Introduction

The next two decades will be a period of continual change for The William States Lee College of Engineering. Change will occur in a multitude of ways, often at a frantic pace, and it will exceed that experienced by the college since its inception. Major changes will include a focus on continuous improvement, college reorganization, and evolution to become a major research university with program breadth and scholarly depth. In the midst of this change, the college has adopted a vision that will carry the college well into the millennium. That vision is based on

The William States Lee College of Engineering will be the engineering college of choice for students, faculty, sponsors and partners, reflecting the prestige gained by the excellence of our programs, research, graduates, and faculty.

The College nurtures collaborative and friendly learning communities in which all stakeholders (students, faculty, sponsors, and partners) can succeed and are involved in the continuous assessment and improvement processes.
Student, faculty, resource and community development are guided by the principle that they should enhance our learning environment and promote the prestige of our institution.

The College of Engineering (COE) is an academic unit composed of four departments providing a dozen academic programs; Civil Engineering, Electrical and Computer Engineering, Engineering Technology, Mechanical Engineering and Engineering Science. Undergraduate and graduate student enrollment has exceeded 1700 in the 2001-02 academic year and the college has been growing faster than the university as a whole (see attached graph). Unlike many traditional engineering programs, the college begins engineering instruction in the freshman year and promotes team and communication skill development as an integral part of the undergraduate program. The College's Engineering Technology department is also home to the most comprehensive 2+2 technology programs in the state. The approach to graduate programs and research focuses on applied research and, although there are a wide variety of research projects underway, concentration areas include: Precision Engineering, Manufacturing, Computer Engineering, Microelectronics, Environmental Engineering, Metrology, Communications and Networks, Bioengineering, Construction Engineering, Transportation Engineering and Computer-Aided Engineering.

History
Engineering studies at Charlotte College began in the early 1950s. Community demands for engineering education were growing, and distinct engineering disciplines began forming when Charlotte College became the fourth campus of the Consolidated University of North Carolina in the 1960s. To give order to the fast-growing programs, the UNC Board of Trustees formed the College of Engineering at UNC Charlotte in 1965. Responding to Charlotte's demands for an even higher level of engineering curriculum, the College began offering its first master's program in 1979. The Department of Computer Science joined the College in 1984.

In the mid-80s, a major effort was initiated to build the research programs and several world-renowned researchers were recruited. Facilities for applied, interdisciplinary research received a major boost in 1991 with the opening of the 75,000-square-foot C.C. Cameron Applied Research Center. Industrial demand for higher levels of graduate engineering education continued in Charlotte. In 1987, the College of Engineering started an interinstitutional Ph.D. program with N.C. State University; and, by 1993, the College was offering its own Ph.D. programs in both Electrical and Mechanical Engineering. In 1994 the college was dedicated as The William States Lee College of Engineering after the late Bill Lee, former CEO of Duke Power and College Advisory Board Chairman.

Throughout the late 1990s, business demands for information services were reaching greater and greater levels. These demands led the College of Engineering and the College of Business to form an interdisciplinary School of Information
Technology in 1998. In July 2000, the University combined the College of Engineering's Computer Science Department and the School of IT into the new College of Information Technology.

During its history, The William States Lee College of Engineering has continually expanded and improved as it built top-quality academic and research programs. Forward into the future, the College will continue to focus on quality and improvement as it leads UNC Charlotte in becoming a major research-level institution and the "University of Choice."

Process

Formal strategic planning and improvement processes in the college began with Bill Lee's leadership in 1992 as chair of the College Board of Advisors. With the adoption of ABET's EC2000 in the late 90's the strategic planning process was merged with a continuous improvement process. The process cycle is currently initiated each year in the fall when the chairs and administrative staff of the college begin several preliminary meetings to review the current plan (CAC meetings). This is followed by a day and a half Assessment and Improvement Meeting (AIM) to discuss highlights, review what is complete/incomplete, and
initiate discussion about future directions for the college and individual departments. Following this, individual departments then hold planning sessions to examine, discuss, and draft their preliminary departmental plans and action items. In the spring, a second full-day AIM (again involving chairs and college administrative staff) works to adjust planning elements, review improvements, and make additional recommendations. In concert with preparation of a strategic plan, strategic planning at the college and department level is an ongoing and continuous process closely tied to assessment, which is measurement based using a wide variety of tools including student, faculty, alumni and employer surveys. The yearly planning cycle culminates at the one day summer AIM when college wide plans are reviewed and revisions proposed for the next cycle.

