

To: All Faculty  
From: J. Andrade, co-Chair  
Subject: December 16, 1999      Discussion on  
**Department Future, Directions, and Strategic Planning**

The following summary and perspective of our recent meeting may be helpful in preparing for ongoing discussions. Please let me know if you feel your input was not faithfully recorded!

Wishing you all a very successful, productive, and rewarding new year...

The meeting began with the recognition that there was considerable faculty interest in developing a strategic plan for the department, that the initial Graduate Council review input has suggested that the department needs such a plan, that the College of Engineering has requested a strategic plan from each department, and that the faculty retreat of last June began a set of discussions on the long-range future of the Department.

Andrade noted that the objectives of this meeting are to produce direction for faculty hiring and for space planning, particularly in the post Whitaker years. This is particularly important in approaching possible philanthropists and major foundations regarding targeted support of departmental activities and in developing new funding thrusts and directions in response to new and emerging government and industrial interests. It is also important in the recruitment of quality graduate students in an increasingly competitive environment.

Joe also noted that a ground rule of the discussion is that everyone has input. The discussions began with an initial statement from each member of the faculty followed by an extensive discussion.

Rick Rabbit began the discussion by suggesting that each and every member of the faculty must strive for excellence, and that we must develop an environment which fosters and enhances personal excellence; he also raised the question of the need for critical mass in key areas. He noted that the undergraduate program is not a problem; the teaching and administrative needs of the undergraduate program can be effectively met by appropriate involvement of research faculty and by the effective use of graduate TAs. He suggested that all regular faculty buy back a portion of their time to provide resources to enable research faculty to participate in teaching activities.

Rob MacLeod suggested that an area or thrust could be in computation and simulation as applied to Bioengineering problems, and that we should foster interaction with other strong programs on campus.

Dick Norman referred to individual pinnacles of excellence and the need for graduate student support.

Russell Stewart noted the extreme competition that now exists from many other programs, not only from Whitaker support but from very major private philanthropic support. He cited the new institutes at Stanford, Berkeley, UCLA, and USC as examples. He argued that perhaps rather than thinking about growth that we should think about becoming more focused and even smaller -- not simply engaging in a "...mindless pursuit of quantity."

Vlado Hlady asked the question of what have we lost since the last major strategic planning discussion in 1991. He noted that research faculty have largely disappeared from the department and suggested that our clinical connections have decreased. He questioned the lack of involvement with the Department of Biology. He asked about technical support people and resources for them as well as for appropriate TA support. He noted that as we approach growth we should broaden our base to include research and adjunct faculty and to strengthen our interactions with appropriate components on campus.

Doug Christensen noted that when we were a smaller department we needed the research faculty more and therefore they were more involved at that time.

Ken Horch pointed out that the present university administration has provided a somewhat "chilling environment" for research faculty in terms of space allocation and related resource issues. He also noted that the School of Medicine has emphasized clinical duties and income in recent years and that has had a significant impact on funding and support levels for research faculty. He noted particularly the areas of orthopedics and radiology.

Rob MacLeod noted that that the Department of Bioengineering can enhance research involvement and research opportunities via appropriate collaboration with the clinical community.

Doug Christensen noted the loss of Bruno Frazier and the need to consider micro-machining as well as overall bioinstrumentation as areas of faculty need.

Ken Horch and Rob MacLeod commented on the possible new School of Computing and the growth of computer science in the area of scientific computation and visualization.

Henry Kopecek noted, now that the undergraduate program is in place and operational, the leadership of the department must reinforce its commitment to our continued excellence as a research intensive department. He said that we should compare and contrast ourselves with other competitive departments nationally, particularly in terms of our coursework requirements for students. He noted that good students learn on their own and that if our students are of a high enough caliber they do not need the extensive numbers of courses which we require. He also noted the importance to have students together so that they can

interact and reinforce each other. He emphasized the advantages of large synergistic groups containing postdocs and other resources to assist student development and research. He noted that research faculty should be a part of all research groups.

Greg Clark asked about the possible narrowness of our curriculum. He noted that there may be a tension between individual faculty needs and student needs. He also emphasized students learn by example.

Susan Bock brought up the issue of critical mass -- that in hiring decisions we may want to consider individuals who can help to bring areas and groups together to achieve critical mass which may not now be present.

Russell Stewart, in response to some discussion related to the current administrative and state environment, noted that perhaps we should not be like everyone else -- that we should develop our own unique niches which can indeed be quite different from the Bioengineering mainstream.

Vlado Hlady noted that we may have overly mainstreamed ourselves, particularly in the quest for Whitaker department development support.

