Strategic Plan
The Henry Samueli School of Engineering
University of California, Irvine
5 February, 2010

Preamble

This strategic planning exercise began during January 2009. The ground work and information was collected by nine different working groups. A steering committee served as coordinator and repository of the input, and was responsible for drafting values, vision, and mission statements. The nine working groups were:

1. Strengths, Weaknesses, Opportunities and Threats (SWOT)
2. Data, Benchmarking and Measures
3. Undergraduate Education
4. Graduate Education
5. Research Thrusts
6. Organization and Processes
7. Space Needs and Planning
8. Diversifying the Faculty, Staff and Student Body
9. Resource Goals

These groups engaged a majority of the faculty. All except the last group produced reports (available upon request). The faculty at-large met to hear reports, as well as discuss and debate, five times during the winter and fall of 2009. During the late fall of 2009, the working groups were asked to reconvene in order to finalize content. The five academic departments were asked to also review and comment one last time. The steering committee compiled all input and wrote the report.

Introduction

Organizations need to constantly assess their values, their higher aspirations, and their goals. They need to re-affirm, or change, their products and their culture. And, they need to outline the steps to be taken to support their goals and aspirations. That exercise is strategic planning, and the time for planning is all the time. Planning is particularly important when circumstances disrupt the status-quo, and when it is apparent that "business as usual" is no longer an option.

In January 2009, The Henry Samueli School of Engineering (HSSoE) at UC Irvine initiated the development of a new plan. On one hand, the national and state economic crisis was evidence that "business as usual" was not an option for anyone; it was time to re-assess and re-focus. On the other hand, it was clear that the School was poised, after a decade of successes and growth, to take another big leap in the pursuit of excellence. The School needed to clearly articulate a new future, and this strategic plan (i.e. "the Plan") is the map of that future.

This Plan is a living document that will evolve as the various goals are achieved or their relevance changes. Nevertheless, the expectation is that it will serve as a blueprint, as an evolving constitution, that will guide all of our actions. For the foreseeable future, every major decision should have an answer to the following question: how does the action support our strategic plan? Rarely, should an action be taken that is not supportive of the articulated directions. If a contradictory action is to be taken, or if the issue is not addressed in the plan, then it behooves us to argue for a change in plan or correct the omission.

The Plan first states our vision for the future and makes a clear mission statement. Then it articulates our values - the compass that should control our actions. The rest of the Plan is organized in the following categories: Education (undergraduate and graduate); Research; Community and Culture; Resources and Administration; and Visibility and Impact. Within each of these broad areas, goals (five to 10 years) are stated, and action items (one to three years) are defined in support of these goals. The Henry Samueli School of Engineering will use the action items as elements of an implementation plan that will be revisited annually and updated as progress (or lack thereof) is made. Progress will be measured against the stated outcome of the action items and against metrics defined by the Data, Benchmarking and Measures Working Group.

The year-long discussions produced a series of overarching objectives and long-term aspirations that defied simple classification. In a way, all the goals support these overarching objectives. They can be summarized as:

1. Innovate in research inspired education.
2. Grow the School to about 150 faculty within a five to 10 year period.

3. Maintain our healthy undergraduate number of students, while increasing the quality and increasing the graduate students to about 1,000, within five to 10 years.
4. Improve student life and community.
5. Make the necessary adjustments to control costs and increase revenues to thrive in the new realities of the California higher education budget.

The faculty, staff, and students of The Henry Samueli School of Engineering are committed to excellence in education and research, and to making this School one of the very best in the nation. We invite all readers to comment on our plans and help us achieve our goals.

Our Vision, Mission, and Values

OUR VISION

We will always strive to be one of the BEST engineering schools…

- By defining the future of our fields of study and being recognized as leaders in knowledge creation and technology development.

- By attracting the best students, scholars, and industries interested in our areas of expertise.

- By offering our students an unparalleled research-inspired education.

- By serving our students for life.

- By preparing our students for leadership and lifelong learning.

- By creating the best learning and working environment for students, faculty and staff.

- By improving and sustaining the well-being and standard of living of all through science, engineering, and appropriate technology.

