

**Semi-annual Report: Progress on Recommendations
From the 10/19/07 Engineering Advisory Council Meeting
Robert H. Davis, Dean, 4/10/08**

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

This report summarizes progress and plans made on recommendations from the 19 October 2007 meeting of the Engineering Advisory Council of the University of Colorado at Boulder. This report, as well as prior reports and summaries of past meetings, may be found at: http://engineering.colorado.edu/overview/advisory_boards.htm.

1. College Updates

The College of Engineering and Applied Science continues to do well in many respects. Freshman applications for Fall 2008 admission are up 16% over Fall 2007, which in turn was up 22% from the year before. It is too early to have data on acceptances, but the targeted class size is slightly smaller but of higher quality than last year's record 730 first-year students entering in Fall 2007. Private fundraising has already met its \$5 million goal for FY08, with three months to go. Key faculty honors in 2008 include the election of Bernard Amadei to the National Academy of Engineering for his founding of Engineers Without Borders and the awarding of the Gordon Prize by the National Academy of Engineering to Larry Carlson and Jackie Sullivan for their founding and leadership roles of the Integrated Teaching and Learning Program. Dr. Sullivan was also appointed to the new position of Associate Dean for Student Cultivation for our college.

Specific recommendations made at the 10/19/07 meeting are given below in *italics*, followed by progress and plans to-date:

Check if there is a correlation between ACT/SAT math scores and the diagnostic test of preparation of calculus – Although some information has been gathered, one more summer's worth of data (2008) will be incorporated to have a fuller set of data, with analysis to follow.

College K-12 outreach should include an emphasis on improving quality of math education – The following actions have been taken:

- 1) We worked with our partner schools in Lafayette, CO to enhance their math instruction through several methods. Pushing school-wide math instruction and student learning change is a very difficult process, and we are pleased to report significant progress:
 - We did a thorough analysis of the math level that every student enrolled in the Pre-engineering Academy is concurrently, and was previously, enrolled in. This analysis was a lot of work, and yielded results that demonstrate that math expectations were too low.
 - We also analyzed first-year CU mathematics grades for all Centaurus students enrolled in our engineering college as another measure of high-school preparedness in math. We then met with all math teachers at Centaurus High, along with Anne Dougherty from Applied Mathematics at CU, to help the math teachers understand the level of math skills and knowledge necessary for success in college engineering.

Again, it was an eye-opening encounter; the teachers seemed genuinely surprised at how poorly their students performed in college-level math.

- We took the Principal and several members of the Centaurus math faculty to meet with math faculty at the Denver School of Science and Technology, a minority-serving school that achieves high math performance. The DSST teachers challenged the Centaurus teachers regarding their low expectations and results.

- Consequently, every 9th grader enrolled this year in the Pre-engineering Academy at Centaurus (~76 students) must also be enrolled in Algebra I. This requirement is a giant leap. To support the most under-prepared students, Centaurus piloted a side-by-side *Math Workshop* to double math instruction. We are supportive of this pilot and its lead teacher, and have very recently partnered with him to seek external funds to support broader implementation of *Math Workshop*.

- Breakthrough! Looking forward, Centaurus High proposes to eliminate pre-algebra instruction and enroll every 9th-grade student in a rigorous Algebra I course, along with a companion math skill-building class for those that are underprepared coming out of middle school. Ensuring that all 9th graders take *at least* Algebra I pushes and encourages all students to tackle higher-level mathematics throughout their high-school academic experiences — bolstered, of course, by increasing their confidence in 9th-grade algebra.

- 2) *TeachEngineering* Digital Library — Of the 676 hands-on K-12 engineering lessons and activities published in the standards-based library, 70% have been created by CU. Many of these units have math learning outcomes, and by mid 2008 all curriculum in *TeachEngineering* will be dynamically aligned to the math standards for all 50 states — the first collection in the nation to do so (this tool is in advanced testing as of March 2008).
- 3) TEAMS – We have stressed inclusion of mathematics even more in our TEAMS initiative, which integrates engineering into science classes for about 1600 students weekly in six Lafayette schools. Measurement, modeling and analysis are cornerstones of our design-based K-12 engineering curriculum.
- 4) In our DSST partnership, there is no need for math intervention from CU, as success through at least pre-calculus is a requirement for high-school graduation — and every student in the school scored above 500 on the math portion of the SAT this year, with 94% scoring above 600. We are grateful that DSST is willing to work with our other K-12 engineering partners to serve as role models to inspire them to improve their math instruction.

