

THE COLLEGE OF ENGINEERING

STATUS AND FUTURE*

PLANNING DOCUMENT UPDATE

* IN SUPPORT OF A PRESENTATION TO THE EXECUTIVE OFFICERS
OF THE UNIVERSITY OF MICHIGAN, NOVEMBER 4, 1981

CONFIDENTIAL

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OF THE UNIVERSITY OF MICHIGAN, NOVEMBER 4, 1981

College of Engineering
The University of Michigan

James J. Duderstadt, Dean

January 25, 1982

MEMORANDUM

TO: Dr. ^{BEM} Billy E. Frye
Vice-President for Academic Affairs

FROM: James J. Duderstadt ^{JJD}

SUBJECT: Decision Charts summarizing issues presented to Executive Officers
on November 4, 1982 and in College of Engineering Planning Document

In the November 4 presentation to the Executive Officers, the College of Engineering reviewed its long term objectives as well as its short term urgencies. We proposed a series of actions to address these matters. At that time we indicated our belief that the College was at a critical point in its history, and that it required the immediate and significant support of the University if it were to be able to meet its present challenges and responsibilities and take advantage of the unique opportunities that lie before it during the 1980s.

To assist the Executive Officers and their staffs in analyzing these issues, we have prepared a series of "Decision Charts". These identify the most critical of the decisions that involve the College of Engineering, indicate their urgency, estimated cost, funding source (if applicable), and briefly summarize implications of both positive and negative decisions.

We have also provided a preliminary version of a College Data Base, along with an updated version of the College of Engineering Planning Document (including a copy of a summary of this document now before the faculty of the College). These efforts represent our attempt to come to grips internally with the need for making hard decisions (including internal budget reallocation and program reduction) required to meet the critical needs of this state and nation while achieving excellence in education and scholarship. We would hope that the University is prepared to make similar commitments.

We believe the College is unique within the University, not only in the degree to which it has suffered from inadequate University support over the past decade, but as well with respect to the importance of its role in meeting the pressing needs of the state and the nation, the demand it will experience for its graduates and the achievements of its faculty over the next decade, and for its ability to acquire significant resources from both public and private sources. It is essential that the University recognize the importance of this unique position of the College within the University at this time, and that it respond by meeting the serious and immediate needs of the College in a way that will allow it to achieve its objectives of excellence and national leadership during the decade ahead.

Enc.

xc: Executive Officers
VP/Academic Affairs Staff

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COLLEGE OF ENGINEERING

PLANNING DOCUMENT

CONTENTS

UPDATE OF PLANNING DOCUMENT (January 22, 1982)

APPENDICES:

- A. PROGRAMMATIC AREAS OF IMMEDIATE CONCERN
- B. AREAS FOR MAJOR PROGRAMMATIC EMPHASIS OR REVIEW
- C. PLANNING DOCUMENT SUMMARY FOR COLLEGE FACULTY

CONFIDENTIAL

A PLANNING DOCUMENT FOR
THE COLLEGE OF ENGINEERING

January 22, 1982
(Updated)

THE COLLEGE OF ENGINEERING GAME PLAN

"We saw no evidence of a comprehensive long-range plan or of any formalized planning".

External Review Committee for College of Engineering (April, 1980)

GOAL: To honestly assess the present status of the College, establish objectives over the next decade, and develop plans to achieve these objectives. This "Game Plan" document is intended to assist in the preliminary stages of this activity by:

- i) Outlining the College's short term urgencies
- ii) Suggesting long-term goals
- iii) Identifying internal courses of action to achieve these goals
- iv) Suggesting appropriate actions ("proposals") to the Central Administration of the University

NOTE: The Game Plan is intended as an "evolutionary" document and will be modified as actions are taken and goals are achieved.

SCHEDULE:

- i) Initial draft of Game Plan and supporting documentation and proposals to Vice-President Frye (Spring-Summer, 1981)
- ii) Review by College Executive Committee (including revisions (July-August, 1981)
- iii) Submission to University Executive Officers (August 18, 1981)
- iv) Review by Chairmans' Advisory Committee (September, 1981)
- v) Major presentation to the University Executive Officers (November 4, 1981)
- vi) Review by faculty of the College (Winter Term, 1982)

SUMMARY OF OBJECTIVES

MAJOR OBJECTIVE: TO BE THE BEST--to rise to a position of leadership among engineering institutions.

GENERAL GOALS:

1. To achieve excellence in education, scholarship and research, and in the professional activities of our faculty and students.
2. To establish an environment within the College that not only allows for excellence, creativity, and innovation, but actively stimulates, rewards, and demands such qualities.
3. To seek and obtain the resources necessary to support such an environment.

SPECIFIC GOALS FOR THE 1980s:

1. To improve the quality, achievements, and reputation of the faculty of the College by implementing policies concerning hiring, promotion, tenure, and salary that strongly emphasize excellence.
2. To increase very substantially the quality and quantity of research performed by the College.
3. To shift the focus of the instructional programs of the College toward upperclass/graduate level education.
4. To rapidly and dramatically improve and enlarge the graduate programs of the College, particularly at the PhD level.
5. To complete the move of the College to the North Campus within the next three years.
6. To rebuild the equipment inventories and support staff lost through budget cuts over the past decade.
7. To greatly strengthen the College's relationships with industry.
8. To establish an aggressive development program aimed at securing support from both corporate and private donors.
9. To develop a continuing long range planning activity.
10. To develop fair and effective policies for resource allocation.

FACULTY COMMITTEES TO STUDY PROPOSALS IN PLANNING DOCUMENT

1. FACULTY RECRUITMENT

Identification and recruitment of "stars"
Use of endowed chair funds

2. FACULTY DEVELOPMENT

Special needs and concerns of junior faculty
Special needs and concerns of senior faculty
Opportunities for faculty development throughout career

3. PROGRAMMATIC REVIEW AND REALLOCATION

Suggest mechanisms for periodic reviews (including zero-base budgeting)
Suggest areas for possible review (reduction, discontinuance)

4. RESEARCH ENVIRONMENT

Suggest schemes for improving research environment within the College
(involving actions both at the University and College level)
Examine sponsored research fund support of academic salary

5. GRADUATE PROGRAMS

Examine balance between undergraduate, M.S., and Ph.D. programs
How to rapidly and dramatically improve and enlarge PhD programs
Graduate student recruitment
Graduate student financial aid

6. COLLEGE --> SCHOOL ISSUE

Examine implications of moving to school status
Present implications of moving to junior level admission

7. COLLEGE EQUIPMENT AND TECHNICAL SUPPORT COMMITTEE

Identify College equipment and technical support needs
Coordinate College activities in these areas
Function as an executive committee similar to Computer Policy Committee

8. COLLEGE DEVELOPMENT COMMITTEE

Provide advice on major development activities within College
Assist in stimulating major development projects

1. INTRODUCTION

For over a century the College of Engineering at the University of Michigan has ranked among the leading engineering programs in the world, with claims to unusual strength across the full spectrum of technical interest. Each of the eleven academic programs of the College has been ranked among the top such programs in the nation, with several of these programs generally being regarded as national leaders. The College has received international recognition for the quality of its instructional and research activities.

It is our belief that the College will play an even more critical role during the next decade as the State and the nation become increasingly dependent on engineering to revitalize industry and the economy. Today our nation faces an engineering manpower crisis of unprecedented proportions that poses the most serious implications for national productivity and defense. This year some 20,000 engineering positions will go unfilled. The projected engineering manpower needs of the nation for the next decade far exceed the capacity of its engineering colleges. This crisis can be met only through the strong and sustained support of outstanding engineering programs such as those offered by the College of Engineering at the University of Michigan.

1.1. PRESENT CONCERNS

Despite the importance of the College of Engineering to the University, the State, and the nation, it is nevertheless true that the College faces serious difficulties at the present time. An External Review Committee for the College identified a number of "danger signs" in a report presented in March of 1980. These included low faculty morale, a decline in Ph.D. production, a decline in staff size in the face of surging enrollments, research disincentives, insufficient general fund support, the absence of competitive salary programs, the disruption caused by the inability to complete the North Campus move, and the absence of formalized planning activities. Many other areas of concern have been becoming apparent in discussions with faculty, students, alumni, and colleagues in industry and peer institutions. Those concerns that appear to require the most immediate attention can be summarized as follows:

- (i) There has been a serious erosion in University support of the College over the past decade. In recent years enrollment in the College has surged by over 35% to its present level of 5495 students, student credit hours have increased by 45%, while faculty size (FTE) has decreased by 11%. At the present time the College has neither the human resources nor the physical facilities to handle this enrollment while maintaining its traditional level of excellence in its instructional and research programs.

(ii) The research and instructional programs of the College have been handicapped by deteriorating physical facilities, outdated laboratories, and obsolete equipment. This situation has been aggravated by our inability to complete the move to the North Campus. We are presently facing the difficulties caused by the physical separation of our faculty, our laboratories, and our instructional activities on two campuses.

(iii) There has been a serious deterioration in our research and graduate programs, due in part to the increased instructional load on our faculty, but also due to administrative decisions made over the past decade that have tended to de-emphasize graduate education and research.

(iv) Faculty morale is low. The faculty is frustrated by the increased instructional loads, inadequate salaries, the deteriorating environment for research, and the absence of a highly visible effort on the part of the University Central Administration to address these difficulties. Apathy on the part of many faculty members is a particularly serious concern.

(v) There has been a notable absence of long range planning within the College. The College has been distracted by more immediate goals such as the North Campus move and quantitative measures of instructional efficiency to such an extent that the quality of its research and instructional programs has not received adequate attention.

These concerns require direct and immediate action if the College is to reestablish its reputation for excellence and respond to the serious needs of both the State and the nation.

1.2. FUTURE PROSPECTS

Despite these present concerns, it must be recognized that the College also faces a time of great opportunity. Never before has the demand for our graduates been higher. Even after allowing our enrollments to expand by 35% over the past 5 years to the present level of 5300 students, we are able to meet only a small fraction of this need. Both the quantity and quality of students applying for admission to the College are exceptional. At present we are forced to turn away large numbers of outstanding applicants simply because we do not have the resources to handle them.

Both the State and the nation are beginning to recognize the important role that engineering will play in revitalizing industry and the economy, and both are becoming more receptive to the support of engineering education as an essential component in meeting these objectives. Furthermore, the College is in a unique position to establish strong new ties with industry, to work with industry to meet its needs, and in turn, to receive support from industry in meeting the needs of the College. It should also be noted that the College will be rebuilding its faculty over the next decade through the replacement of retiring staff. This will provide it with the flexibility to move in new directions and emphasize new programs.

If we are to be successful in meeting these challenges, in taking advantage of these opportunities, it is essential that the College develop a careful plan for the long term. We must honestly assess the present status of the College, establish objectives over the next decade, and develop plans to achieve these objectives. This document is intended to assist in the preliminary stages of this planning activity. It attempts to outline both the long term goals of the College as well as its short term urgencies and to identify internal courses of action designed to achieve these goals. It also suggests appropriate actions on the part of the Central Administration of the University that will assist the College in meeting our objectives. Particular attention has been directed toward those concerns raised by the External Review Committee Report of March, 1980.