Henry Kopecek noted that the major change in our operating environment in the last several years is the large increase in research support now available nationally; although the NIH budget has increased dramatically that has not been reflected in the NIH research support in the College of Medicine or in the College of Engineering.

Patrick Tresco noted the importance of developing a process for strategic planning and the means to attempt to predict evolving and developing areas. Patrick also noted that the research faculty taught about half of the courses in 1991 whereas today nearly all of our courses are taught by regular FTE faculty.

There was also a reference to the Whitaker WebSite where a recent meeting related to development and leadership awards is summarized and that a large number of our peer departments presented their plans and directions at that meeting.

In response to the interest in strategic planning and in obtaining a good factual basis for that exercise, Joe Andrade appointed a **subcommittee, chaired by Tresco and including Norman and Hlady, to put together a brief report of the facts and information needed to help develop the department strategic plan.**

There was also some discussion of the “biologization” of engineering. The question was raised that if indeed many traditional engineering departments began to incorporate a significant biological component into their programs, then

what is the specific role and future of the Dept. of Bioengineering? After some discussion it was noted that we have historically been a bio**Medical** engineering department and it is indeed the medical/clinical emphasis which will provide our uniqueness. It was also noted, however, that we will have an opportunity and a responsibility to provide our engineering colleagues with appropriate biological perspectives.

Ken Horch noted that the department indeed needs a mission statement and a five-year strategic plan to meet Dean Stringfellow's recent request for materials with which to develop the College of Engineering plan.

Vlado Hlady noted that computing/simulation and a medical/clinical emphasis could serve as "new" directions or identified areas for the Department.

Ken Horch noted that the new Health Sciences Senior VP is very interested in enhancing research activities and opportunities while maintaining the clinical emphasis, providing unique opportunities for Bioengineering. He also noted that our education activities should reflect the clinical/biomedical engineering emphasis, including undergraduate activities.

Rob MacLeod emphasized the need for collaborative outreach to other departments and programs.

**Rob MacLeod and Rick Rabbit were appointed to join Joe Andrade and Ken Horch in drafting a mission statement for the department, to be discussed at the next several faculty meetings.**

Joe Andrade summarized that some of the new thrust areas and directions for the department could include:

strong clinical emphasis;  
simulation and computation;  
bio-based engineering (the original Whitaker Award focus);  
interactive biomaterials (this is the major theme and thrust of the proposal recently submitted to the Whitaker Foundation, V. Hlady, P.I., for the conclusion of our department development award).

**Other conclusions and action items:**

**reinvolve research and adjunct faculty;  
develop interactions and collaborations with other appropriate programs and activities, including the biomathematics initiatives and the scientific computing and visualization activities.**

**3. work with the Dean and other chairs in the College of Engineering to facilitate the biologization of appropriate areas of engineering.**

**4. enhance collaboration with clinical medicine and basic science**

**departments in the College of Medicine.  
enhance interaction and collaboration with other outstanding research  
departments and programs, including computer science, pharmaceuticals,  
and mathematics.**

## **Dept. of Bioengineering Annual Faculty Retreat**

June 9, 2000, 8:30 am - 3:30 pm

Alumni House

### ATTENDANCE:

Executive faculty: Dick Norman, Greg Clark, Rob MacLeod,, Henry Kopecek, Sri Nagarajan, Doug Christensen, Rick Rabbitt, Vlado Hlady, Pat Tresco, Ken Horch, Joe Andrade, Susan Bock, Russell Stewart, Jeff Weiss

Adjunct faculty: Tom Cheatham, Jim Herron, Rick Van Wagenen, Ed Maynard, Jarmilla Janatova, Greg Burns, George Pantalos, Natalya Rapaport, Ken Webb

Staff: Linda Twitchell, Sharon Croxford, Marilyn Gorder

SAC Reps: Byron Wright, Arun Badi

### AWARDS -JDA

JDA announced that Roy Bloeboem and Dennis Parker have been appointed to endowed chairs. Dennis Parker also received the Distinguished Research Award. George Pantalos will leave next month for a faculty position in Kentucky. He was thanked for his outstanding teaching and other services to the Department. Congratulations to all!

### REVIEW OF THE PAST 12 MONTHS -JDA

#### **Major events during the past year were:**

the initiation of the Undergraduate Program;  
the recruitment of SN and JW;  
the fifth year Whitaker Biointeractive Materials award (EBIOMAT);  
the Graduate Council Review, which examined the progress of the department over the past 10 years and its plans for the future;  
the Graduate Fellowship program to promote recruitment of first-year students;  
an NSF grant to support the development of a dual BS/MS degree Program;  
additional research and administrative space in MEB;  
remodeling of a new Kolff exhibition and conference Room in MEB;  
remodeling of the teaching lab, expanded to accommodate the UG program;  
FTE levels of several faculty members were increased.