OUR MISSION

"We are a research institution of higher learning."

Our mission is to educate students, at all levels, to be the best engineers and leaders in the nation and world by engaging them in a stimulating community dedicated to the discovery of knowledge, creation of new technologies, and service to society.

A STATEMENT OF VALUES

All members of The Henry Samueli School of Engineering - students, staff, and faculty - pledge to honor a set of values that will guide all of our actions in the pursuit of our vision and mission.

Those values are:

- Excellence
- Innovation
- Integrity
- Service
- Respect for the individual
- Strength in diversity
- Nurturing students, faculty, and staff

Goals

Our goals have a decadal time scale and represent what The Henry Samueli School of Engineering wants to accomplish based on its mission statement.

I. EDUCATION

We are an educational institution, and our product is our students. All of our activities, from the research laboratory to the classroom, serve to educate "the best engineers and leaders in the nation and world by engaging them in a stimulating community dedicated to the discovery of knowledge, creation of new technologies, and service to society."

A. Undergraduate Education

Our overarching objective is to make undergraduate education and students central to the culture and life of The Henry Samueli School of Engineering. We want to:

1. Deliver undergraduate education in innovative and exciting ways, engaging students in the excitement of engineering from the very first day.
2. Attract the very best students of *California*, the *United States* and the *world,* and educate them to be the best engineers and leaders by engaging them in a stimulating community dedicated to the discovery of knowledge, creation of new technologies, and service to society.
3. Create a memorable and rewarding academic and social experience that will result in loyal alumni.

Like most engineering curricula in the nation, ours needs to be redesigned in order to achieve our mission and make undergraduate education central to our activities. The challenge is significant. A new model of education must continue to emphasize fundamentals, while improving students' understanding and confidence in applying the fundamentals via design and hands-on experiences throughout the program. A new model must integrate analytical, computational and experimental methods. A new model must teach systems integration and teamwork. And, the new model must provide students with excellent communication skills, a broad education, and a keen awareness of contemporary issues. With this in mind, a set of goals and action items have been formulated:

Goals

1. Achieve a more competitive undergraduate-to-faculty ratio of approximately 17.
2. Improve the quality and increase the diversity of our students.
3. Create hands-on engineering experiences throughout the curriculum, beginning freshman year.
4. Engage students in design projects that address at least one of the major problems facing our society, such as energy, climate change, and health care.
5. Develop five-year degree programs (coordinated B.S./M.S. degrees).

6. Create an Engineering Education Innovation Center to explore and develop new technologies and paradigms for delivering engineering education.
7. Improve the campus atmosphere/environment so more students stay on campus and engage in university life.

Action Items

1. Form a school-wide Curriculum Development Task Force to advise on curricular transformations, including:
   a. Major curricula revisions to promote hands-on project experience, throughout the curriculum, on major engineering problems facing society.
   b. Major curricula revisions to seamlessly integrate B.S. and M.S. degrees, enabling more flexibility in the first four years, and project experience in specialty fields in the fifth year.
   c. Integration of math and science topics with engineering coursework.
   d. Potential for school-wide design courses.
   e. Integration of campus writing requirement with project-based courses.
2. Align each student with a faculty or staff mentor, and take steps to ensure that students and mentors know each other well.
3. Improve the quality and increase the diversity of our students by:
   a. Engaging more actively in the admission process.
   b. Building strategic relationships with community colleges and high schools.
   c. Developing and implementing a marketing strategy to attract out-of-state and foreign students.
4. Develop a plan for renewal of teaching laboratories on a recurring basis.
5. Implement community building activities, such as regular social activities, student competitions, and boot camps for entering students.

B. Graduate Education

Graduate students are the engines that propel university research. The more talented and motivated the students, the more productive and innovative becomes the research enterprise, and the greater the institutional recognition. As such, the School's ability to not only attract the best graduate students, but to educate and enable them to contribute to the frontiers of science and engineering is critical to institutional achievement. This emphasizes not only the need for abundant resources for student support, but timely and engaging curricula, cutting-edge research opportunities, mentorship efforts and professional development programs that effectively enable and position our students for the highest level of scholastic and professional achievement. To increase the attractiveness and depth of existing programs, and create opportunities for new programs in emerging areas, faculty growth is an overarching objective of the School.