It should be noted at the outset that this document places considerable emphasis on achieving excellence in graduate education and research. Not only is this fitting in terms of the traditional mission of the University, but it also reflects the fact that despite record-high numbers of outstanding undergraduate engineering students, there is a clearly perceived and rapidly growing national crisis in the education of advanced-degree engineers. The grossly inadequate production of graduate level American engineers and scientists poses a serious threat to national security, both in the narrow military sense as well as in the broader sense of maintaining economic and industrial viability in the face of problems of energy, environment, productivity, and food supply. The lack of engineering Ph.D.s will soon be felt very strongly by universities as they become unable to adequately staff their engineering faculties. Nowhere is it more important than in the State of Michigan that a strong cadre of well-educated, advanced-degree engineers be produced to play crucial leadership roles in the revitalization of our manufacturing industries and in the broadening of our industrial base. We strongly believe that one of the University's highest priorities should be to foster graduate education and research in the College of Engineering.

However it must be stated quite clearly that in our efforts to achieve excellence in the research and graduate programs of the College, we do not intend to lose sight of the importance of our undergraduate programs. The quality of the undergraduate instruction offered in the College is outstanding. The excellence of these programs has received international recognition. Thus, while the emphasis in this particular document is most clearly directed toward graduate education and research, we regard the sustained achievement of excellence in undergraduate education to be an objective of comparable importance over the next decade.

2. GENERAL GOALS

The most important long range objective of the College must be a rededication to the achievement of excellence in education, in scholarship and research, and in the professional activities of our faculty and students. We cannot allow ourselves to be distracted by more immediate objectives such as physical facilities or instructional efficiency to the degree that we lose sight of our primary objective of excellence in our research and instructional programs. The key to quality lies not with the physical facilities nor effective administration but rather with people, with their abilities, their attitudes, and their commitment.

In this regard, our second general goal should be to reestablish an environment within the College that not only allows for excellence, creativity, and innovation, but actively stimulates, rewards, and, indeed, demands such qualities. We must move rapidly to achieve an environment that both attracts outstanding faculty and students and retains these individuals.

Our third general goal will involve seeking and obtaining the resources necessary to support such an environment. Certainly the College can and must make a strong case for significant increase in General Fund support. Quantitative data concerning budget histories, enrollment levels, and instructional load make it apparent that the College is seriously underfunded.

However to achieve the level of excellence necessary to reestablish the College among the leading engineering programs in the nation, we must develop in addition alternative sources of funding. Certainly one such source will be funding from sponsored research. There seems little doubt that this funding can be substantially increased, provided suitable research incentives are put into place. It is also important that the College be allowed to establish contact with the State Legislature both directly and through industry, to stress the importance that adequate support of the College will have on the long term health of industry within the State, and also to press for the State to fulfill its commitment to provide the funds necessary to complete the move to the North Campus.

But it is essential to recognize that those funds that will provide the margin of excellence in the College can, indeed, must, come from private support, from direct interaction with industry and our alumni. We must approach industry with a willingness to respond to their needs, and in so doing, develop a relationship that will lead to the direct support of College activities by industrial sponsors. We must also move rapidly to establish an aggressive development program to seek assistance from our alumni, both through direct contributions and through the influence that they can exert within private industry and government. It is essential that the College acknowledge and respond to the major changes that are being forced upon it by the changing nature of funding of engineering education, changes that are pushing it, at least for the foreseeable future, toward the status and the psychology of a private institution. Over the long term this shift from

public to private funding may work to our advantage since it will tie us more directly to industry, which has been and must remain the lifeblood of engineering.

It is our belief that the College is unique within the University, both with respect to the demand it will experience for its students and the achievements of its faculty over the next decade, as well as in its ability to acquire significant resources from both public and private sources. However it is essential that the University Central Administration recognize the importance of this unique position of the College within the University and respond by meeting the very real funding needs of the College, removing those restrictions that inhibit efforts to seek external funding, and providing the seed funds necessary to attract external resources. The University must respond both with the incentives and the resources during the next few years to allow the College to accomplish the transition from public to private sources of funding. This transition cannot occur abruptly, and during this period the College will require the understanding, encouragement, and assistance of the University if we are to maintain and enhance the reputation for excellence which has characterized the College throughout its history.

3. MAJOR OBJECTIVES AND PLANNED ACTIONS

In establishing objectives for the College and planning specific courses of action, we have kept foremost in mind three important guidelines:

(i) It is essential that the College keep as its primary objective the achievement of excellence in its research and instructional programs.

(ii) It must strive to maintain the flexibility to respond to changing needs and priorities.

(iii) It must be prepared to shift resources when necessary, possibly reducing or even eliminating some programs and activities in order to improve or initiate others. In such decisions it must keep in mind the important criteria of quality, centrality, and cost-effectiveness in these decisions.

In this section we propose several major objectives for the College over the next decade and suggest actions aimed at achieving these objectives. These objectives and planned courses of action are grouped into six general areas: 1) faculty; 2) programs; 3) research; 4) space, equipment, and support needs; 5) development; and 6) administration. In several instances actions have already been taken to move toward these objectives, and these actions have been so noted.

3.1 FACULTY

The key to the achievement of excellence lies with the faculty of the College of Engineering, with their abilities, their attitudes, and their commitment. Hence our most important objectives and actions will be directed toward improving the quality, productivity, and morale of our faculty.

3.1.1. OBJECTIVE: To improve the quality, achievements, and reputation of the faculty of the College by implementing policies concerning hiring, promotion, tenure, and salary that strongly emphasize excellence in scholarship.

PLANNED ACTIONS:

1. PROMOTION AND TENURE POLICY: To develop and publicize a rigorous policy for promotion and tenure review that places heavy emphasis on reserach and scholarship. In particular we must establish general and highly visible guidelines for promotion and tenure review, including details of our expectations for the achievements of junior faculty. It is also advisable that we consider a policy regarding the balance between academic research and professional engineering activities for faculty advancement.

(Action Taken: Both the Chairman's Advisory Committee and the College Executive Committee reviewed the promotion and tenure guidelines adopted by the College in 1972. It was felt that these guidelines were appropriate, provided they were applied with sufficient flexibility to allow for variations in department objectives and individual faculty roles. The Executive Committee reaffirmed the guidelines on June 12, 1981, and they were then circulated to the faculty of the College.)

2. STAFFING POLICY: Implement a more flexible staffing policy that places primary emphasis on programmatic needs rather than instructional load. In particular:

2.1. The College must maintain the highest standards in the hiring of new faculty, particularly with regard to research capability.

2.2. As a general rule, the Executive Committee will authorize permanent faculty positions only to meet programmatic needs. It prefers to meet fluctuations in instructional load by providing funds for flexible staff (graduate teaching assistants, adjunct or visiting faculty).

2.3. Faculty position openings created by retirements or resignations will revert to the College. Openings arising because of the decision to release untenured faculty will remain with the Department

2.4. Departments will be allowed sufficient flexibility to find the best possible faculty. The Executive Committee will allow the time necessary to fill positions associated with major programmatic goals. During this search period every effort will be made to provide the department with temporary (flexible) staff funding to meet instructional loads until the position is filled.

2.5. While the primary hiring emphasis will continue to be on junior faculty at the Assistant Professor level, departments are encouraged to broaden their searches to identify outstanding candidates suitable for appointment at higher rank. Of particular interest are candidates with a clearly established potential for major contributions to the College (i.e., star on the rise). Proposals for broadening the original hunting license to accommodate such individuals will be entertained by the Executive Committee on a case by case basis.

2.6. The Executive Committee believes it is essential that new junior faculty be provided with ample opportunity for professional development. It would ask each department hiring such a faculty member to commit itself to providing one summer of support (through a combination of instructional and discretionary funds) and to a reduced teaching (one course per term) and minimal service load for the first two academic years of the appointment.

2.7. The College should develop an aggressive effort to recruit outstanding scholars with established reputations in key programmatic areas. It is prepared to utilize funds from endowed chairs or special supplements to normal general fund appointments to attract such individuals. Departments are invited to make specific proposals concerning the recruitment of such faculty.

(Action Taken: This policy was approved by the College Executive Committee on June 2, 1981 and is now being implemented in College staffing activities.)

3. FACULTY SALARIES: The College is having an increasingly difficult time attracting and retaining high quality faculty due to the serious erosion in its salary patterns when compared both with industry and peer institutions. An aggressive and highly visible salary improvement program is of the highest priority, both for faculty morale as well as for the retention of our most productive faculty.

3.1. It may be necessary to channel a significant portion of any increases in general fund support into salaries rather than increased faculty size. This will require a strong commitment to improved instructional efficiency (decreasing instructional loads while maintaining or perhaps even increasing SCH/FTE by using larger class sections and more flexible staff).

3.2. We must strive to bring our salary schedules more into line with those in industry and at peer institutions. This will require direct action at the University level. We must develop accurate data in support of salary improvement requests that include comparisons with industry, peer institutions, units with 100% General Fund appointments (e.g., LSA), and outside income possibilities (consulting).

3.3. Major emphasis should be placed on a salary improvement program for faculty in the junior and intermediate ranks, where both productivity and marketability are the highest. Primary emphasis should be on raising the salaries of our most productive faculty. While it is true that the base salary program within the College has seriously eroded over the past decade, the College must avoid across-the-board cost-of-living salary improvement programs and instead place primary emphasis on merit salary increase programs. The Dean and Executive Committee must stand firmly behind the Department Chairmen in their efforts to implement such merit-based programs (which may well result in some faculty within the College receiving zero annual salary increases).

3.4. The College should not only use merit as the determining factor in salary determination within departments, but moreover the allocation of salary improvement funds among departments should also contain a strong quality factor.

3.5. We must develop plans to handle the salary compression problem that will develop as we shift our emphasis toward bringing in outstanding scholars at higher salary levels.

3.6. The College should consider innovative programs to augment the General Fund salary base. In particular it should strive to establish more of an enterprenurial atmosphere within the College, similar to those at MIT and Stanford. Then the possibility of outside opportunities could be used to attract and retain new faculty (to

augment their University salaries). Some consideration should also be given to intergrating consulting activities into academic appointments (such as by a Medical Service Plan type of model). Bonus salary programs might also be considered.

(Action Taken: Data characterizing the present market exposure of the College was presented to the University on September 21, 1982, along with a detailed plan for an extraordinary market salary adjustment program. Utilizing both internal discretionary funds and additional funds provided by the University, the College implemented the market adjustment program on September 29, 1982. After first implementing a strong merit program (on a 5.5% base), the College then adjusted assistant professor salaries (with strong merit/market considerations) to competitive levels (average adjustment of 30%). A selected cohort of associate professors characterized by outstanding performance in research also received comparable market adjustments. The College Executive Committee, with the advice of the department chairmen, then made similar adjustments to a selected cohort of full professors as a direct research incentive, using measures of present research activity (PhD supervision, publications, and sponsored research). The average market adjustment (including the 5.5% merit program) for the selected cohort amounted to 21%. This brought the College-wide salary program (merit plus market) to 12%.)

4. JUNIOR FACULTY: The College should direct particular attention to the development, needs, and concerns of junior faculty. The instructional loads on junior staff must be reduced to allow more opportunity for scholarly activities. An improved salary program must also be a top priority. In addition the College should consider innovative mechanisms to stimulate excellence in the achievements of junior faculty, such as the use of discretionary funds, release time for research, junior faculty chairs, and improved channels between the College administration and junior faculty.