The proposed partnership with Mesa State College raised concerns: It should be pursued only if it is of equivalent quality to the CU-Boulder program, includes research opportunities, and has a sufficient pipeline of qualified students – research best practices on making an extension program successful. – A Memorandum of Understanding to initiate this partnership was signed in February 2008. To qualify, students must meet admissions requirements of Mesa State College as well as CU Engineering. A guaranteed transfer agreement was updated, with an increase in the minimum grade-point-average. Our college has committed funds for discovery learning apprenticeships and for seed grants to promote cooperative research and opportunities for student participation in the research. A conversation with the Accreditation Board for Engineering and Technology (ABET) has been initiated on best practices and accreditation

procedures for such partnerships, and other schools (Georgia Tech, Washington State) with extension programs have been consulted.

Spinout startup companies from college research – The Associate Dean for Research, the Chair of Electrical and Computer Engineering, and other faculty have been actively involved in the campus entrepreneurship summits that have occurred over the last six months. These summits are designed to identify the barriers to spinning out companies and to improve the climate and rewards system at the University of Colorado for these activities. Further, the Technology Transfer Office has used a startup company formed from the College as a model of collaboration between the University and the Boulder innovation Center. The College has also established a graduate entrepreneurship certificate program to facilitate training of graduate students in this area.

Investigate how many of our NSF grants include corporate partners – We now have access to the grants database and have compiled a list of NSF grant holders. Prior to the EAC meeting, we will evaluate which of those grants have corporate partners.

Tie college research to the Colorado initiatives of Governor Ritter – Governor Ritter has listed aerospace, biotechnology, energy and tourism as four primary areas for economic development in Colorado. Our college is taking lead roles in new campus initiatives in aerospace (Space Systems Science and Engineering Initiative), biotechnology (Colorado Initiative in Molecular Biotechnology), and energy (Colorado Center for Biorefining and Biofuels – C2B2, Center for Research and Education in Wind – CREW) and related building projects (Systems Biotechnology Building, Aerospace and Energy Systems Building). Don Elliman, the Governor’s Director of Economic Development, is scheduled to speak at the 4/25/08 meeting of the Engineering Advisory Council.

2. Biotechnology Initiative and Building

The systems Biotechnology Building is expected to enter the architectural design phase in Summer 2008, pending state approval. Approximately \$25 million in private gifts have been committed for the building. A Geosciences Building has also been proposed for the east campus, further indicating a move by CU-Boulder to expand science and engineering efforts on the east campus. Below are responses to recommendations made at the 10/19/07 EAC meeting.

Vern Norviel asked each EAC member to give Art Dawson the name of at least one potential donor for the biotechnology building – In response, only six names were received. Vern offered to follow up with EAC members for additional names, and has been provided with the EAC email list.

Amy Palmer is an outstanding ambassador and should meet with selected donor prospects – Amy has since met with one donor prospect and was very well received. While most of the faculty participation with biotech prospects has relied on Tom Cech and Leslie Leinwand to-date, Amy Palmer and other faculty will be included in future cultivation events.

Interdisciplinary mentors and input on tenure and promotion reviews should be provided for junior faculty in the biotechnology initiative – Rob Davis spoke with Leslie Leinwand (Faculty Director for the Biotechnology Initiative). Currently, Leslie provides informal mentoring for the junior faculty. Rob will work with Leslie and also Todd Gleeson (Dean

of the College of Arts and Sciences) this summer to formalize an interdisciplinary mentoring program and process for input on promotion and tenure reviews.

