering as a vehicle for the integration of math and science. ITL co-director Jackie Sullivan led the multi-institution development of the *TeachEngineering* collection.

Wrap-up and Future Items

Recommendations made at the end of the 10/8/04 EAC meeting are given below in *italics*, followed by the response for each recommendation.

Provide feedback on prior recommendations, with a list of recommendations made and a list of actions taken and results achieved.

This report provides the requested feedback, with highlights and additional discussion to be provided at the next EAC meeting.

If time allows, include tours of facilities/programs on the agenda.

The 4/22/05 EAC meeting agenda includes a 30-minute slot for tours.

Continue with presentations by students and faculty.

The 4/22/05 EAC meeting agenda includes faculty and student presentations.

Continue with breakout groups.

The 4/22/05 EAC meeting agenda has breakout groups, and the Dean will discuss his vision to provide continuity for these breakout groups by forming subcommittees.

Leave time for discussion.

The Dean has asked presenters to use fewer slides and leave more time for discussion.