(Action Taken: The special market salary program implemented in September, 1981 raised assistant professor salaries by an average 30% to a level of \$29,000 per academic year.)

(Action Taken: Funds to support junior faculty salary programs have been obtained from several major corporations: Exxon (\$100,000 for ChE, \$100,000 for MEAM), Atlantic-Richfield (\$25,000 for MME), and TRW (\$30,000 for ECE). Additional efforts are being taken to attract similar contributions from other companies.

(Action Taken: Attempts to begin a junior faculty forum have been made (with marginal success to date).

(Action Taken: All departments are being strongly encouraged to reduce assistant professor instructional loads to one course per term.)

5. SENIOR FACULTY: We should attempt to reinvolve our senior faculty in College activities more effectively. In particular, we should recognize that faculty interests and roles may change with time, and that we should have the ability to deal with these differing roles via more flexible appointment models. We should identify and encourage more positive roles for tenured faculty who have ceased to be active in research, thereby reducing the instructional and service load on faculty maintaining active research interests. A detailed projection of anticipated retirements in each program within the College over the next decade should be developed. Staffing strategies should then be closely guided by these projections. In some cases accelerated retirement programs may be necessary to allow the earlier replacement of nonproductive senior faculty.

6. FACULTY DEVELOPMENT: The College should take steps to provide for continued opportunities for faculty development throughout a faculty member's career. It should attempt to develop an "early warning system" to identify faculty with incipient nonproductivity ("flameout") and target resources to keep them from sliding out of research activities. Furthermore both the College Executive Committee and individual departments should take more care in the critical evaluation of faculty proposals for sabbaticals and leaves of absence, with careful attention given to their implications for both individual professional development and College programs.

(Action Taken: The College has obtained a \$150,000 grant from IBM to assist in faculty development activities in the computer area. Similar grants have been received from Exxon, Atlantic-Richfield, and TRW.)

It is important to recognize that the reputation of an academic unit is made by a few outstanding scholars ("essential singularities") whose accomplishments in research or professional service are so outstanding as to attract international attention and acclaim. We must establish an environment that will attract, support, and nurture these individuals.

(Action Taken: At the present time the College has acquired roughly \$3.5 M in endowment for faculty chairs. We intend to use the funds generated by this endowment to augment General Fund supported positions with the additional salary and perquisites to attract outstanding scholars. The College is presently conducting searches for such individuals.)

3.1.2. OBJECTIVE: To dramatically increase the research productivity of our faculty by moving rapidly to reduce instructional loads on faculty with strong research capabilities and implement strong incentive/merit programs. A suitable goal would be to work toward an instructional load of one course per term for a faculty member with strong research and Ph.D. student supervision activities.

PLANNED ACTIONS:

1. ENROLLMENT: The College should determine whether it has the resources both in faculty size and physical facilities) to handle the present level of undergraduate student enrollment. If it concludes that even with major improvements in instructional efficiency (see below) its resources are inadequate, then it must act immediately to reduce these undergraduate enrollments to a level commensurate with the resources provided by the Central Administration of the University.

(Action Taken: On November 4, 1981 the Deans of the College met with the Executive Officers of the University for an extended presentation and discussion of the status, concerns, and goals of the College. In this presentation a variety of enrollment goals were discussed. The College conveyed its belief that without substantial budget restoration, it would be forced to cut its undergraduate enrollment by roughly 30% over the next two years (1200 students). With budget restoration, it believed it could handle an enrollment of 4000/750/400 (BS/MS/PhD), although it regards the optimum enrollment as 2000 (J/S)/1000/500.)

2. INSTRUCTIONAL EFFICIENCY: In any event it is essential that the College pursue courses of action leading to improvements in instructional efficiency. In particular we must improve our instructional efficiency by moving to larger class sizes and fewer sections while making extensive use of flexible staff. To the extent that we make more use of GTAs, we not only assist in reducing faculty instructional loads but also provide badly needed graduate student support. Space planning for the North Campus must take into account the need for large lecture auditoriums to accommodate the shift to larger class sizes. We must also introduce administrative mechanisms such as selective control of transfer student admissions at the department level to mitigate enrollment, fluctuations and smooth our instructional loads from department to department. (See Section 3.2.2.)

3. FLEXIBLE STAFF: The present balance between permanent faculty and flexible staff within the College must be carefully examined. There is some concern that the College does not take sufficient advantage of GTAs and visiting or adjunct staff in meeting its instructional loads. We simply cannot afford to tie up our most productive faculty with heavy instructional loads the way we presently do.

(Action Taken: Major funding for flexible staff was built into the College's 1981-82 budget (relying in part on hunting license funds). The degree to which such funding can be maintained in future years will depend on whether the College receives a significant budget restoration.)

4. DIFFERENTIAL FACULTY LOAD MODELS: We should develop faculty appointment load models that aim for a uniform level of faculty effort while allowing for flexibility in the balance among instruction, research, and service activities. In this way faculty who are no longer active in research can be asked to assume additional instructional and/or service responsibilities (e.g., teaching 3 courses per term or assuming additional counseling responsibilities), thereby relieving the present instructional load on faculty active in research. Such differential loads should be handled in a positive manner (e.g., by offering a 20% salary bonus to a faculty member willing to assume an additional course each term). We should also examine more creative approaches to freeing up faculty for research. For example, we might encourage double-load teaching one term to allow a faculty member to take the next term off for full-time research.

(Action Taken: Departments have been encouraged to reduce instructional loads on assistant professors to one course per term, at least during their early years with the College.)

5. MERIT-BASED INCENTIVE PROGRAMS: The College must implement strong incentive programs to reward excellence, creativity, and innovation. In particular, it should utilize merit as the overriding factor in determining salary increases. Furthermore, the allocation of salary improvement funds among departments should also contain a strong quality factor.

(Action Taken: The Deans and Executive Committee interacted strongly with the department chairmen to achieve a strong merit salary program for 1981-82. The 5.5% base salary program ranged from 0 to 15%, while the total merit plus market adjustment program ranged from 0 to 35%. The salary structure of the College was dramatically overhauled to reflect strong merit considerations.)

3.1.3. OBJECTIVE: We must take vigorous and highly visible actions to improve morale among faculty of the College and reverse the slide toward apathy and inactivity on the part of many of our faculty.

PLANNED ACTIONS: Morale in the College is quite low, due to the increased instructional load, inadequate salary programs (particularly in the face of peer expectations), the deteriorating environment for research, and the absence of a highly visible effort on the part of either the College or the Central Administration to address these difficulties.

1. INCENTIVES: We must move rapidly to reintroduce strong incentives for excellence and achievement back into the College. Some of these actions can and will be taken within the College (e.g., strongly merit-based salary and promotion policies, differential appointment models). However action at the University level will also be needed, particularly in the areas of research incentives, salary improvement programs, and space and equipment needs. These actions are presented and discussed in detail at other points in this document.

2. FLEXIBILITY: It is essential that we develop the flexibility through both administrative policy and discretionary fund support to respond to faculty innovation and creativity in research and instructional areas.

3. JUNIOR FACULTY: Of particular concern is the morale of our junior faculty. We must meet frequently with junior faculty and give them clear indications of our support as well as our expectations for their performance.

4. SENIOR FACULTY: We should attempt to reinvolve our senior faculty in College activities more effectively. In particular, we should recognize that faculty interests and roles may change with time, and that we should have the flexibility to deal with these differing roles via more flexible appointment models.

(Action Taken: A variety of actions including the salary program, reactivation of the North Campus move plans, improved faculty/administration communication, and the dramatic increase in the emphasis given research and graduate education appears to have lifted faculty morale for the moment, despite the serious economic difficulties faced by the University and the State. However it is also apparent that dramatic improvements in general fund budget and the research environment will be necessary to sustain this morale.)

3.1.4. OBJECTIVE: To expand significantly the faculty role in influencing College policies. To establish an atmosphere of open communication between the College administration and the faculty.

PLANNED ACTIONS:

1. CHAIRMAN ADVISORY COMMITTEE: To establish an advisory committee consisting of all Department Chairmen that will meet regularly with the Dean to discuss general policy issues concerning the College. (See Sec. 3.6.1.)

(Action Taken: Established in May, 1981.)

2. DIRECT COMMUNICATION MECHANISMS: The Dean and his staff must make an active and concerted effort to improve communication channels with faculty. This will not only include frequent meetings with departments and research groups, but also more effort to meet with individual faculty. Every attempt will be made to establish an atmosphere of easy faculty access to the Dean and his staff.

3. COLLEGE FACULTY MEETINGS: The amount of "boilerplate" present on College Faculty Meeting agendas will be minimized to allow more time for an open discussion of substantive issues.

4. FACULTY INVOLVEMENT IN PLANNING: To appoint ad hoc faculty committees to review and make recommendations concerning major issues delineated in this Planning Document.

3.1.5. OBJECTIVE: We should carefully re-evaluate our present commitment and policies with regards to affirmative action and seek to develop a more aggressive program to recruit minority and women faculty.

PLANNED ACTIONS:

1. To take steps to maximize the pool of minority and women candidates for faculty positions. A key component will be an aggressive graduate student recruitment program for minority and women students.
2. To make every effort to retain qualified minority or women faculty.

3.2. PROGRAMS

The key to meeting the programmatic needs of the College will involve maintaining the flexibility to respond to changing needs and priorities. We must have the willingness, determination, and administrative ability to shift resources internally, so that outdated or inappropriate programs can be reduced or eliminated to provide the resources necessary to initiate or build programs in new or important areas.

3.2.1. OBJECTIVE: To rapidly and dramatically improve and enlarge the graduate programs of the College, particularly at the Ph.D. level.

PLANNED ACTIONS: The College must seek to achieve a graduate/undergraduate program balance more appropriate for a major research institution. For many years there has been a conscious effort within the College to stress undergraduate programs at the expense of graduate education (in sharp contrast to our peer institutions). At present we have only 343 Ph.D. students (roughly 1 per faculty member) and graduate only 50-60 Ph.D.s per year. This situation must be improved as rapidly as possible, since the reputation of the College is strongly dependent on its research and Ph.D. programs. Such a shift in emphasis is of particular importance in light of the crisis situation that has developed in meeting the Ph.D. manpower requirements necessary to sustain our nation's industrial and defense interests.

1. GOAL DEVELOPMENT: We must develop targets for Ph.D. production, graduate student enrollment, and research funding for each department and give these goals high visibility within the College.

(Action Taken: Preliminary goals for graduate enrollment and research volume were established and presented to the Executive Officers on November 4, 1981. These goals correspond to doubling PhD enrollment and sponsored research funding over the next five years.)

2. GRADUATE EDUCATION EMPHASIS: We should develop a plan to shift emphasis to some degree to graduate programs (particularly at the Ph.D. level). This plan should have a very high visibility. We must provide very strong, positive rewards for those departments shifting resources into Ph.D. programs.

(Action Taken: The College administration has made it very clear that it regards a dramatic improvement in the quality of our graduate and research activities as the most important goal of the College for the next decade.)

3. INCREASED Ph.D. ENROLLMENTS: We must move rapidly to increase our Ph.D. enrollments by:

(i) Implementing an aggressive Ph.D. recruitment program (particularly among our own top undergraduates). We should remember that exciting programs attract good students, not simply dollars.