3. Honors Program

Progress on recommendations made 10/19/07 regarding the Honors Program is provided below:

Offers of admission to the Honors Program should be made well before students' decisions are due – Due to the March 8th date for “Explore CU Engineering/Admitted Students Day,” the deadline for applications to the Engineering Honors Program was the following Wednesday, March 12th. The application committee made its initial recommendations on April 4th and letters of invitation went out on Tuesday, April 8th. On April 24th (after communicating with those we have invited about their intentions), we will notify each applicant of his or her status: a new invitee, wait-list, or non-acceptance. By May 2nd, we should know the intentions of all invitees and will start making offers to those on the waitlist. Every applicant has been informed of the admissions process and the relevant dates.

Invite prospective honors students to campus – During the March 8th “Explore CU Engineering/Admitted Students Day,” Scot Douglass made presentations regarding the Engineering Honors Program in each of the three morning sessions to a total of 97 students and their families. There has been no additional programmatic initiative to invite prospective honors students to campus this application cycle, although Scot Douglass has met individually with 11 visiting students, collectively with the Boettcher finalists and, as already mentioned, in large groups on Admitted Students Day. Once Andrews Hall renovations are completed, which will include a Residential Academic Program for engineering honors students, it will be easier to invite prospective honors students to campus.

4. Subcommittees

4.1 Education and Outreach Committee (EOC)

Progress on recommendations made 10/19/07 by the EAC Education and Outreach Committee include:

Invite EAC members to speak at the MEP Leadership Class – Invitations were not made this Spring, due to a change in MEP leadership (Dave Aragon took a campus-wide position, and Anthea Johnson Rooen is temporarily on her own as MEP Co-director).

Online math assessment while prospective students are still in high school is needed – Janet Yowell of our Integrated Teaching and Learning Program led Centaurus High School students through the College's online calculus assessment pre-test in Spring 2007, and is doing so again this Spring. This year's cohort seemed to place well in the appropriate levels of calculus courses. Malinda Schaefer Zarske, also of the ITL Program, may do this assessment for Denver School of Science and Technology seniors this Spring (although DSST in addition may have its own assessment vehicle). All incoming students are instructed that the College's online calculus assessment pre-test is mandatory; they are instructed in June to take this test so they can register the appropriate math course when they do online registration in July. This timing also coincides with when they are notified of any AP or IB exam for calculus received.

CU Engineering should continue to teach engineering electives at DSST (consider using graduate students, or professionals who live/work closer to the school) – We resumed

teaching engineering electives at DSST in Spring 2008, with two courses (one taught by a graduate student and the other team-taught by a staff member and a graduate student).

Brian Argrow should plan the MEP/WIEP student event with EAC members for next spring, with help from Jean Becker and Dan Hernandez – This event is scheduled for 4:15-5:45 p.m. on 4/25/08, right after the EAC meeting.

Pilot the Redshirt Program with the ME department, if necessary approvals and resources obtained – Our plan is to pilot the program in Fall 2009, and resources are being sought from campus and private sources (one gift has already been made).

4.2 Resource Development Committee (RDC)

Jessica Wright Bowen joined the CU Foundation as Senior Director of Engineering Development shortly after the prior EAC meeting in October 2007. Under her leadership, the engineering development team has already exceeded its \$5 million goal for FY08, including a couple large gifts or pledges for undergraduate scholarships. I-CUE (Investment in CU-Engineering) is nearing its goal of \$1.5 million by 6/30/08, and a report will be provided at the 4/25/08 RDC meeting. Below are responses to specific recommendations made at the 10/19/07 RDC meeting:

Development liaisons should work with RDC members to secure additional commitments for I-CUE – Several RDC members responded, and Lanny Pinchuk's efforts were very successful, securing \$4,000 in additional contributions (and a \$5,000 additional endowment contribution spurred by the letter). Additional letters are being sent by Nan Joesten and Gary Anderson this Spring. A few other RDC members have offered to connect with one or two prospects whom they believe would be interested.

The number and amount required for endowed chairs should be benchmarked for peer schools – The engineering development team is collecting this information and will report the results at the 4/25/08 RDC meeting.

