The College of Engineering and Applied Science

Current Units Potentially Impacted:

**College of Engineering**
- Aerospace and Mechanical Engineering
- Chemical & Environmental Engineering
- Civil Engineering and Engineering Mechanics
- Electrical and Computer Engineering
- Hydrology and Water Resources
- Materials Science and Engineering
- Mining Engineering
- Systems and Industrial Engineering

**Arizona Research Labs**
- Division of Biomedical Engineering

**Graduate Interdisciplinary Programs**
- Biomedical Engineering
- Cognitive Science
- Statistics

**College of Science**
- Computer Science
- Applied Math
- Applied Physics

**Eller College of Management**
- Management Information Systems

**College of Agriculture & Life Sciences**
- Agriculture & Biosystems Engineering

**School of Information Resources and Library Science**

Proposal Team:

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Vision: To create a College of Engineering and Applied Science that will serve as the integrator of teaching, research, and development activities across engineering, applied sciences, and information technologies and an attractor of multidisciplinary collaborative work on Campus and beyond.

Engineering as a discipline is a universal brand. Its focus on design and application of scientific principles is recognized by practitioners in all disciplines. Engineers are drivers of innovation who transform ideas into practice. Major state, national, and international employers in electronics, defense, infrastructure construction, information technology, and manufacturing rely on the Arizona universities to provide the highly skilled workforce to remain competitive. The demand for our graduates in some fields far exceeds our capacity to educate engineers. Projections for engineering growth are among the highest in all fields to meet our present needs and to remain internationally competitive. According to the Winter 2008 Salary Survey from the National Association of Colleges and Employers, Engineering graduates are also among the top paid professionals in the country, with average starting salaries in excess of $56,000 per year.

The inextricable co-dependence between Engineering, Applied Science, and industry cannot be denied or ignored. It is a modern-day reality of higher education that will play a pivotal role in the UA’s goal to become one of the ten best public universities in the nation. With this in mind, the College of Engineering and Applied Science (CEAS) will be positioned to foment vibrant research relationships with Arizona’s technology businesses, government, and public sector. This will in turn drive real research dollars to the UA and the State, help cultivate a climate for internships, co-op programs, and regional high-wage job opportunities for UA graduates, and facilitate technology transfer and spin-off companies.

In addition to explicitly addressing the land-grant mission of the university, Engineering and Applied Science contribute strongly to the focus areas promoted by President Shelton. Impact and innovations that address our climate, environment, water, energy, and sustainability (and related areas such as transportation and space exploration) all require engineers to transform scientific proofs of concept into societal benefit. Further, Engineering is already engaged in numerous cross-disciplinary graduate research programs with the Medical College, Optical Sciences, and Management Information Systems—just to name a few. Students are shared between units, providing them with a much more relevant educational experience and training environment.

In short, CEAS would address the UA’s current fiscal crisis, provide future revenue streams in the form of intellectual property, philanthropy through employers, foundations, and alumni loyalty, while delivering on the land-grant mission of this University. It also has the greatest potential impact on economic development, as more high-tech companies could be formed in
Southern Arizona, closing the loop on the entire research, education, workforce development, and technology transfer ecosystem. This new College will work closely with the Offices of Federal Relations, Technology Transfer, and Corporate Relations to further enhance our status as a “world class” university.

**Motivating Factors:** While keeping in mind the primacy of the University’s land-grant mission and SPBAC’s Transformation criteria, this proposal is intended to help CEAS and the UA:

- Maximize efficiencies (administrative, teaching, research, and service) across the College and Campus, and thus provide a strong and stable foundation for the new organizational structure
- Improve short-term efficiencies in support services, and better use of faculty time
- Increase long-term revenue streams by improving the grant submission processes and promoting technology development and transfer
- Further enable interdisciplinary faculty to work collaboratively on grand challenges that will serve the State of Arizona, the nation and the world
- Maintain identity and integrity of excellent programs to sustain and bolster philanthropic ties to alumni and employers
- Leverage numerous ABET-certified programs to achieve world class status and rankings

As an example, several years ago the Department of Electrical and Computer Engineering (ECE) recognized the need to educate “renaissance” engineers and scientists who will have a deep and broad understanding of the grand challenges facing us, who will be able to discover, to innovate, and to translate the outcomes of their work into broader societal benefits. Clearly, strictly delineated boundaries between engineering and scientific disciplines must be transcended.