(ii) Moving to increase funds for graduate student support through: industrial grants (particularly for minorities and women), more use of GTAs, internal funds for fellowships, work study funds, more assistance from the Office of Financial Aid (which would allow the College to shift discretionary funds from scholarship to fellowship support), a revision of the indirect cost assessments on GRAs, and special endowments for graduate fellowships.

3.2.2. OBJECTIVE: The College must take actions to mitigate the impact of large fluctuations in enrollment on academic programs

PLANNED ACTIONS: Recent years have seen a rapid growth in undergraduate enrollment in certain programs (ECE, ChE, MEAM, and IOE) to the point where the resources of these programs (both physical facilities and faculty) have become seriously overloaded. We intend to control such enrollment fluctuations by allowing departments to adopt selective admissions policies to govern transfer students.

1. SELECTIVE PROGRAM ADMISSION OF TRANSFER STUDENTS: Academic programs will be allowed to control the admission of transfer students by selective admission policies. The program will first negotiate an enrollment quota with the College administration, using considerations of physical facility and staffing resources. The programs will then selectively admit transfer students (using criteria such as GPAs) until this quota is reached. This policy would have the additional advantage of allowing programs under less enrollment pressure to leave admissions open for a longer period. Students entering the College as freshmen would not be restricted in their choice of an academic program.

(Action Taken: This plan was presented to and approved by the College faculty in October, 1981. The plan is now being implemented for Fall Term, 1982.)

2. ENROLLMENT STUDY: The College should determine whether it has the resources (faculty size and physical facilities) to handle the present level of undergraduate enrollment (4100 students). If such a study determines that even with improved instructional efficiency, the present resources are inadequate for this number, then the College should act promptly to reduce these enrollments to a level compatible with resources provided by the University.

(Action Taken: Analysis performed and presented to Executive Officers on November 4, 1981.)

3.2.3. OBJECTIVE: The College should consider moving to the status of a professional School of Engineering.

PLANNED ACTIONS: It is important to recognize that the College of Engineering has an important professional role in addition to its traditional academic roles of education and research. With the increased emphasis being given to professional aspects of engineering (including engineering registration and practice-oriented professional degrees such as the M. Eng. and D. Eng.), we believe that the College of Engineering should carefully consider moving to the status of a professional school.

1. PROFESSIONAL SCHOOL STATUS: The College should consider becoming a School of Engineering, granting practice/design oriented professional degrees such as the M. Eng. and D. Eng. in addition to the present M.S. and Ph.D. degrees (which would continue to be granted through Rackham).

2. UPPERCLASS ADMISSION: The College should also consider whether it should move to a strictly upperclass/graduate status with admission at the junior year level (similar to Business Administration, Pharmacy, and Architecture and Urban Planning).

(i) This would allow the College to focus its limited resources at the upperclass/graduate level where most engineering courses are offered.

(ii) The lower division students would be shifted over to LSA, thereby compensating for the anticipated loss in enrollment in LSA over the next decade while relieving enrollment pressures on the College. The College would continue to assist in counseling of "pre-engineering" students and would conduct limited course offerings (as required by specific engineering majors) to these students.

(iii) As a practical matter, some 55% of our graduating seniors already transfer in at the junior year. Furthermore, only one 3 hour course in engineering (aside from engineering humanities courses) is taken by freshmen.

(iv) Moving to admission at the junior year is consistent with the trend in engineering practice to shift away from highly specific to more general engineering activities thereby placing more importance on a liberal education for engineers.

(v) Such an upper division program would clearly be acceptable to the Accreditation Board for Engineering and Technology. In fact, many engineering programs have already gone to upper level admission.

(Action Taken: Preliminary discussion of moving to a school status occurred at the College faculty meeting in October, 1981. While there was strong support for this move, there was also general agreement that more information should be obtained before making a final decision.)

3.2.4. OBJECTIVE: The College should conduct regular and frequent reviews of all programs.

PLANNED ACTIONS:

1. LONG RANGE PLANNING: Long range planning activities should be made an important part of the annual budget process. Departments should be asked to come in with a long range plan with objectives, along with an assessment of the status of the department, at budget time. At this point the College Executive Committee could provide approval of specific goals (e.g., research volume, undergraduate and graduate enrollments) along with allocation of resources adequate to achieve these goals.

(Action Taken: The College will implement strategic planning activities as part of its annual budgeting process. In the present economic climate it is essential to conduct period reviews of all academic, service, and administrative activities (evaluated according to the criteria of centrality, quality, and cost-effectiveness).)

2. PERIODIC EXTERNAL REVIEWS: The College should establish a periodic review policy (such as that at MIT) in which each department or program is reviewed at regular intervals (e.g., every 2-3 years) by an external review team with strong representation from industry.

3. REVIEW RECOMMENDATIONS: To assist in providing a basis for budget priority and resource allocation decisions, it should be clearly understood

that one possible recommendation of any major program review (occurring at the time of chairman appointment) could be for program reduction or discontinuance. A clear statement of the criteria to be used in such reviews should be developed.

3.2.5. OBJECTIVE: The College must develop a comprehensive plan for computer support of instructional and research needs.

PLANNED ACTIONS: It is now apparent that the present University computer system is no longer adequate to meet the needs of the College. Therefore it is essential that the College begin planning for a significant expansion of internal computing capability. To this end, we intend to establish a Computer Policy Committee to develop and implement policies involving computer usage in the College. Members will be appointed to 3 year (staggered) terms by the College Executive Committee, with broad representation from various classes of computer users (MTS mainframe, scientific computation, computer research, computer aided design, real time processing, mini (VAX) and micro (Apple) use. Possible functions of the Ccomputer Policy Committee will include general allocation of MTS funds, review of major computer equipment and software acquisition requests, and coordination of College computer support. The Committee will work closely with the Associate Dean for Research and Development (who will be a member of the committee).

(Action Taken: A detailed proposal for the College Computer Policy Committee was considered and approved by the College Executive Committee on August 4, 1981. The Committee has been meeting since September, 1981 with some success.)

(Action Taken: A detailed analysis of College MTS needs was performed, and a corresponding request for an additional 14.8% in MTS allocation was submitted to the Vice President for Research in August, 1981.)

In Appendix A we have listed a number of specific programmatic areas that should receive particular attention.

3.3. RESEARCH

The research environment within the College (and the University in general) has deteriorated seriously over the past decade. There are few incentives and many disincentives for conducting research. This is particularly critical since research determines the reputation of the College, the quality of its faculty and students, its instructional programs, and its contributions to society. Research also plays a very real role in determining the resources of the College and University.

3.3.1. OBJECTIVE: To increase very substantially the quantity and quality of research performed by the College, as measured both by scholarly productivity and sponsored research volume.

PLANNED ACTIONS:

1. ASSOCIATE DEAN FOR RESEARCH AND GRADUATE PROGRAMS: To give research activities a very high priority and visibility within the College, we intend to appoint an Associate Dean for Research and Graduate Studies. This individual and his staff will assume the responsibility for developing policies within the College concerning research and industrial development activities, coordinating these activities both within the College and University as well as external to these units. This Associate Dean will supervise the College wide support of research activities (e.g., computer services, central technician support, accounting support) and will act as a strong advocate for the faculty in seeking accountability from University units that affect research activities (e.g., the Vice President for Research, DRDA, Personnel), and Federal Fund Accounting). He will also supervise the distribution of funds returned from the University out of indirect cost payments (see below). Other important duties will include administrative support of graduate programs in the College, including graduate recruitment and support, program coordination and review, and liaison with the Rackham School of Graduate Studies.

(Action Taken: Professor Daniel E. Atkins assumed the position of Associate Dean for Research and Graduate Studies in September, 1981.)

2. INDIRECT COST POLICIES: The present University policies governing sponsored research will seriously impede our efforts to achieve a significant increase in research activities. Not only do these policies prevent the College from acquiring the funds so essential to stimulate new research programs and support ongoing research activities, but they also allocate indirect cost funds generated by the College to the support of other units of the University that are less effective in recovering the full costs of their sponsored research activities. Moreover these policies have had a strongly negative impact on the morale of the College faculty engaged in sponsored research.

(Action Taken: The College presented the following formal proposal to the Executive Officers of the University in November, 1981:

The dominant portion of all University funds used to support sponsored research activities (including funds used to cover contract overruns or disallowances, underrecovery of indirect costs, cost-sharing, department administration of sponsored research, and equipment and renovation) should be allocated to units in direct proportion to their success in recovering indirect costs. Based on accounting data for the past several years, this would amount to an allocation of University resources to units corresponding to some 35% of their indirect cost recovery.

The Executive Officers have yet to act on this proposal.)

3. OTHER INCENTIVES: We must move at once to provide strong, positive individual incentives for research through a variety of mechanisms:

- (i) indirect cost return as discretionary funds
- (ii) promotion/tenure/merit increase policies that stress research accomplishments
- (iii) differential faculty appointment models that recognize the importance of research activities and the demands of research administration

4. REDUCING BURDENS OF RESEARCH ADMINISTRATION: We must seek to reduce the burdens of research administration on junior faculty and allow them more time for creative research. Possible approaches would include encouraging collaboration with senior faculty in the preparation and promotion of research proposals and research projects involving larger teams of faculty (and larger magnitude) to consolidate research administration activities. It is particularly important that we do not let our desire for diversity spread our faculty so thin that the research interests of junior faculty become isolated.

3.3.2. OBJECTIVE: The College must move at once to clarify policies on the use of sponsored research funds to support academic salaries.

PLANNED ACTIONS: A serious concern of our faculty is the present policy of supporting roughly 20% of their salary using sponsored research funds. Over the course of the past 20 years since this policy was first implemented, salaries of College faculty on 80% general fund plus 20% sponsored research appointments have deteriorated to the levels of those on 100% general fund appointments in comparable units (e.g., the Departments of Mathematics, Physics, and Chemistry in LSA). Furthermore the instructional load carried by our faculty on 80% General Fund appointments has now risen to the point where it exceeds that borne by faculty in other units who are supported by 100% General Fund appointments.

1. GENERAL POLICY: We should carefully reexamine the present system of sponsored research support of academic salaries. While such partial appointments may be necessary at present for budgetary reasons, they should be approached in a positive manner so that faculty will be encouraged to support part of their salary from research funds, rather than told that this is the expected norm.

2. ELIMINATING PRESENT INEQUITIES: We should consider several possible strategies aimed at removing the inequities of the present policy:

(i) The College should determine the number of FTEs (100% General Fund) needed to handle present enrollments, based both on University and peer institution data. It should then demand that the Central Administration either fund these FTE positions or allow a corresponding enrollment decrease.

(ii) The College might consider reassigning present 100% academic salary rates to the 80% General Fund appointment of faculty. The University would be committed to fund only this 80% base salary. Faculty could then augment this base (up to 20%) from sponsored research support. (Note while that this would effectively increase the potential salary of faculty by $100/80 = 1.25$, it would decrease the number of FTEs funded by the University by 20%.) (This may be a dangerous course of action.)