A more coordinated focus is needed on underrepresented minority students, as progress has been lacking – A new Associate Dean for Student Cultivation position was created effective 2/1/08 to focus college-wide resources and attention on our diversity and retention challenges. Jackie Sullivan was appointed to this position. Resources were successfully obtained from the campus to cost-share this position. Initial outputs include creation of detailed operations budgets and forecasts for the MEP and WIEP programs to support better decision making, a thorough historical analysis and forecast of scholarships for women students college-wide, a more focused March/April calling campaign for under-represented admitted students, a concerted look at students not admitted to the College to see if we are turning under-represented students away who would have historically been admitted (and succeeded), and submittal of four facilities and tutoring proposals (expected to yield \$41K in new funding by mid-April). The Dean also agreed to about 120 additional scholarship awards to prospective students from underrepresented groups, even though not all of the funds for these four-year awards are in hand.

Focus on a few initiatives where we can be the best – the interdisciplinary biotechnology initiative is emerging as a model – The current strategic-planning process is aimed, in part, at identifying key initiatives with this objective in mind. Materials science &

engineering, space systems, and energy/sustainability are among the areas considered, in addition to the biotechnology initiative.

Do more connecting of students and alumni to the College through enhanced alumni relations and events – Several new initiatives were established over the past year. Regional events and corporate clubs are focused on a proactive approach to bringing CU to alumni rather than simply encouraging alumni to visit Boulder. The efforts gather alumni in areas of the country and/or at companies with dense CU populations in order to engage individuals and reconnect them to CU. Events have been held in Houston, Washington, D.C., Los Angeles, and San Francisco. Corporate events have been held at CH2MHill in Littleton, CO, and Northrop Grumman in Redondo Beach, CA. In addition, our student outreach brings students together for an evening of alumni outreach with the goals of (1) thanking donors for gifts to the College, (2) offering students an opportunity to network with alumni and share current CU Engineering experiences, and (3) providing alumni with the opportunity to engage in the current campus culture. The first thank-a-thon was held in Spring 2007, and planning is underway for another thank-a-thon this Spring. Finally, an electronic newsletter aimed at alumni will launch in Spring 2008. These initiatives have been made possible by the addition of a Director of Alumni Relations, Carrie Goldin, for the College.

4.3 Research and Corporate/Government Relations Committee (RCRC)

Listed below are the committee's recommendations (in *italics*) from the 10/19/07 meeting, along with progress and plans made to date.

A set of guidelines for corporate relations with CU should be written – The Associate Dean for Research, Chris Bowman, has attended the recent National Research Council meeting to ascertain how other universities and engineering colleges foster relationships between academia and industry. Further, the Technology Transfer Office has agreed to draft (and has completed the first draft) an Intellectual Property and Interacting with CU FAQ document. This document will be further vetted at the 4/25/08 EAC meeting.

College faculty should be engaged in study boards, program leadership, and proposals – While many college faculty are already active in these areas, additional involvement is being encouraged by the Dean via (i) the New Faculty Program, (ii) service criteria for reappointment, promotion and tenure, and (iii) placing a greater emphasis on external professional service in annual evaluations.

An action plan will be needed to implement the strategic plan – At the campus level, there are nine subcommittees currently working on implementation plans for the Flagship 2030 Strategic Plan. At the college level, the Engineering 2020 Strategic Plan will include action items for implementation.

In each of the key areas, an assessment of our and competitors' strengths is needed, to identify opportunities for us to build excellence – Those assessments will be part of the SWOT (strengths, weaknesses, opportunities, threats) analysis in our strategic plan.

5. Concluding Business

Final recommendations from the 10/19/07 EAC meeting and suggested agenda items for the 4/25/08 EAC meeting are provided below:

Focus on strategic planning and response of the College to the campus Flagship 2030 plan – College faculty and staff have been very active in strategic planning over the past few months, and a report and discussion will be part of the upcoming EAC meeting.

RDC should include biotechnology, I-CUE, and the capital campaign – All of these items will be on the 4/25/08 RDC agenda.

RCRC should include Washington, DC efforts, research initiatives, and an update on the proposed Engineering Research Centers – All of these items will be on the 4/25/08 RCRC agenda.

EOC should include DSST progress and the program with Mesa State – These items will be on the 4/25/08 EOC agenda.

An event with MEP/WIEP students should be held late Thursday afternoon on 4/24/08 – The event has been set for late Friday afternoon on 4/25/08 instead, to better accommodate most people's schedules.