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ABSTRACT

Six major conference papers cover selected planning activities for eight institutions of higher education. Discussed are academic planning for the University of Houston; circulation, parking, and landscape planning for the University of California at Irvine; planning office organization and staffing at Harvard and Ohio State Universities; building project programing for the University of Chicago physical science building; computer applications at Duke University; and capital and operational budgeting for Macalester College and the University of California. (EA)

COLLEGE AND UNIVERSITY PLANNING — 1969

Selected Papers from the Fourth Annual Conference
Society for College and University Planning
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OPENING ADDRESS

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President Hoffman, President Wagner, distinguished ladies and gentlemen. I began to wonder a while ago when I saw this distinguished group here why I had agreed to talk to them. After hearing my introduction, I know why: it sure is good to hear someone be complimentary for a change.

That gracious introduction, however, neglected to mention one aspect of my record, and I think it's one I should point out to you. After I graduated from Cisco High School, the state condemned the building and tore it down. I graduated from Andoc Junior College, which forthrightly closed its doors during the Depression. Daniel Baker College has now been absorbed by Howard Payne, and in the last legislative session, Texas Tech changed its name. There must be something significant in this chain of events.

I've been asked to discuss the planning activities of the Texas Coordinating Board and obviously a complex and demanding task of coordination couldn't be covered in a period such as this except in the broadest of generalities. So let me at the outset attempt to place our activities in a historical perspective.

Coordination in higher education is a relatively recent development. Although the need for some sort of a plan in higher education was recognized much earlier, most states didn't begin moving in this direction until about 20 years ago. Today, faced with unprecedented enrollment, limited funds, and the need to institute programs that are relevant to manpower needs and social problems, state systems of higher education must have some degree of planning, if coordination is to be achieved.

Most states have some kind of formal coordinating agency or authority. The memberships and functions of the agencies vary widely from state to state, but until this year it seemed that the national trend would be in the direction that Texas has taken: namely that of retaining the separate governing boards for institutions and achieving coordination through a lay board appointed by the governor and confirmed by the senate. This year however, four states have turned from statewide coordination to statewide governing boards. Whether this is a trend that will be followed in the future or not, we can only watch with some interest.

In Texas, higher education developed over many years without any overall plan for what it wanted its higher education system

to become and do. There was what might be described as almost a condition of anarchy, so far as any higher educational planning was concerned. Generally speaking, the thorny questions or problems of appropriations and financing were dealt with in the political arena, and the most politically potent institutional administration was the most successful in building its campus and getting money. Locations of colleges and universities during this period were determined by local interests and local pressures. Once the institutions were established, those same local interests were unrelentingly ambitious on their behalf, ambitious before the institutions were ready to perform. Campaigns were mounted to elevate junior colleges to four year institutions, without any regard to the roles or types of institutions that were being created or destroyed. Campaigns were mounted to add graduate programs to four year colleges, and to make regional universities out of the old teachers colleges.

And so it went until the early 1950's when serious efforts began to be made toward achieving coordination and organized planning for development of higher education at state levels. In Texas these efforts led to the creation of the Commission on Higher Education, which was succeeded in 1965 by the Coordinating Board for the Texas College and University System.

The Coordinating Board was given more responsibility and authority than its predecessor agency was, and for the first time in this state, junior colleges were included under its jurisdiction. Previously they had been administered by the Texas Education Agency which is responsible for public elementary and secondary education in the state.

The statute which created the Coordinating Board specifies its purpose as: "Establish in the field of public higher education in the State of Texas an agency to provide leadership and coordination for the Texas higher education system, institutions, and governing boards to the end that the State of Texas may achieve excellence for college education of its youth through the efficient and effective utilization of and concentration of all available resources and elimination of costly duplication in program offerings, faculties and physical plants."

In the coordination of public higher education in this state, there is a three way relationship between the Coordinating Board, the institutional administrations and the governing boards of those institutions. An adequate and effective system of higher education demands a joint involvement and a sharing among all three. Needless to say, the traditions and aspirations of individual institutions and their local supporters sometimes pose problems for those institutions in accepting any statewide limitations in their aims and aspirations. On the other hand, the administrations and governing boards have realized that they can't be all things to all people, that

they must give searching thought to the role that their own institution can and should play within the framework of the state system, and then focus every effort towards having the institution play that role with distinction.