In the realm of strategic and long term planning, during the year the faculty discussed plans for a Whitaker Leadership application, the possibility of establishing a School of Biomedical Engineering, and obtaining space in a new building. The role and needs of adjunct research and clinical faculty in the future of the Department were also considered.

The **budget** for the next FY addressed some salary equity issues, although the departmental budget is still inadequate. A 10% "**good citizen buyback**" on the 450-500K budgeted for 9 FTEs in the department would help provide teaching faculty and staff support. Voluntary participation in such a program was requested.

### CHAIR SEARCH PROCESS -JDA

JDA reported that Dean Stringfellow expects to appoint a **new Chair** by August.

## EDUCATION AND CURRICULUM

### BS/MS PROGRAM -DC and KH

NSF will fund a grant to support development of a **dual degree program** for a BS/MS in Bioengineering. This will be a highly structured program for select students who will matriculate with AP credit in math, chemistry and physics. Students will take during the first two summers. MS research projects will start in the junior year and replace the Senior Project of the regular UG program. There will be a comprehensive exam at the end of the course of study.

BS/MS program students will receive stipend support of \$1000 in year 1, \$2500 in year 2, \$4000 in year 3, and \$6000 in year 4. Initially the stipends will be provided by the NSF grant. Funds from private donors will be sought to provide stipends after NSF support ends. NSF funding will begin in September 2000. The first cohort of 8 students will enter in Fall 2001.

As of this time, the Utah dual BS/MS degree program in Bioengineering is unique in that it can be completed in 48 months (other Bioengineering BS/MS programs require 5 years). The uniqueness of the program is expected to attract highly motivated, well-qualified students and to promote national recruiting efforts. During the discussions it was suggested that BS/MS students may want or need to extend their studies into a 5th year.

Resources from the NSF BS/MS grant are expected to benefit the quality the regular UG program in several ways. For example, establishment of a "summer camp" to introduce BS/MS and regular UB pre-freshmen to concepts of Bioengineering is being considered.

### UG CURRICULUM TRACKS -DC

The UG curriculum has requirements for 15 hours of "track" elective courses. The faculty met in breakout groups to discuss and plan specific elective courses for each track. A list of electives for **each track is due at the August 4th faculty meeting**. The possibility of establishing special tracks to accommodate double majors was also discussed.

### UG RECRUITMENT

The issue of UG recruitment was considered and the need to contact high school science teachers and guidance counselors emphasized.

### GRADUATE CURRICULM PROPOSAL -RR

RR proposed a plan for revising the Graduate curriculum. The theme of his proposal was that by taking advantage of available UG course offerings, the graduate program curriculum may be tailored to better serve the diverse backgrounds and needs of individual Bioengineering graduate students.

Typically, graduate students enter our program with one of four different profiles:

biomedical engineering/ bioengineering background,  
traditional engineering (no life sciences),

physical sciences background (Chem, Physics, Math), or biosciences background (biology/medicine).

The different backgrounds of these students may be better accommodated and served **by a new curriculum:**

Required core courses would be reduced from 16 sch to 9 sch, and will include graduate Physiology core (6 sch), graduate lab (2 sch), Scientific Presentations and Seminar classes. Utilization of UG courses to remediate deficits in the backgrounds of individual students will allow grad Physiology and grad Lab core courses to be taught in a more focused and advanced manner, and will permit the number of credit hours devoted to the core to be reduced.

In addition to the above core classes, the graduate curriculum will include a group of courses covering what is considered essential knowledge for a BE degree (5000 level courses, e.g. Biophysics, Bioinstrumentation, Biomaterials, Biomechanics). Required courses in this group will be based on **individual student** backgrounds. Each student will consult with the DGS **to select his/her essential** courses, and the DGS will sign off on approved programs. Alternatively, an entry exam may be administered to **determine what essential** courses a student should take. The proposed graduate curriculum will also require several advanced topics courses (6000 level).

A comprehensive exam will cover required and other essential materials. **The relative emphasis on** competency vs. integration in this exam needs to be addressed. The possibility of again requiring students to pass the M.S. comprehensive exam before entering the Ph.D. program may be considered. This would allow the Ph.D. exam to become more focused on "advanced" topics.

The faculty discussed the proposal and considered tailoring of the graduate curriculum to the background of individual students and efficient utilization of the UG program as strong positives. However, it was also noted that students who entered the program with no background in engineering or biosciences would experience course overload under the new program.