We are striving to attract the best available students, and monitor their success during and after graduate school. We want to add emphasis on a cohesive student body that fosters a culture of hard work, commitment to excellence, and loyalty to the institution. With this in mind, a set of goals and action items have been formulated:

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Goals

1. Develop a graduate student body that is competitive with those of top tier institutions, with students drawn from the top engineering programs in the nation and world.
2. Strengthen our sponsored research portfolio. The dollars per faculty must double, by both increased activity of individual investigators and by developing large, extramurally sponsored, research programs/centers. Effecting this change will require implementation of support structures, incentives, and a change of culture in the faculty. The research section of this report will address this issue in more detail.
3. Provide fellowship funding so that every entering Ph.D. and M.S./Ph.D. student can engage in a rigorous first-year research-prep curriculum.
4. Seek strategic international partnerships as a source of high quality students.
5. Identify opportunities for professional programs and develop the proper incentives and oversight necessary for their implementation.
6. Develop appropriate data gathering processes for alumni, and create placement/mentoring services for our graduates.

Action Items

1. Refresh existing program areas by:
    a. Reviewing and refocusing existing M.S. and Ph.D. degree programs, and measuring success with appropriate metrics, and in comparison to peer institutions.
    b. Eliminating redundant and undersubscribed programs, specializations, and concentrations.
    c. Coordinating five-year B.S/M.S. degrees, look at the possibility of a Master of Engineering degree.
    d. Evaluating opportunities for professional programs/short courses.
    e. Considering Internet delivery of education.
    f. Building national and international collaborations.
2. Improve the online visibility of programs by:
    a. Clearly articulating graduate coursework (i.e., plans of study).
    b. Clearly articulating advancement processes (admissions requirements, preliminary exam, candidacy exam, dissertation defense).
    c. Emphasize connectivity within the programs—how courses fit together into something greater than the sum of the parts.
3. Cultivate new programs or joint programs for in-demand areas, such as alternative energy, business/management, and law.
4. Develop a school-wide plan to increase fellowship funds, including:
    a. A program to systematically respond to major fellowship programs (e.g., GANN, IGERT).
    b. A program to publicize and facilitate applications to graduate fellowship/scholarship programs (NSF, DOE, EPA, NIH, NASA, etc.).
    c. An effort to attract and recruit recipients of graduate fellowships.
5. Improve the recruitment, mentoring, and placement of students by:
    a. Making financial offers early, including multi-year offers.

b. Broadly implementing "recruitment day" events to maximize yield and promote the School.
c. Reviewing admission and candidacy filters in use across the School, and promoting the highest standards, at the risk of reducing the Ph.D. graduate rate.
d. Creating more public presentation and interdisciplinary interaction opportunities for graduate students.
e. Faculty involvement in job placement.

6. Heighten student responsibilities and professionalism by:
a. Teaching and practicing engineering ethics.
b. Promoting organization and discipline in the labs.
c. Promoting a rigorous work ethic and quality standards.
d. Creating student organizations in every department and encouraging their collaboration in promoting a culture of excellence and "belonging" to The Henry Samueli School of Engineering.

II. RESEARCH

We seek to pursue research that is timely, socially responsible, and trendsetting. Building on a strong foundation of fundamental engineering areas, ranging from mechanics to electronic devices, four thrust areas have been identified to shape our future research activity and brand the research identity of the School. These thrust areas will catalyze trendsetting research by engaging a broad spectrum of School faculty, drawing researchers from outside of engineering, attracting the most talented graduate students, and focusing attention and resources on the most important engineering challenges of our times. Some faculty will continue to work outside of these thrusts areas, and will undoubtedly benefit from recognition brought on by the School's success in its thrust areas.

The four thrust areas focus on:
1. Science and Engineering of Human Health
2. Environmental Science and Engineering
3. Sustainable Energy and Transportation Systems
4. Communications and Information Technology

Details of these areas are available as part of the Research Group report, and are available on request. The area of Complex Systems Engineering will be investigated and possibly developed as a fifth thrust.