(iii) A third option would be to reassign the present College 9-month academic salary to an 8 month period. This would not only allow faculty to acquire an extra month (3 or 4 month summer support) on sponsored research, but it would also increase the base salary rate by $1/8 = 12.5\%$. (This is also a course of action with high risk.)

3. 3 MONTH SUMMER APPOINTMENTS: We need to develop a policy regarding 3 month summer appointments. (For example, how should we handle requests to reduce to a 90% academic appointment in order to free funds for a third summer month -- although it might be noted that the 3 month summer appointment might be more productive than a 20% academic term appointment from a research point of view.)

3.3.3. OTHER POSSIBLE ACTIONS

1. CONSULTING: We should try to attract some component of faculty consulting activities back onto campus by suitable incentive programs (possibly patterned after the Medical School MSP program).

2. ANNUAL RESEARCH ACTIVITIES REPORT: We should assemble an annual research activities report for the College, listing all publications, grants, etc. (This might make use of the data collected for the present ABET review.)

3. OVERRUN, DISALLOWANCE, AND COST-SHARING OBLIGATIONS: There is some misunderstanding among College faculty concerning the very real and direct cost of contract overrun, disallowances, and cost-sharing obligations to the College. The College must be certain that these costs are understood and minimized by faculty.

(Action Taken: A detailed explanation of existing University policies governing overruns, disallowances, and cost-sharing on sponsored research projects was prepared and circulated to the faculty in August, 1981.)

(Action Taken: In December, 1981 department chairmen were alerted that they would receive an allocation to cover all disallowances and overruns proportional to their department's indirect cost recovery. Total responsibility for these costs would be borne by the departments.)

4. RESEARCH SUPPORT STAFF: The College must build up research support staff (including technicians, software engineers and programmers, and secretarial services) using indirect cost return funds.

5. INTERACTIONS: College interactions with other University research units such as IST should be strengthened (and carefully monitored). Furthermore, the status and future of major College research units should be carefully monitored).

6. "RATIONALIZATION CONCERN": There is some concern that many faculty may be just rationalizing about not being able to do research because of disincentives. It is very important to implement positive incentive programs, but the practical benefit may be more pronounced for people that are already active (so that we can reward and retain them). In any event, it is important that we send out a clear signal that research activities will be considered of paramount importance in merit increases and promotion/tenure reviews.

3.4 SPACE, EQUIPMENT, AND SUPPORT NEEDS

Physical facilities, equipment resources, and the availability of support staff are critical factors in achieving an environment suited for the achievement of excellence in research and instructional programs. While it is true that the effort to complete the move to the North Campus has on occasion diverted the College's attention from more important goals such as excellence in teaching and research, it is also true that our programs are seriously handicapped at present by deteriorating physical facilities, a faculty divided between Central and North Campus, outdated laboratories, obsolete equipment, and inadequate support staff.

Despite the present financial condition of the State, we believe that it is a particularly opportune time to approach the State Legislature to ask them to honor their previous commitment to appropriate funds needed for the completion of the North Campus move. A strong case can be made that this, more than any other action that the State might take, could have an impact in terms of assisting State industry and attracting new industry that would help to breathe new life into our foundering economy. We will present a more detailed proposal in support of this action in Section 4 of this document. At this point, we will only summarize the key features of this proposal along with other actions needed to meet space, equipment, and support needs.

3.4.1. OBJECTIVE: To complete the move of the College to the North Campus within the next three years.

PLANNED AND PROPOSED ACTIONS: The College of Engineering should set as one of its highest priority objectives a completion of the move to the North Campus on as rapid a schedule as possible. This move should be approached in a manner that makes the most effective use of existing space on the North Campus. In this way we can alleviate the problems caused by the uncertainty surrounding the status of Engineering Buildings I and III. We have outlined below a sequence of actions aimed at attaining this objective.

1. The unfinished space available on the ground floor of the Dow Building would be configured as the North Campus Instructional Center contained badly needed classrooms (including large lecture halls) and the Instructional Television System.

2. We should determine the availability of the following space on the North Campus:

(i) The Research Administration Building: This building could be used to house the Department of Industrial and Operations Engineering.

(ii) The Printing Services Building would provide the laboratory space needed by the Center for Robotics and Integrated Manufacturing, along with selected laboratories of the Department of Electrical and Computer Engineering.

(iii) The North Library Annex: The location of this building, adjacent both to the Computer Center and the Engineering/Transportation Library, would be an ideal Student Activities Center for our numerous student engineering societies. It would also be a possible location for the Engineering Placement and Co-operative Education Center.

3. We should continue with plans to consolidate the Department of Mechanical Engineering and Applied Mechanics entirely on the North Campus in the G.G. Brown, Automotive, and Dow Buildings.

4. The high bay area of G.G. Brown should be modified to accommodate the move of the Department of Civil Engineering into this area and Building 1-A.

5. The College proposes to move the Engineering and Transportation Library into the IST Building where it will be configured as a sophisticated Technical Information Center, providing a highly visible resource base (including computer based reference and software services) both to the University

community and industry. This would be closely coordinated with the College's Chrysler Center for Continuing Engineering Education and its instructional Television System (to be moved into the Chrysler Center in 1981-1982.) In view of our unfavorable experiences in recent years with the University Library system, we feel it absolutely essential that the College reassume administrative responsibility for the Engineering and Transportation Library. Otherwise there is a very real chance that the College and the University (not to mention the State and the nation) will lose the tremendous resources present both in the collections and staff of this library, viewed by many as the leading university engineering library in the nation.

6. If the above moves can be accomplished, then only one new building (that originally planned as Building I of the old North Campus move plans) would be required to hold ECE and IOE. The funds for this building were "promised" several years ago by the State Legislature in response to a commitment to match private contributions to the College's Capital Campaign (\$20 M). Hence it seems an opportune time for the College and the University to make a concerted effort to obtain these funds from the State, even in the light of the present budget situation.

7. It should be stressed that these actions would not only lead to the consolidation of the College of Engineering on the North Campus in the most rapid and cost-effective basis, but they would also provide highly visible evidence both to the State and to Michigan industry of the University's desire to adapt its resources to meet present State needs by stressing those programs that have the most potential to assist industry and the economy.

(Action Taken: This plan was presented in preliminary form to Vice President Frye and Brinkerhoff in June, 1981. A revised prospectus for Engineering Building I was prepared and submitted to the Executive Officers in December, 1981, and detailed proposals for the Research Administration, GG Brown Laboratory, and Printing Services/North Library Annex Buildings will be submitted to Vice-President Brinkerhoff in January, 1982. Present scheduling targets the submission of final drawings for Building I to the Capital Outlay Committee in fall of 1982.)

 3.4.2. OBJECTIVE: To develop a space allocation plan so that the College can make the most efficient use of existing space. In effect, the allocation of space should be one aspect of resource allocation.

PLANNED ACTIONS:

1. SPACE RENTAL PLANS: The College must develop decision criteria to assist in space allocation. The most dramatic approach would be to quantify these criteria in terms of a space rental scheme in which each department (or research group) would be required to "rent" space needed for its activities. This would work in a manner very similar to charges for computer time.

(i) Initially each unit would be allocated a certain

amount of funds for space rental, based on staff size and needs, enrollment, and so on. These would be real dollars that could be spent either for space rental or other uses, at the unit's discretion.

(ii) The unit would then be asked to pay rent for space actually used. If it used less space than its initial allocation, it could divert the remaining funds to other uses. It could use more space if it were willing to pay for it.

(iii) Research contracts would be assessed space charges through indirect costs. (Note that this would require indirect cost return to the College.)

2. SPACE ALLOCATION CRITERIA: Such an involved space rental scheme may not be necessary, however. Most conflicts in space are only in a few overlapping areas (roughly 10% of total space requirements). A priority list of decision criteria could resolve these conflicts. The College might also identify perhaps 10% of its space as "community space" with rapid turnover based on needs.

3.4.2. OBJECTIVE: We must build back up the equipment inventories and support staff lost through budget cuts over the past decade.

PLANNED ACTIONS:

1. Use seed funds from the General Fund to attract industrial support for equipment.
2. Give high priority to the build up of technical support staff (particularly in the electronics area).
3. Use indirect cost return to build up computer services support staff (both hardware and software development).
4. While much of the sophisticated equipment obtained through research grants can be used in instruction, there remains the continuing problem of meeting more mundane equipment needs for undergraduate instruction. These needs must be addressed through General Fund support.

3.5. DEVELOPMENT

It is important that we recognize that funds from industrial or private sources will represent a critical component of the College's resources over the next decade. Indeed, industrial support and funds from private donors will probably play the key factor in determining the College's ability to achieve its goal of excellence during this period, as funding from public sources (State and Federal government) decline. Hence it is essential that we establish an aggressive development program to tap private sources of funds.

Certainly our alumni must be persuaded to play a far more active role in the support of the College. We must convince them that the College should be regarded, in effect, as a private institution, with needs and goals similar to those of the leading private engineering programs (e.g., MIT, Caltech, and Stanford).

An equally critical role must be played by industry. Industry is the primary beneficiary of our products, of our students and our research. It is absolutely essential that we get the message across that until the public is once again willing to fund engineering education, industry must be willing to pick up the ball. To begin to provide a major source of our support, to "pay" for the very important products we produce for them, our students and our creative achievements.

But here the College of Engineering must do its share. It must approach industry with a willingness to respond to its needs, and in so doing, develop a relationship that will lead to the direct support of College activities by industrial sponsors. It is particularly important that we address these special needs of Michigan industries in the areas of manufacturing and productivity, by moving rapidly to develop and apply our strong potential in areas such as manufacturing engineering, computer aided design and manufacturing, robotics, industrial engineering, and engineering materials.

It is important to acknowledge the major changes that are being forced upon us by the changing nature of the funding of engineering education, changes that are pushing us, at least for the foreseeable future, toward the status and psychology of a private institution. In the long run this shift from public to private funding may work to our advantage, since it will tie us more directly to industry, which has been and must remain the lifeblood of engineering.

3.5.1. OBJECTIVE: The College must establish an aggressive development program aimed at securing support from both industrial and private donors.

PLANNED ACTIONS:

1. FACULTY ADVISORY COMMITTEE: Convene a special committee composed of faculty in the College with extensive experience in fund raising activities to develop general policies and goals for a major development effort. In particular, we should try to come up with a general development strategy along with a "shopping list" of items that we can use in approaching industry and private donors.

(Action Taken: This faculty advisory committee was selected and convened for its first meeting in June 1981. It will continue to meet at regular intervals during the next year.)

2. CAPITAL CAMPAIGN: Plan for a new capital campaign for programs, faculty, and students (not just bricks and mortar). This should include a strategy for seeking major gifts from foundations, corporations, and individuals.

(Action Taken: We have contacted each of the members of the National Advisory Committee active during the 1974-77 Capital Campaign requesting their participation on a new Committee for the 1980s. Thus far, most of this group has responded quite positively to our request.

3. DEVELOPMENT STAFF: We must rebuild our professional development staff by seeking individuals with experience in fund raising for technical programs (e.g., from the MIT or Caltech capital campaign).

(Action Taken: Some re-organization of the development staff was implemented. Elaine Harden was appointed as Assistant to the Dean/College Relations with responsibility for maintaining relations with key alumni. A new position of Director of Development was created and the search for an individual to fill this position is now underway.)