**The faculty unanimously endorsed the proposal and asked the DGS to fully develop and present the plan at a future faculty meeting.**

#### LONG RANGE PLANS AND INITIATIVES

The faculty discussed long range plans for the department, including **growth and the questions of** whether the faculty as a whole wants to pursue

a Whitaker Leadership Award, establishment of a School of Bioengineering, and/or a new building initiative.

There was extensive discussion of the related topics of faculty growth, space, physical reunification of the faculty and development of stronger research programs.

JDA pointed out that all of above components are inter-related and progress (or lack of progress) in any one area will impact on the situation in other areas. DN noted that



growth of the faculty would help the department to deal with its increased teaching mission. KH pointed out that several departments use buy back programs to generate funds which support the hiring of non-tenure track faculty for teaching and laboratory instruction. Finally, several faculty noted that animal research and clinical connections may be compromised by relocating the entire department to the lower campus.

#### CONSORTIUM AND CENTER IDEAS

##### COMPUTATIONAL BIOLOGY AND MEDICINE -RM

RM described the Keck initiative on computation biology and medicine which includes two components: (1) patient data assembly and correlations, and (2) simulations. A building with a Keck Institute at hub is being planned. The design includes the potential to build on additional wings (for Computer Sciences and Bioengineering) if and when resources are obtained. The possibility of using Keck funding to leverage a Whitaker Leadership award was discussed.

##### MINIMAL ERROR MEDICINE -JH, TC, JA

Jim Herron, Tom Cheatham and JDA plan to submit a "minimal error medicine" initiative on the fine tuning of drug therapy to the NIH Center for Biocomputing.

##### PHARMACEUTICS -JK, SK, JH

JK and VH have a joint project on the recognition of small epitopes. Pharmaceutics has applied for support of an UG summer program. Kern is the new Pharmaceutics Graduate Admissions Chair and there is interest in the possibility of joint recruitment efforts with Bioengineering.

##### TISSUE ENGINEERING -PT, Ken Webb

The tissue engineering group has research initiatives with Steve Gray, Dick Normann, and Glenn Prestwich.

##### NEURAL SYSTEMS ENGINEERING -SN

SN noted that the University already has critical mass in the area of Neural Systems Engineering, with a large number of these faculty already associated with Bioengineering. New Ophthalmology Department hires may be of interest to **the** Bioengineering Department. Current initiatives in the Neural Systems Engineering area include a new Neuro Sciences Building, an IGERT in Neural systems engineering, an NIH training grant, a research center for restoration and a learning disability treatment evaluation center.

##### BIOINTERACTIVE MATERIALS -VH

VH reported on a bioengineering partnership with Tom Beebe on an RFA for Nano-micro-imaging projects.

#### LONG RANGE PLANNING

The issue of FTE growth was discussed. The roles of partial FTEs and of research and adjunct faculty in the future of the department were also addressed.

The Department is committed to an Undergraduate Program of 50 students per year and to the launching of the new NSF supported BS/MS degree program.

**The faculty agreed to go forward with a Leadership Award application if the Whitaker announces another round of funding. The emphasis will be on development in one of three areas:**

**Computational Biology and Medicine,  
Neural Systems Engineering, or  
Biointeractive Materials.**

**RM, VH, SN and DN will form a Committee to work on early planning of the Whitaker Leadership application.**

The faculty supported the concept of strengthening ties with the medical school and health sciences center, and increasing medically related and clinical

**RM, JW, Ed Maynard and Duane Westenskow will form a committee to plan the development of a Clinical Bioengineering Training Program to provide research experience for interns, fellows, and residents.**

#### APPOINTMENT, RETENTION AND PROMOTION OF RESEARCH/ADJUNCT FACULTY

RN, Departmental RPT Chair, reviewed the criteria for appointment, retention and promotion of research and adjunct faculty. The criteria and quality requirements are the same as for tenure-track, except in the teaching category.

#### SAC REPORT (Bryon Wright)

Bryon Wright reported on the activities of the SAC during the past academic year. These have included RPT and teaching evaluations, recruitment of first year students to SAC, an admissions survey, and Fall and Spring picnics. The SAC is also working on increasing BMES (UG) and EMBS (graduate) involvement, and on reviving SAC lunches. **The SAC will play an important role in the orientation and adjustment of incoming students. An Orientation/Mentoring committee consisting of Bryon Wright, RR, GC, VH and SN was formed.**

#### INDUSTRIAL INTERACTIONS

It was noted that internships/co-ops will play an important role in later years of the UG program, so the Industrial Advisory Board and Departmental liaisons with who might sponsor such students should be revived.

#### ADJOURNMENT