Research in these thrust areas, as described above, represents a shift in the tradition and culture of the School, and incentives will be required to initiate leadership in this direction. Further, a review of academic personnel procedures is warranted to ensure that faculty initiative is not stymied by short-sighted performance metrics. Nevertheless, it is absolutely critical that the School move forward to advance its thrust areas. Recent analysis has clearly shown that we lag behind other top schools in the area of large,

multi-investigator research grants. With this in mind, goals and action items have been formulated:

Goals

1. Establish multi-million dollar externally funded centers aligned with our thrust areas, each involving several School faculty members and strong ties to industry.
2. Partner with the School of Medicine and surrounding industry to make biomedical engineering activity among the very best in the country. The Edwards Lifesciences Center for Advanced Cardiovascular Technology must be a top priority.
3. Partner with the Schools of Physical and Biological Sciences to ensure the success of the campus' Smart Energy and Sustainable Environment initiatives.
4. Build a closer alliance with The Donald Bren School of Information and Computer Sciences (ICS) and the California Institute for Telecommunications and Information Technology (Calit2), and make Calit2 a success.

Action Items

1. Create an *Office of Research in Engineering (ORE)* to help School faculty compete for multi-million dollar, multi-investigator/center grants and industry contracts/grants. This office should involve ICS and Calit2. Major responsibilities should include:
   a. Proposal preparation support, including knowledge of major funding programs (and deadlines) and industry contacts.
   b. Distribution of seed and bridge funding.
   c. Knowledge of faculty expertise to facilitate team-building in response to major funding programs.
   d. Long-term planning.
2. Focus each of the thrust areas.
   a. Institute a colloquium series.
   b. Prepare prospectuses/white papers describing thrust areas and corresponding educational, programmatic, and resource needs.

III. COMMUNITY AND CULTURE

A focus on education, interdisciplinary collaborations, and a commitment to excellence requires a school that acts as a single unit, is flexible, rejoices in the accomplishments of its members, and works and celebrates together. A commitment to excellence and a broad education for our students calls for a diversified school. The need for diversification exists at the student, staff, and faculty levels.

Goals

1. Refocus our efforts on the business of education. Good research and good education go hand-in-hand. The best undergraduate and graduate students will

come when they perceive that the institution and the faculty care for them and offer the very best educational experiences in the classroom and the laboratory.

2. Break barriers between departments. The interdisciplinary research outlined previously cannot be carried out under the traditional departmental structure alone.

3. Promote and increase social interaction between faculty, students, and staff. Socialization outside of the work place is the best way to create trust, understanding, mutual respect, and promote collaborations. The School should increase the opportunities for such social interactions.

4. Increase the pool of applicants and the yield of underrepresented minorities and women to undergraduate and graduate studies. Diversity is a necessary ingredient for quality. There are many dimensions to the need for diversity. At the undergraduate level, we have an overwhelmingly California-centric student body, depriving our students of the experiences and opportunities to learn about how things are done elsewhere. Furthermore this contributes to the lack of a "residential" college atmosphere that exists, since a large portion of the students simply go home on the weekends. Some minorities, like African-Americans, are also under-represented in the undergraduate student body. The graduate student body is internationally diverse, and somewhat more diverse in its representation of students outside California. Again, underrepresented minorities are missing. The fraction of women is too low for both undergraduate and graduate students.

5. Increase the number of women and underrepresented minorities in the faculty. The number of women in the faculty is significantly below what it should be, as are underrepresented minorities.

6. Promote an active campus life by students, faculty, and staff. The UC Irvine campus is not as active after working hours. Buildings are closed and not air-conditioned outside normal working days and hours. The students and faculty do not find entertainment and distractions near, or on campus. The School's ability to affect some of the required changes is limited, but it behooves us to do all we can.

Action Items

Focus on education:
1. Restate and explain the importance of excellent education and innovation in education for promotion and merit.
2. Reformulate the evaluation of teachers; disseminate student evaluations broadly; include information on grading distributions when assessing teacher performance.
3. Increase school-wide events and recognition of students.
4. Develop a student activity center.
5. Integrate our design offerings.