4. PUBLICATIONS PROGRAM: We must rebuild our publications program, taking care to aim it at the interests of alumni (e.g., alumni news rather than esoteric articles on engineering). We should strive to achieve a self-supporting operation for our alumni magazines (similar to those of most private universities).

(Action Taken: A preliminary publications program has been initiated, and the first publication for alumni has been prepared and distributed.)

5. ALUMNI PROGRAMS: We must build a strong alumni program patterned after private institutions. We need to develop a strong graduating class identity. This should be initiated while students are still enrolled in the College. We must make a strong appeal to alumni that we can no longer be regarded as a public institution, at least to the extent that we will be more dependent on private resources than public funds for the foreseeable future.

6. INTERUNIVERSITY INTERACTIONS: We believe it is essential that the development activities of the College be tightly coordinated with those of the University in general. To this end, we hope to establish a close working relationship with the Central Operating Committee — Capital Campaign and Development and the Office of the Vice President for University Relations and Development. The College should also determine the degree to which it wishes to interact with the Michigan Alumni Association.

3.5.2. OBJECTIVE: We should develop a strong Industrial Affiliates program to seek maximum interaction and assistance from private industry.

PLANNED ACTIONS:

1. We will develop Industrial Affiliates programs similar to those at MIT, Stanford, Illinois, and Caltech.
2. These programs should be built around present and planned College programs and facilities such as the Chrysler Center for Continuing Engineering Education, the Instructional Television System, and the Technical Information Center (planned).
3. The Industrial Affiliates programs should be strongly discipline oriented.

(Action Taken: The Department of Electrical and Computer Engineering and Mechanical Engineering and Applied Mechanics have initiated four such affiliates programs. Industrial and Operations Engineering has been conducting such a program in the Ergometrics area for several years.)

3.5.3. OBJECTIVE: The Industry Committee should be reorganized and asked to perform specific tasks in support of the College (in addition to its present advisory role).

PLANNED ACTIONS: Due to "benign neglect" over the past decade, the College Industry Committee has lapsed into a rather passive role of only marginal value to the College. This Committee should be reconfigured the Committee as an active group of direct importance to the College. Possible roles include (i) providing industrial contacts, (ii) applying pressure on both the State Legislature and the University on behalf of the College, (iii) becoming involved in specific projects to generate resources for the College, (iv) continuing to provide advice. It is essential that the Dean play a far more active role in guiding the activities of this Committee (perhaps by becoming its chair).

(Action Taken: Select members of the Industry Committee have been contacted to assess their attitude toward the future of this Committee. The general feeling seems to be that while the present Industry Committee may serve a useful College relations activity, a new committee should be appointed to assist the College in a more active manner.)

3.6. ADMINISTRATION

We must seek to achieve a College administrative structure more appropriate for the pursuit of excellence in our research and instructional programs and more responsive to the needs and concerns of faculty and students. It is essential that the faculty role in influencing College policy be significantly expanded. We must move to establish an atmosphere of cooperation and open communication between the College administration and the faculty.

3.6.1. OBJECTIVE: To reinvolve the Department Chairmen in policy formation within the College.

PLANNED ACTIONS:

1. CHAIRMAN ADVISORY COMMITTEE: The Department Chairmen feel isolated from policy making within the College, frequently being forced to operate in a vacuum, without any visible policy or criteria for decisions. Hence our first action will be to establish a Chairmen Advisory Committee that will meet regularly with the Dean to discuss general policy issues concerning the College.

(Action Taken: The Chairman's Advisory Committee was convened and met weekly during the months of May and June. These meetings were extremely productive, and the decision was made to continue the meetings on a monthly basis during the academic year.)

2. POLICY DEVELOPMENT: The first task of this committee will be to provide a foundation for the development of general policies in the areas of:
(i) hiring, promotion, and tenure criteria; (ii) resource allocation; and
(iii) space allocation since these are the issues presently of most concern to Department Chairmen. Furthermore, suitable policies in these areas will allow more decentralization of administrative responsibilities within the College to the department level.

3. GENERAL INTERACTIONS: It is essential that strong channels of communication be established and maintained between the Department Chairmen and the Dean's Office. The input from Chairmen and faculty must be sought out before making any major policy decisions. It is essential to avoid confrontation at this level if at all possible, and instead to rely on an open receptiveness to all points of view and a highly visible process to arrive at decisions in a fair manner.

3.6.2. OBJECTIVE: To restructure the Dean's Office and staff to achieve a more responsive and flexible administration.

PLANNED ACTIONS:

1. ADMINISTRATIVE STRUCTURE: The administrative staff of the College will be streamlined and integrated more effectively within the tentative organization chart shown in Appendix B. The principal administrative positions will consist of three Associate Deans responsible for Academic Affairs, Research and Graduate Studies, and Student Affairs and Curriculum.

(i) The Associate Dean for Academic Affairs will be responsible for policy formation and administration of the general fund component of the College budget, including resource allocation decisions, interaction with Department Chairmen and faculty, staff appointments, and other activities concerned with the academic programs of the College.

(ii) The Associate Dean for Research and Graduate Studies will be responsible for policy formation and administration in the areas of research, industrial development, and graduate studies. Other responsibilities will include the Computer Policy Committee, research support, research centers, and special project development.

(iii) The Associate Dean for Student Affairs and Instruction will be responsible for policy development and administration in the areas of instruction, student services, curricula, and undergraduate student affairs.

The Associate Deans will be assigned administrative responsibilities and budgetary authority. They will be provided with sufficient staff (including administrative assistants) to allow them the opportunity for policy formulation and implementation activities. It is felt essential that the Associate Deans be provided with the opportunity to continue their personal professional activities (e.g., research).

(Action Taken: Professor Charles Vest was appointed Dean for Academic Affairs and began this appointment on June 1. Professor Daniel E. Atkins was appointed Associate Dean for Research and Graduate Studies and Professor H. Scott Fogler was appointed as Associate Dean for Student Affairs and Instruction effective October 1, 1981.

2. OTHER ADMINISTRATIVE POSITIONS: An effort will be made to make more use of faculty for administrative positions. This involvement will be accomplished through partial appointments.

3. OTHER POSSIBLE ACTIONS:

(i) A North Campus branch of the Dean's Office will be established and staffed during the next academic year.

(ii) A major restructuring of Student Records should be considered (including the possibilities of computerizing it or transferring this activity to the Registrar's Office).

(iii) The Dean's Office should be reconfigured physically and equipped with modern office capability (word processing, computer data base).

(Action Taken: The Dean's Office was physically rearranged and equipped with modern office capability [wordprocessor, computer data base] during the Summer of 1981.)

(iv) The Chrysler Center and the Instructional Television System should be combined administratively with common administrative support and marketing staff.

3.6.3. OBJECTIVE: The College must move rapidly to develop a continuing long range planning activity.

PLANNED ACTIONS:

1. POLICY DEVELOPMENT: It is essential that the College develop general and flexible policies that will allow it to handle short-term crises more effectively, thereby affording an opportunity to focus on more important long range planning activities.

2. EXECUTIVE COMMITTEE: The efforts of the College Executive Committee should be focused on major policy decisions rather than day-to-day for major policy decision. It is essential that the functions of the Executive Committee be streamlined to focus on important policy matters rather than administrative details.

3. GOAL DEVELOPMENT: The College should move to develop both short-term and long range goals in each of the areas discussed in this section (faculty, programs, research, physical facilities, and development). The faculty must play an important role in this planning activity.

4. PLANNING ACTIVITIES: Long range planning activities should be made an important part of the annual budget process. Departments should be asked to come in with a long range plan with objectives, including an assessment of the status of the department at budget time. At this point the Executive Committee could provide approval of specific goals along with the allocation of resources adequate to achieve these goals.

5. FUNDING PHILOSOPHY: We must stress a pragmatic approach, taking small steps toward large goals, consistent with the realities of the present budget situation. To this end, we should utilize internal resources primarily as seed funds targeted toward activities with a high probability of payoff. Early requests for additional funds from the Central Administration of the University should be confined to activities with highly visible and certain payoff, rather than speculative proposals. The most immediate emphasis should be on seeding new areas of research and industrial development.

6. FINANCING OF NON-ACADEMIC ACTIVITIES: It is essential that ALL non-academic activities either achieve a self-supporting mode of operation immediately or be phased out. This includes Continuing Education, Instructional Television, the Development Office, and research centers and institutes. We simply cannot afford "losing" operations at this point in time. Our other priorities are too important to lose funds in support of non-essential activities.

3.6.4. OBJECTIVES: The College must develop fair and effective policies for resource allocation. It should attempt to return primary responsibility for cost management to the department level (consistent with careful monitoring from the College level). This would provide strong incentives for local cost control and stimulate the allocation of resources in the most effective manner at the department level.

PLANNED ACTIONS: There has been widespread concern that budget allocation within the College has not been conducted in an equitable manner or in a way which encourages long range planning. There is a perception among Department Chairmen that budgets have usually been based on a uniform percentage increment of the previous year's budget with insufficient attention being given to department needs or objectives. Budget categories have been overly restrictive, leaving departments with little flexibility for local management and resource allocation.

1. GENERAL PHILOSOPHY: It is essential that we develop equitable (and highly visible) criteria for resource allocation and acquire an adequate data base to support these decisions. Both present loads and future goals should be included in these considerations.

2. ALLOCATION MODELS: To this end, it may be appropriate to consider a point count model reflecting College goals (with the approval of the faculty and/or the Department Chairs). Such models would contain strong quality factors. Time dependent coefficients would be useful (as would input from the Central Administration). At least 10% of the budget allocation should be left to the Dean's discretion, however.

3. POSSIBLE ASPECTS: If a suitable resource allocation scheme can be developed, it should then be possible to move toward a more flexible budgeting process in which the primary responsibility for local resource allocation is placed at the department level. The College would establish some general guidelines (as well as monitoring mechanisms) and then allow departments the flexibility to allocate resources locally in such a manner as to achieve their particular goals. Possible aspects (and implications) of such an allocation plan could include:

(i) Each department might be assigned a certain FTE support base, assuming some College-wide norm on sponsored research fraction. (Although this fraction might be set initially at 80%, we might consider gradually increasing it to 100% over the next several years.) Departments would then be allowed to retain internally any funds released by additional research appointments. By the same token, if they wished to move to a higher General Fund academic fraction, they would have to work with reduced FTE numbers or shift funds from other sources (e.g., flexible staff, summer teaching, etc.). This particular approach would allow units to implement different General Fund fractions, provided they were willing to bear the cost of this in reduced FTE numbers.

(ii) One small step in this direction would involve decentralizing the control over cost-sharing and overruns. That is, the College could return the indirect cost return directly to each department based upon indirect cost generation. Then each department would be responsible for paying overruns and cost-sharing out of this. They could use remaining funds for discretionary purposes. By the same token, they would be forced to cover any major overruns out of these or other sources.

(iii) A critical factor in any such scheme to decentralize administrative cost controls is to make it

clear that the College Central Administration would not bail out overruns. Rather this would be taken out of the unit's hide, either by encumbering discretionary funds or future year budgets.

(iv) A second critical factor is some oversight or accounting scheme to monitor department's activities (perhaps computer based).