**Continuous Improvement Process**

The College of Engineering is simultaneously engaged in a process of measurement, evaluation, and feedback for the purpose of continuously improving program objectives in each unit. The process itself continually evolves and strives to operate horizontally and vertically within the college and its units. Much of the groundwork and the continuing development of the process has been aided by the Strategic Planning and Assessment Resource Team (SPART). This body consists of a faculty member from each department with additional support from faculty associates assisting with the measurement process and interpretation. SPART provides a liaison between the college and departmental units in terms of determining process needs and overseeing data collection and dissemination. SPART members work with faculty within their individual units to develop specific measurements, processes and feedback strategies. Department chairs meet with SPART on a regular basis to keep apprised of SPART activities.

Fundamental to the continuous improvement process is the evaluation of progress on the strategic plan and improvement recommendations. This evaluation and recommendation process is conducted by the administrative staff of the college with input from faculty and other sources such as surveys. The first component is the College Administrative Committee (CAC) which is composed of the Chairs, the Assistant Dean of the Office of Student Development and Services, the Assistant Dean of Computing Services, the Associate Dean of Research, and President of the Faculty. In addition, various members of the faculty and college staff are invited as may be appropriate to discuss specific topics. CAC meets for 2-3 hours each week to gather input and guide program modifications as needed. The members of CAC also conduct three yearly Assessment & Improvement Meetings (AIM) that handle strategic planning, develop the continuous improvement process, make program decisions, and coordinate college-wide initiatives.

Three elements designed to specifically address improvements to program objectives and student learning outcomes are: ICAP (Individual Course Assessment Process), FAIT (Focus Area Improvement Teams) and PROBE (Program Objective Evaluation). The complete continuous improvement process
is summarized in the attached figure depicting the improvement triangle. The principal components are:

**AIM (Assessment and Improvement Meetings)** – three yearly intensive assessment & planning workshops involving college leadership.

**CAC (College Administrative Committee)** – weekly meetings that supervise progress and provide feedback to departments/units.

**SPART (Strategic Planning and Assessment Resource Team)** – continuous improvement guidance team composed of faculty and faculty associates.

**PROBE (PRogram OBjective Evaluation)** – a college-based team that evaluates academic program objectives within each department.

**FAIT (Focus Area Improvement Teams)** – faculty groups reviewing subject area performance within departments/units

**ICAP (Individual Course Assessment Process)** – documented review of performance criteria in selected courses.

In selected courses, ICAP conducts a documented evaluation of program objectives and ABET's (a)-(k) criteria including recommended improvements and follow-ups. Overlaying this are the FAIT teams examining issues pertaining to specific subject areas within a unit with a goal of integrating recommendations on a broader scale. PROBE teams operate at the highest level within each department and compile input from surveys, exit interviews, ICAP and FAIT to examine unit wide progress toward program objectives. The three yearly AIM meetings monitor the process and make college-wide recommendations for improvements, including improvements to student support services.

**Assumptions**

The William States Lee College of Engineering will be a major contributor as the university moves toward one of its primary goals of becoming a major university with robust research and Ph.D. programs. Therefore, as a central part of its mission, the college plans to have high-quality undergraduate programs and areas of excellence in research and graduate study. Past space limitations are expected to be relieved in the next few years and provide for the opportunity to grow the college and the range of educational programs that it provides. The emerging challenge in this connection is the wide spatial distribution the college will experience when the new facilities come on line. A secondary assumption is that tight state budgets during the next few years will likely limit the college's ability to grow and expand significantly. However, the NC economy will no doubt recover and again allow the college to offer a broader range of programs to its constituents. Tight budgets and the challenge of operating a highly distributed
college will demand careful planning for optimal use of resources and a team effort by all departments in the college.

Mission/Vision

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Goals

Goal 1

STRETCH GOAL 1: Increase College of Engineering enrollment to 3000 with 120 PhDs by Fall 2010 (campus 24,000).

Objective 1

Student enrollment growth of 10% per year.

Action

Improve retention from Freshman to Sophomore year from 50% -> 70% using SI, early intervention, mentoring, Freshman Learning Community and a quality freshman engineering course.

Action

Grow by initiating new educational programs. This concludes continuing development of the IES Ph.D. program and exploring feasibility of Systems Engineering, 4 yr. ET programs, and a possible ET option in Bioprocessing Technology and Computer Engineering Technology.
Operate an aggressive recruiting campaign.

**Action**

Enhance the reputation of our educational programs.

**Action**

Increase financial support for students, including scholarships, fellowships and graduate assistantships.

**Goal 2**

STRETCH GOAL 2: Enhance the reputation of the College by ranking in the US News and World Report Top 50 Public Research Universities.

**Objective 1**

Improve by five positions each year from a rank of 86 in 2002. Recently released rankings for 2003 place the COE at 79th.

**Action**

Develop 2 nationally recognized areas of expertise in each department. Some of the emerging areas of strength are Biomedical Engineering, Optoelectronics, Communications, IC testing, Building Structural Protection, and Computer Aided Engineering.

**Action**

Operate premier support programs in computing services, OSDS and public relations.