Focus on interdisciplinary work:
1. Formulate virtual centers aligned with thrust areas. Virtual centers are groups of faculty and students with common interests that come together to explore a common agenda and promote/facilitate research in the area. They may, or may not, have defined leadership.
2. Facilitate joint appointments within and outside of the School.
3. Promote common curricula at undergraduate and graduate levels in appropriate subjects.
4. Collocate activities with common intellectual foundations and/or methodologies.

Focus on social interaction:
1. Introduce a "Welcome Back" event in the fall.
2. Organize an "Engineering Family Day."
3. Continue to hold an annual staff recognition event.
4. Develop a series of informal social events.
5. Quarterly meetings of junior faculty with the dean.
6. Unify departmental activities revolving around design experiences, and student recognition.
7. Strengthen students clubs and provide them with better resources and support.

Diversity in the student body:
1. Increase outreach programs.
2. Increase participation in programs and national activities that bring together large numbers of underrepresented minorities and women interested in engineering.
3. Re-double recruitment efforts.
4. Change our Web site and literature to encourage applicants from other states and countries at the undergraduate level.
5. Seek private funds for scholarships and fellowships directed toward this effort.
6. Consider a summer program for undergraduate outreach.
7. Consider a summer program for graduate students outreach.
8. Create a coordinating office for all outreach programs under the existing program for diversity and the faculty chair holder.

Diversity in the faculty:
1. Establish a process by which all search committee members are sensitized to overt or subtle gender and racial biases.
2. Formalize checks and balances processes to make sure that biases do not affect recruitment processes.
3. Actively recruit.
4. Publicize our commitments to diversity in the professoriate in all appropriate venues.

Campus life:
1. Actively work with the campus to improve the quality of life for students, staff, and faculty.
2. Encourage and organize evening social activities.
3. Use engineering venues for all social and business meetings, whenever reasonable.

IV. RESOURCES AND ADMINISTRATION

A lot of resources, time, and money, are being wasted because of inefficient and bureaucratic processes. The School is committed to providing the best possible service to all, and streamlining its business processes, to the extent possible under current UC regulations. At the same time, we will make every effort to seek simplification of UC rules and regulations that cause undue burden on our faculty and staff.   Areas of particular focus are: academic personnel, procurement, travel vouchers, pre- and post-award management, scheduling, and graduate recruitment, admissions, and services.

A. Academic Personnel

The academic personnel review process is one of the most important functions of the university. However, excessive bureaucracy has made the process burdensome to the point where one can lose sight of its fundamentals.

Goals

Promote a revision to the Academic Personnel Manual that brings it to 21st century standards, including:

1. Shift focus to major personnel actions that define the quality of the faculty (mid-career review, tenure decision, promotion to full professor).
2. Eliminate unnecessary documents.
3. Eliminate arcane steps/titles that have little meaning to people outside of the UC system (e.g. Prof. VI, Professor A/S).
4. Develop alternatives to the "Step" system.

Action Items

1. Articulate core expectations of faculty in the HSSoE.

2. Conduct annual seminars for incoming/untenured faculty on advancement in the HSSoE.

3. Simplify and automate processes; publish information online as much as possible.

4. Enforce deadlines.

5. Promote succinctness in the preparation of academic personnel documents.

6. Encourage each department to use a standing committee (rotated and renewed with some frequency) for the processing of merit cases.

7. Promote dean delegation of all merits - including accelerations.

8. Promote independence/accountability of chair in the review process.

9. Emphasize duty of the chair to actively monitor progress of untenured faculty (at least yearly), and arrange for mentoring as needed.

B. Sponsored Projects and Purchasing

Goal

A seamless, paperless online system that will serve the faculty needs in pre-award, post-award, reimbursement, purchases, and equipment. This will require substantial investment from the campus.