(Action Taken: Preliminary discussions of resource and space allocation policies have been held with the Chairman's Advisory Committee and the College Executive Committee during Spring and Summer of 1981. A more detailed resource and space allocation policy is under development with scheduled implementation for the 1982-83 academic year.)

4. SALARY NEGOTIATIONS: There is a general concern that the College Executive Committee has been asked to play too detailed a role in faculty salary determination, and that detailed negotiations should occur between the Deans and the Department Chairs before general consideration by the Executive Committee. More specifically, we would propose the following plan:

(i) The Dean and the Executive Committee will establish general salary guidelines.

(ii) The Dean would then meet with the Chairs individually to discuss (and negotiate) specific salary proposals (before they meet with individual faculty).

(iii) These revised proposals would then be submitted to the Executive Committee for final consideration and approval.

(Action Taken: This program was implemented in the preparation of the 1981-82 salary program of the College.)

APPENDIX A

PROGRAMMATIC AREAS OF IMMEDIATE CONCERN

1. MANUFACTURING SCIENCES AND ENGINEERING: There is general agreement that this area will be one of the major thrusts of the College during the next decade. Furthermore, the College is likely to have available considerable internal resources to direct at this area in the near future. However it is apparent that before any such resources can be committed, there needs to be a major effort to coordinate the various manufacturing engineering activities in different departments (e.g., Mechanical Engineering and Applied Mechanics, Industrial and Operations Engineering, Electrical and Computer Engineering) to develop a sound College-wide program in this area.

(Action Taken: In September, 1981 the Board of Regents approved the establishment of the Center for Robotics and Integrated Manufacturing (CRIM) with Dean Daniel E. Atkins chosen as Acting Director. Initial funding for CRIM is provided by \$250,000 in State funds (PRR) and \$250,000 from the Eaton Corporation. Participants in CRIM include roughly 30 faculty from ECE, MEAM, IOE, MME, and Aero. It is anticipated that CRIM will play a major role in the establishment of the State's Industrial Technology Institute ("Robotics Institute") planned for the Ann Arbor area.)

2. COMPUTER SCIENCE AND ENGINEERING: The recent review of the Computer and Communications Science program in LSA and the pending review of the Computer, Information, and Control Engineering program in the College has prompted a University-wide re-evaluation of the various computer-related academic programs conducted on this campus. Because of the critical importance of this area to all of our engineering programs, the College must be an active participant in this review to ensure that it leads to actions consistent with our needs and goals.

(Action Taken: The College Computer Policy Committee has been reviewing and coordinating computer activities in the College. In September a major proposal involving ECE and CCS was submitted to the NSF to establish a program in Experimental Computer Science and Engineering.)

3. DEPARTMENT OF HUMANITIES: The future of the Department of Humanities within the College should be reviewed very carefully. We must determine whether it is consistent with the academic goals and projected resources of the College to continue as the only engineering program in the nation with its own instructional staff in humanities. Of particular concern will be the degree to which this program is duplicated in LSA and the extent to which humanities courses taught within the College tend to isolate our students from those in liberal studies. A related question will concern the possible role of a technical communication program within the College (at either the

graduate or undergraduate level), perhaps combined with new areas such as computer graphics, software communication, and information storage and retrieval.

(Action Taken: The College Executive Committee has carefully reviewed the future of this Department in the College. This consideration has led to the consensus view that some form of program reduction or discontinuance should be actively considered. The Dean has met with the Department on several occasions (including a separate meeting with the junior faculty) to discuss various possibilities in an open and candid fashion. The College is now preparing plans to coordinate the literature stem of the Department with similar instructional activities in LSA, while focusing the rhetoric stem on technical communication and information transfer programs.)

4. OCEANIC SCIENCES: We should determine whether the Oceanic Sciences program can be reoriented to make it more attractive to engineering students, or whether this program should be discontinued (or transferred to LSA).

5. TECHNICAL MANAGEMENT: In recognition of the fact that over half of our graduates become managers within 5 years of graduation, the College should work with the School of Business Administration to develop and introduce courses in technical management into the engineering curriculum. Another possibility might be a two year combined M.S.E./M.B.A. program for outstanding students.

6. MATERIALS AND METALLURGICAL ENGINEERING: A top-quality materials program should be a primary objective in our efforts to improve the research and instructional programs of the College. The present MME Department faces important staffing decisions during the next several years as a large fraction of its staff approaches retirement. We should determine the most appropriate way to strengthen this Department, including a decision of the relative importance of stressing microscopic in addition to macroscopic (process) materials studies and the relative balance between metallurgical, ceramic, and polymer areas.

(Action Taken: The Dean has meet individually with each member of the Department to discuss its future. The results of these discussions along with the recommendations of external scientists and engineers will be considered by the College Executive Committee in Winter Term, 1982. In the meantime it has been decided that the Foundry will not be moved to the North Campus.)

7. APPLIED PHYSICS PROGRAMS: The College should consider developing a graduate program in Applied Physics, to be staffed and administered jointly with the Department of Physics in LSA. The present undergraduate degree in Engineering Physics might serve as a useful point of departure.

8. CO-OP PROGRAMS: The College should develop a high quality Co-op program with Industry. This program must be administered and coordinated centrally.

(Action Taken: The College Executive Committee approved a proposal on August 4, 1981 to develop a detailed administrative and academic plan for the implementation of a pilot Co-op program with selected companies in Winter Term, 1981. A detailed plan was presented to the faculty in November, 1981 and met with considerable enthusiasm. Plans are now underway to acquire the resources to implement the pilot co-op program in 1982.)

9. GENERAL CONCERNS: Some consideration should be given to the balance between the diversity and concentration in programmatic areas. In several departments there seems to be some evidence that the faculty are spread over too many disciplines to achieve the critical mass necessary for excellence.

APPENDIX B

AREAS FOR MAJOR PROGRAMMATIC EMPHASIS OR REVIEW

AREAS FOR MAJOR EMPHASIS

1. Computer Integrated Manufacturing
2. Robotics
3. Computer-Aided Design and Engineering (CAD/CAM)
 - i) Discrete part design and manufacturing
 - ii) Process design and control
 - iii) Construction
 - iv) Engineering services
 - v) Ship design and production
4. Supercomputers (vector processing)
 - i) acquisition of a Cray I or Cyber 205
 - ii) large scale simulation
5. VLSI Research and Development
6. Experimental Computer Science and Engineering
7. Technical Information Management
 - i) Technical data bases
 - ii) Information storage and retrieval
 - iii) Technical communication
 - iv) human-machine interfaces
8. Biotechnology, Microbial Engineering
9. Physical Metallurgy, Ceramics, and Materials Studies
10. Automotive Engineering
11. Controlled Thermonuclear Fusion
 - i) Inertial Confinement Fusion
 - ii) Ion Beam Fusion
 - iii) Hybrid fission/fusion systems

AREAS FOR SUSTAINED STRENGTH

1. Core Disciplines

Mechanical Engineering
Electrical Engineering
Chemical Engineering
Computer Engineering
Industrial Engineering

2. Applied Areas

Aerospace Engineering
Nuclear Engineering
Naval Architecture
Civil Engineering

3. Other Areas

Atmospheric Sciences (Space Physics)

AREAS FOR REVIEW AND POSSIBLE REDUCTION OR CONSOLIDATION

1. Department of Humanities
2. Process Metallurgy (the Foundry)
3. Consolidation of Civil Engineering programs
4. Automotive Engine Testing
5. Oceanic Sciences
6. Administrative Areas
 - i) Student Records (consolidation with Central Records Office)
 - ii) Placement Office (self-supporting basis)
 - iii) Chrysler Center (self-supporting basis)
 - iv) Instructional Television System (self-supporting basis)
 - v) Development activities (self-supporting basis)

SUMMARY OF PLANNING DOCUMENT DISTRIBUTED TO COLLEGE FACULTY

A PLANNING DOCUMENT FOR THE COLLEGE OF ENGINEERING

(SUMMARY)

1. INTRODUCTION

For over a century the College of Engineering at The University of Michigan has ranked among the leading engineering programs in the world, with claims to unusual strength across the full spectrum of technical interest. Each of the 19 academic programs of the College is currently ranked among the top such programs in the nation, and several of these are generally regarded as national leaders.

It is our belief that the College will play a critical role during the next decade as the state and the nation become increasingly dependent on engineering to revitalize industry and the economy. Today our nation faces an engineering manpower crisis of unprecedented proportions that poses the most serious implications for industrial productivity and national security. There is every expectation that this shortfall in engineering manpower will persist at least through the next decade, as engineering programs are constrained in expanding their capacity by inadequate public funding and the availability of engineering doctorates. The College of Engineering can play a major role in meeting the engineering needs of the state and the nation through its engineering graduates and the research activities of its faculty.

To meet these challenges as well as the opportunities that will lie before the College over the next decade, we have set very ambitious objectives. We intend to assume a position of leadership in engineering education and research over the next several years in several of our key programs. We intend to be the best. We have no illusions about the challenge presented by this objective. We recognize that it will require a major rededication to the achievement of excellence in education, in scholarship and research, and in the professional activities of our faculty and students. It will require that we establish an environment within the College that will stimulate, reward, and, indeed, demand excellence in our research and instructional activities. We must create an environment that can be used to attract and retain faculty of truly outstanding capability. It will also be necessary to acquire the physical facilities and funding from both internal and external resources necessary to support and sustain such an environment. To be the best -- certainly this is an ambitious goal -- but it is a goal that we believe is well within reach, and we will refuse to settle for anything less.

In establishing objectives for the College and planning specific courses of action, we have kept foremost in mind three important guidelines:

- (i) It is essential that the College keep at its primary objective the achievement of excellence in its research and instructional programs.
- (ii) It must strive to maintain the flexibility to respond to changing needs and priorities.

- (iii) It must be prepared to shift resources when necessary, possibly reducing or even eliminating some programs and activities in order to improve or initiate others. In such decisions it must keep in mind the important criteria of quality, centrality, and cost-effectiveness in these decisions.

It is essential that the College develop a careful plan for the long term. We must honestly assess the present status of the College, establish objectives for the next decade, and develop plans to achieve these objectives. To assist in this planning, we have prepared a Planning Document for the College that attempts to outline both the longer terms goals of the College as well as its short term urgencies and to identify internal courses of action designed to achieve these goals. This Planning Document has served as the basis for several important initiatives directed at the Central Administration of the University.

In this summary of the Planning Document we will review a number of the major objectives we have proposed for the College and outline several suggested actions aimed at achieving these objectives. These objectives and planned courses of action are grouped into six general areas: 1) faculty; 2) programs; 3) research; 4) space, equipment, and support needs; 5) development; and 6) administration.

2. FACULTY

The key to the achievement of excellence lies with the faculty of the College of Engineering, with their abilities, their attitudes, and their commitment. Hence our most important objectives and actions will be directed toward improving the quality, productivity, and morale of our faculty.

OBJECTIVE: To improve the quality, achievements, and reputation of the faculty of the College by implementing policies concerning hiring, promotion, tenure, and salary that strongly emphasize excellence.

†
ACTIONS:

- i) (*) To implement a rigorous policy for promotion and tenure review that demands excellence in research and teaching.
- ii) (*) To implement a more flexible staffing policy that places primary emphasis on programmatic needs rather than instruction load.
- iii) (*) To implement a vigorous and aggressive salary improvement program for all academic ranks.
- iv) (*) To direct particular attention to the development, needs, and concerns of junior faculty.