Thus, in 2004 ECE dramatically changed its then-current approach to meeting budget fluctuations. We began a transformation process that hired faculty in new areas with substantial research opportunities, decided not to make continued investments in other areas, and placed greater emphasis on research in thematic areas. The results have been remarkable, with ECE returning nearly $320,000 to the State, while concomitantly achieving a 48% increase in research expenditures, over these four years. The EE and CE programs, unranked in 2003, are now ranked in the top 20% nationwide. We initiated the transformation of two degrees (Electrical Engineering, and Computer Engineering), into a single ECE degree. This reduces confusion among prospective students, and reflects the continually changing nature of the ECE discipline, in which computing and electrical concepts become more and more intertwined. In short, our faculty shares the vision for a less complex and more focused university, and we have begun to take steps internally to advocate this vision. Our track record, and the strong interdisciplinary background of our faculty, give us a unique perspective to imagine how the College of Engineering could be strengthened using these same concepts.

These observations, as well as issues such as ABET and professional accreditation, allow us to put forth the vision of a reorganized College of Engineering and Applied Science that strengthens our ability to produce cutting edge research in both traditional and multidisciplinary areas.
Our Plan: We envision a lean administrative structure to run a new college with five (5) schools that combine and re-align current units from various departments and degree programs. The intention is not necessarily to break up any particular unit; rather, we see strengths in various departments that are relevant to several of the proposed Schools, and this is reflected for completeness. Implementation may actually occur via joint appointments, shared courses, etc.

School of Aerospace and Mechanical Engineering. Aerospace and Mechanical Engineering, parts of Systems and Industrial Engineering, parts of Materials Science and Engineering

School of Biosystems and Biomedical Engineering. Biomedical Engineering, Biosystems Engineering


School of Electrical Engineering and Computer Science. ECE, Computer Science, parts of Systems and Industrial Engineering, parts of Materials Science and Engineering. Other areas that bear consideration are the computational elements of Management Information Systems, the School of Information Resources and Library Science, and Cognitive Science

School of Sustainability and Environmental Engineering. Chemical Engineering, Civil and Environmental Engineering, Hydrology and Water Resources, Mining and Geological Engineering, parts of Materials Science and Engineering, parts of Systems and Industrial Engineering

In our view, the proposed CEAS will create a powerful focal point for cutting-edge research and educational thrusts that address our key motivating factors. In addition, it will:

- offer degree programs serving the workforce needs of 2020 and beyond;
- establish centers of excellence that will attract large-scale, multi-disciplinary industrial and government funding;
- enable better organization of faculty;
- combine and economize research infrastructure and resources;
- establish a visible base for attracting senior academic leadership with a strategic vision for CEAS and the University of Arizona; and
- cultivate a climate for internships, co-op programs, and regional high-wage job opportunities for UA graduates, and facilitate technology transfer and spin-off companies, and thus address the land-grant mission of the University of Arizona.

Collaborative Process for this Document

The authors of this document were elected from the faculty and staff, and selected from student leaders. The department head (DH) initiated a college-wide e-mail discussion asking for input from other heads and faculty. Dr. Larry Head (SIE Head) contributed text for this proposal. The DH has had numerous consultations with Dr. Paul Cohen, CS Head. This culminated in joint ECE/CS faculty meeting to discuss the virtual SISTA School. DH has contacted Head of MIS, and met with Dr. Michael Tabor, Head of Applied Math. DH also spoke with the Dean of Optical Sciences. We believe that it is in the best interest of the University to maintain the independent identity of the College of Optical Sciences.
The Existing College

The concerted effort in these areas will over time provide a more focused faculty, and a corresponding increase in research productivity through federal and state grants. Our plan is to move some staff and research faculty on state lines to soft monies generated by increased research expenditures. A competent research support staff, including technical experts such as postdocs and research administrators, will be funded on these soft monies.

Moving approximately 40 staff college-wide from state to soft lines could result in between $10-16M in funds over 10 years. We emphasize that these staff should be accommodated by an increase in research expenditures that follows from a new composite profile of faculty aligned with the focus areas of the university.

This plan could potentially provide cost savings in the College of Science, with overlap in courses taught, and potential pooling of accounting, secretarial, and IT resources.

The Proposed College:

Department heads are reduced. Faculty count will not change initially, but early retirement and other incentives can refocus faculty with hires in the above areas to improve the ranking and peer estimation of Engineering, and contribute directly to the strategic goals and vision of the University through research results and increased research revenue.