Action Items

1. Make the Technology, Engineering, and Computing (TEC) Business Center a success.
2. Develop an IT-based travel reimbursement system.
3. Create and publish an equipment inventory system.
4. Advertise and expand the use of HSSoE Intranet resources, including forms for purchase orders (POs) and reimbursements.
5. Use blanket purchase orders where feasible to simplify purchasing of repeat items.
6. Allow for low-value online purchases from known vendors by principal investigators (PIs) without going through PO procedures (possibly PALCard, or similar).
7. Institute online review of PI accounts – eliminate paper reporting.

C. Space

The opening of Engineering Hall provides the impetus to develop principles for space allocation and space planning. Those principles should articulate some of the following ideas: full utilization of available space; efficient use of space; flexibility to allow evolution and adaptation to new needs; and promotion of shared resources and space as appropriate and beneficial.

Goals

1. Appropriate and efficient use of space.
2. Promotion of interaction and productivity.
3. Clear processes for allocation and re-allocation of space.
4. Shared resources when beneficial and possible.

Action Items

1. Complete the shell space of Engineering Hall.
2. Complete infrastructure improvements of Engineering Tower.
3. Make the Rockwell Engineering Center building a "student activity center," housing all student services. Develop student "project rooms" in the existing trailers area.

4. Work closely with Calit2 to maximize the use of all resources for the benefit of research.
5. Begin planning for space demands related to planned growth, including the long-term need for a new building.
6. Form a standing space committee – formulate principles of space management.

D. Resources

The School needs to articulate a well-developed plan for resource development. The School needs permanent revenue streams that are compatible with its educational mission.

Goals

1. Develop and implement a broad and deep affiliates program.
2. Develop revenue-generating professional and self-supported programs.
3. Develop the summer session.
4. Increase research activity and corresponding overhead return.
5. Implement professional degree fees.

Action Items

1. Engage a restructured Engineering Leadership Council.
2. Prepare a series of white papers describing our educational and research initiatives.
3. Prepare a donors/prospects plan.
4. Establish regular contacts with alumni.
5. Improve our communications; develop an effective public relations (PR) strategy for all units.
6. Engage as many faculty as possible in the resource development efforts.
7. Coordinate our corporate, foundations, and individual giving strategies.

V. VISIBILITY AND IMPACT

The School needs increased visibility nationally and worldwide.

Goals

1. Strengthen industry relationships. We must be the place where industry seeks answers to their problems, at least those related to our thrust areas of excellence.
2. We must help create the "Silicon Valley" of biomedical devices, working closely with industry partners.
3. We must develop targeted professional programs and explore Internet-based delivery of education.
4. We must develop strategic international partnerships in education and research.

5. Develop a unified/"single look" communications strategy based largely on the Internet.
6. Bring extraordinary individuals to campus on a regular basis; become a destination.
7. Be recognized as one of the top 20 engineering schools, and reach the top 10 in one or two specialty areas.

Action Items

1. Develop an internship program for graduate and undergraduate students.
2. Form a Publicity and Communications Standing Committee
   a. Each department must have a newsletter that shares a common look.
   b. Post a "Summary of Research" on the Internet with common-look faculty profiles.
   c. Develop a plan to roll out newsletters for all departments.
   d. School blog.
   e. Routinely send accomplishments of faculty and students to local papers.
   f. Evaluate and update the HSSoE home page on a regular basis.
3. Form a Standing Committee for International Activities
   a. Prepare principles of engagement.
   b. Identify potential partners.
4. Create an Office of Research in Engineering and corresponding faculty/industry oversight committee
   a. Evaluate the possibility of developing a business incubator, possibly with Calit2.
   b. Develop an Innovation Competition.
   c. Enterprise Forum participation; UCI – MIT.
   d. Venture Capital enterprises meeting with OCTANe collaboration.
   e. Interdisciplinary innovation start-up funds to promote large projects with translational potential.
5. Organize/sponsor one main conference within our thrust areas or related topics every two years.
6. Identify markets where professional education is needed and develop implementation strategy.
7. Create a corporate affiliate program(s).
8. Strengthen the relationship with the School of Medicine.
9. Reinstitute the Distinguished Lecturer Series. Improve advertisement of existing lectures.