†(*) --> Actions taken; (**)--> Actions planned.

- v) (**) To address the particular needs of senior faculty.
- vi) (**) To provide for continued opportunities for faculty development throughout a faculty member's career.
- vii) (*) To acquire the resources (endowment) and begin the search for several new faculty of world-class caliber.

OBJECTIVE: To dramatically increase the research productivity of our faculty by moving rapidly to reduce instructional loads on faculty with strong research capabilities and implement strong incentive/merit programs.

ACTIONS:

- i) (*) Determine the resources (both faculty size and physical facilities) necessary to handle the present level of undergraduate enrollment and then work with the Central Administration to bring funding and enrollment levels into a suitable balance.
- ii) (**) To pursue courses of action leading to improvements in instructional efficiency (e.g., larger class sizes, more use of flexible staff, use of modern telecommunications/computer methods).
- iii) (*) Determine an appropriate balance between permanent faculty and flexible staff and work to achieve this balance throughout the College.
- iv) (**) Develop faculty appointment/load models that aim for a uniform level of faculty effort while allowing for flexibility in the balance among instruction, research, and service activities.
- v) (*) Implement strong incentive programs to reward excellence, creativity, and innovation (including a strong merit salary program).

OBJECTIVE: We must take vigorous and highly visible actions to improve morale among faculty of the College and reverse the slide toward apathy and inactivity on the part of many of our faculty.

ACTIONS:

- i) (*) Move rapidly to reintroduce strong incentives for excellence and achievement into the College (including an aggressive salary improvement program).
- ii) (*) Develop the flexibility through administrative policy and discretionary fund support to respond to faculty innovation and creativity in research and instructional areas.

OBJECTIVE: To expand significantly the faculty role in influencing College policies. To establish an atmosphere of open communication between the College administration and the faculty.

ACTIONS:

- i) (*) Establish an advisory committee consisting of all department chairmen that will meet on policy issues with the Dean and his staff.
- ii) (**) To make an active and concerted effort to improve communications channels with faculty.
- iii) (**) To minimize the boilerplate present at College faculty meetings to allow more time for an open discussion of substantive issues.

OBJECTIVE: To carefully re-evaluate our present commitment and policies with regards to affirmative action and seek to develop a more aggressive program to recruit minority and women faculty.

ACTIONS:

- i) (**) To take steps to maximize the pool of minority and women candidates for faculty positions.
- ii) (**) To implement an aggressive program for recruiting minority and women students at the graduate level.

3. PROGRAMS

The key to meeting the programmatic needs of the College will involve maintaining the flexibility to respond to changing needs and priorities. We must have the willingness, determination, and administrative ability to shift resources internally, so that outdated or inappropriate programs can be reduced or eliminated to provide the resources necessary to initiate or build programs in new and important areas.

OBJECTIVE: To rapidly and dramatically improve and enlarge the graduate programs of the College, particularly at the Ph.D. level.

ACTIONS:

- i) (**) To develop targets for Ph.D. production, graduate student enrollment, and research funding for the College as well as for each department.
- ii) (*) To develop plans to shift the emphasis toward graduate programs (particularly at the Ph.D. level).

- iii) (**) To move rapidly to increase our Ph.D. enrollments by implementing an aggressive Ph.D. recruitment program and increasing funds for graduate student support.

OBJECTIVE: The College must take actions to mitigate the impact of large fluctuations in enrollment on academic programs.

ACTIONS:

- i) (*) Implement a policy to allow the control of transfer student admissions at the department or program level.
- ii) (**) Bring enrollment levels and General Fund budget levels into balance.

OBJECTIVE: The College should consider moving to the status of a School of Engineering.

ACTIONS:

- i) (**) The important roles of the College in post-baccalaureate education, research, and professional aspects of engineering should be given a level of recognition comparable to the undergraduate programs of the College by moving to the status of a School of Engineering (with M.S. and Ph.D. degrees continuing to be granted through the Rackham School of Graduate Studies).
- ii) (**) The College should consider moving to a strictly upperclass/graduate status with admission at the junior year level.

OBJECTIVE: The College should conduct regular and frequent reviews of all programs.

ACTIONS:

- i) (*) Long range planning activities at the department level will be made a part of the annual budget process.

OBJECTIVE: The College must develop a comprehensive plan for computer support of instructional and research needs.

ACTIONS:

- i) (*) To establish a Computer Policy committee to develop and implement policies involving computer usage in the College.

4. RESEARCH

The research environment within the College (and the University in general) has deteriorated seriously over the past decade. There are few incentives and many disincentives for conducting research. This is particularly critical since research determines the reputation of the college, the quality of its faculty and students, its instructional programs, and its contributions to society. Research also plays a very real role in determining the resources of the College and the University.

OBJECTIVE: To increase very substantially the quality and quantity of research performed by the college, as measured both by scholarly productivity and sponsored research volume.

ACTIONS:

- i) (*) To appoint an Associate Dean for Research and Graduate Studies to assume responsibility for policy formation and administration in the areas of research, industrial development, and graduate studies.
- ii) (*) To make a concerted effort to obtain significant indirect cost return to provide the funds essential to stimulate new research efforts, support ongoing activities, and provide strong research incentives.
- iii) (*) To provide strong, positive incentives for excellence in research, including merit salary programs that heavily emphasize scholarship and faculty appointment models that recognize the importance of research activities and the demands of research administration.
- iv) (**) We must seek to reduce the burdens of research administration on junior faculty and allow them more time for creative research.

OBJECTIVE: The College must clarify policies on the use of sponsored research funds to support academic salaries.

ACTIONS:

- i) (*) Carefully reexamine the present system of sponsored research support of academic salaries.
- ii) (**) Work to eliminate present inequities of sponsored research in the College relative to other University units.
- iii) (*) Adopt clear policies allowing the possibility of 3 month summer research appointments for faculty.

5. SPACE, EQUIPMENT, AND SUPPORT NEEDS

Physical facilities, equipment resources, and the availability of support staff are critical factors in achieving an environment suited for the achievement of excellence in research and instructional programs. While it is true that the effort to complete the move to the North Campus has on occasion diverted the College's attention from more important goals such as excellence in teaching and research, it is also true that our programs are seriously handicapped at present by deteriorating physical facilities, a faculty divided between Central and North Campus, outdated laboratories, obsolete equipment, and inadequate support staff. We have therefore set as a major objective the completion of the move of the College to the North Campus on the most rapid and cost-effective basis.

OBJECTIVE: To complete the move of the College to the North Campus within the next three years.

ACTIONS:

- i) (*) To review all plans for the North Campus move and prepare a new master plan to accomplish this move on the most rapid and cost-effective basis.
- ii) (*) To utilize renovation of existing College facilities on the North Campus, coupled with reassignment of other University buildings to accommodate all of the departments in the College with the exception of Electrical and Computer Engineering.
- iii) (*) To reactivate the state planning activity and obtain the release of funding for Engineering Building I, now intended primarily for the Department of Electrical and Computer Engineering.

OBJECTIVE: To develop a space allocation plan as one aspect of more general resource allocation so that the College can make the most efficient use of existing space.

ACTIONS:

- i) (*) To complete a detailed inventory of College space availability and needs for use in North Campus planning.
- ii) (**) To develop decision criteria to assist in space allocation.

OBJECTIVE: To rebuild the equipment inventories and support staff lost through budget cuts over the past decade.

- i) (**) To give a high priority to rebuilding technical support staff within the College.

- ii) (**) To develop a coordinated program to solicit industrial grants to support both instructional and research equipment needs.

6. DEVELOPMENT

It is important that we recognize that funds from industrial or private sources will represent a critical component of the College's resources over the next decade. Indeed, industrial support and funds from private donors will probably play the key factor in determining the College's ability to achieve its goal of excellence during this period, as funding from public sources (state and federal government) decline. Hence it is essential that we establish an aggressive development program to tap private sources of funds.

OBJECTIVE: The College must establish an aggressive development program aimed at securing support from both industrial and private donors.

ACTIONS:

- i) (**) Restructure the Development program of the College and rebuild the professional staff necessary to support this activity.
- ii) (*) Plan a new capital campaign for programs, faculty, student support, and physical facilities (as a component of the University's Capital Campaign).
- iii) (**) Rebuild the College's publication program.
- iv) (**) Build strong alumni programs patterned after those of private institutions.

OBJECTIVE: The College should work to build strong relationships with private industry.

ACTIONS:

- i) (**) Encourage the formation of industrial affiliates programs (with strong discipline dependence).
- ii) (*) Reorganize the Industry Committee, broadening it to national scope and relying on its subcommittees to play an active role for the College.

7. ADMINISTRATION

We must seek to achieve a College administrative structure more appropriate for the pursuit of excellence in our research and instructional programs and more responsive to the needs and concerns of faculty and students. It is essential that the faculty role in influencing College policy be significantly expanded. We must move to establish an atmosphere of cooperation and open communication between the College administration and the faculty.

OBJECTIVE: To reinvolve the Department Chairmen and faculty of the College in policy formation concerning major issues before the College.

ACTIONS:

- i) (*) To establish a Chairman's Advisory Committee that will meet regularly with the Dean and staff to discuss general policy issues concerning the College.
- ii) (**) To work with the chairmen to develop general policies for resource allocation.
- ii) (**) Appoint key ad hoc faculty committees to study and make recommendations concerning major issues delineated in this document.

OBJECTIVE: To restructure the Dean's Office and staff to achieve a more responsive and flexible administration.

ACTIONS:

- i) (*) The principal administration positions in the College will consist of three Associate Deans responsible for Academic Affairs, Research and Graduate Studies, and Student Affairs and Instruction. The associate deans will be assigned both administrative responsibilities and budgetary authority.

OBJECTIVE: The College must move rapidly to develop a continuing long range planning activity.

ACTION

- i) (**) The College must develop general and flexible policies that will allow it to handle short-term crises more effectively, thereby affording an opportunity to focus on more important long range planning activities.
- ii) (*) The College should move to develop both short-term and long range goals in each of the areas discussed in this document.

- iii) (*) Long range planning activities should be made an important part of the annual budget process.
- iv) (*) The College must stress a pragmatic approach, taking small steps toward large goals, consistent with the realities of the present budget situation. Internal resources should be utilized primarily as seed funds targeted toward activities with a high probability of payoff.
- v) (*) It is essential that all non-academic activities either achieve a self-supporting mode of operation rapidly or be phased out.

OBJECTIVE: The College must develop fair and effective policies for resource allocation. It should attempt to return primary responsibility for cost management to the department level (consistent with careful monitoring from the College level). This would provide strong incentives for local cost control and stimulate the allocation of resources in the most effective manner at the department level.

ACTION

- i) (**) It is essential that the College develop equitable and highly visible criteria for resource and space allocation and acquire an adequate data base to support these decisions.,
- ii) (**) It is appropriate to consider quantitative models reflecting College goals to assist in the allocation of resources.
- iii) (**) The College should move to a more flexible budgeting process in which primary responsibility for local resource allocation is placed at the department level.
- iv) (*) Faculty salary programs should be developed with strong interaction between the chairmen, Executive Committee, and Deans to achieve a system with a strong merit component.