**Action**

Deliver innovative program elements:
- Ethics Seminar
- Freshman Residential Learning Community
- Leadership Academy

**Action**

Deliver programs to improve FE pass rates to be equal or better than those at other state, national, and research intensive institutions.
Goal 3

STRETCH GOAL 3: Dramatically strengthen the College’s research identity, market niche, and capability. Establish a research culture that supports a successful and highly visible research enterprise which spearheads the university's thrust toward becoming a major research university.

Objective 1

Add 3 new Centers of Excellence (one in each department) in the next 5-8 years.

Action

Develop an Institute for Biomedical Engineering. Initiate planning for a Center for Motorsports and Automotive Engineering, and participate in developing a Regional Institute for Homeland Security and Major Disaster Management by providing a strong research component in building/structure protection and transportation engineering.

Action

Identify a suitable area of strength to form a future center or institute, particularly in a discipline connected to ECE & ELET.

Objective 2

Develop new educational and research programs in selected areas.

Action

Complete a Permission to Establish an IES Ph.D. program and a Permission to Plan for a program in Systems Engineering. Explore the feasibility of an ET program in Bioprocessing Technology.

Goal 4

STRETCH GOAL 4: Differentiate and grow the programs in Engineering Technology by establishing a School of Engineering Technology.

Objective 1

Develop an operational model for the School of ET.

Action
Prepare a white-paper on the organization and structure of a School of ET including P&T processes.

**Objective 2**

Identify new ET programs that would expand our suite of ET programs (e.g., Computer ET, Industrial Safety, etc.)

**Action**

Prepare white paper on potential new programs.

**Objective 3**

Offer four-year BSET programs.

**Action**

Submit a proposal for selected 4-year ET programs to the Provost by fall 2003.

**Goal 5**

Develop and maintain a successful learning environment, which attracts and retains qualified students and faculty and excites the very best.

**Objective 1**

Continue space planning and the transition into new facilities as they come on line. Expand space for student services, freshman programs, facilities & lab management and engineering computing.

**Goal 6**

Improve student capabilities as measured by increases in performance relative to key competencies (see Continuous Improvement section above and Student Learning Outcomes section below).

**Goal 7**

Provide unique educational opportunities, including distance learning and continuing education opportunities that fit our unique mission, vision, and capabilities.

**Goal 8**
Provide state-of-the-art IT infrastructure that supports the mission of our College, the objectives of our programs, and the needs of our students, faculty and staff. Key strategies include:

Build and maintain a high-quality computing environment.

Use technology to streamline the business processes of the college.

Provide improved access to college computing facilities and services.

Participate in developing a campus-wide academic computing plan.

Work with COIT to assure a smooth transition for this new college.

Maintain and enhance support for the college's use of technology in teaching.

**Student Learning Outcomes**

Evaluating the performance of the curriculum is closely tied to the Program Objectives identified in each educational program. Program objectives reflect in broad terms end result or capabilities expected for graduates of a particular program. Furthermore, all engineering and technology programs must demonstrate that their graduates have satisfied the ABET (a)-(k) Engineering Criteria 2000. In addition, individual programs have program specific learning outcomes that extend this common criteria. The (a)-(k) outcomes contribute to the overall program objectives identified for each program and their graduates. The performance on Program Objectives and in each of the (a)-(k) attributes is measured by a variety of instruments and at a variety of levels within the curriculum. This includes:

Individual Course Assessment Process (ICAP): Specific measures within selected courses, e.g., student performance on a specific problem, presentation, design review, project report, and/or lab report.

Surveys of alumni and their employers.

Student, faculty, alumni, and employer surveys.

Performance on Senior Projects.

Focus Area Improvement Teams (FAIT): Subject area reviews conducted within departments.

FE exam scores with topic performance breakdown.

Senior exit interviews.
Student ratings of teaching survey.

Assessment & Improvement Meetings (AIM): Fall, Spring and Summer intensive workshops examining overall college, department and support service progress on goals.

Program Objective Evaluation Teams (PROBE): Team evaluation of department performance on Program Objectives.

Outcome 1
(a) an ability to apply knowledge of mathematics, science, and engineering.

Outcome 2
(b) an ability to design and conduct experiments, as well as to analyze and interpret data.

Outcome 3
(c) an ability to design a system, component, or process to meet desired needs.

Outcome 4
(d) an ability to function on multi-disciplinary teams.

Outcome 5
(e) an ability to identify, formulate, and solve engineering problems.

Outcome 6
(f) an understanding of professional and ethical responsibility.

Outcome 7
(g) an ability to communicate effectively.

Outcome 8
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context.

Outcome 9
(i) a recognition of the need for, and an ability to engage in life-long learning.

**Outcome 10**

(j) a knowledge of contemporary issues.

**Outcome 11**

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.