Specifically what we on the staff of the Coordinating Board see as our major planning responsibilities may be defined in three general statements.

1. Identify the needs of the state in terms of people; that is, in terms of human resources to be developed, the number and types of programs needed and the number and types of student spaces that will be needed to handle these programs and this number of people.

2. Assess the resources available and required to meet state goals. Here again we deal with programs, with facilities and most specifically with the role that each institution should play in the state mosaic of higher educational endeavor. This function involves recommendations on the expansion of the system, in the possible changes of institutional roles and how these institutional roles, as they change, fit into a changing pattern of state needs. Our problem in this area is not how to achieve a dull mediocrity, an undesirable equality. It is rather one of how to meet the needs of the state with creative planning which places emphasis on purposeful innovation, the application of new ideas and techniques to the educational enterprise, so that real and individual institutional excellence can be achieved.

3. Influence the availability of funds to achieve the state goals which have been identified, and to insure an equitable distribution of those funds so that the most effective use of the state resources can be made.

In attempting to meet these broad and rather awesome responsibilities that are involved in this type of planning, we have worked toward the development of a state-wide long range plan for higher education. We have been told that we are foolish to project only to 1980, and that our projections and plans for 1980, when that year finally comes along, will be "Model T" type plans, not sufficiently ambitious. Others have said we've been too ambitious in planning for 1980 that we can't see that far ahead. This is a problem that all planners have. People not involved in the process feel that we plan too much or too little.

I thought you might be interested in some of the activities that we've gone through in trying to meet our responsibility. First, we have projected the college age population and its growth rate by county. Some of the counties have sizeable populations within themselves, and all of the counties, whether the population is significant or not, are sure of their

own significance in the state plan. We've tried to predict the number of students the institutions will need to serve, and where the concentrations of these students will be geographically.

Second, we have tried to plan for the expansion of the public junior college system, and have encouraged open door admission policies to these institutions. The junior colleges are primarily locally controlled institutions, and we want to insure that every Texan who desires some educational opportunity will have a junior college within a reasonably accessible distance of his home.

Third, we have suggested -- and this created a great deal of interest -- stabilizing enrollment patterns for existing public senior colleges during the next decade, in order to keep them at whatever is determined to be the optimum size for the particular institution, and to assure the maintenance of educational quality. There is a real relationship, we're not sure what this is, between optimum size and the ability of an institution to provide the types of services that people are requiring of higher educational institutions in this day.

Fourth, to help accommodate students who would be precluded from attending the existing senior institutions if this enrollment stabilization is achieved, we've recommended additional senior colleges and some upper division master's level institutions in the population centers of the state, where we believe the majority of the students of the future will be living. The legislature has authorized establishment of three of the six recommended general academic institutions, and plans for the development of these institutions are already under way.

Fifth, we have projected the growing demands for professional education in the state and have recommended the establishment of new medical schools and new dental schools to meet the state's needs during the next decade. Two new medical schools recommended by the Coordinating Board and an additional dental school have been authorized by the legislature this year, and the responsible institutions have begun planning for their development. In addition, the legislature has recognized for the first time, that private schools, particularly those in medicine and dentistry, have an important role to play in meeting the needs of the state in professional education. Thus, the state has authorized contractual relationships with our two private institutions, Baylor College of Medicine and Baylor University College of Dentistry.

Sixth, to assure maximum use of existing facilities and to help determine the need for additional facilities, we have inventoried instructional and other space available at Texas institutions of higher education. We are in the process of conducting space utilization studies with a view toward development recommendations for the institutions to look at, so that they might use these

to increase the operational efficiency of their physical plants. We have a large number of committees, composed of representatives of the institutions themselves, working on a major project designed to attain the most equitable distribution and the most effective use of state funds available for higher education. This project involves studying, revising, refining and identifying other areas which can be supported by the formula system which this state adopted a number of years ago as a basis for school requests for operational funds.

This is an overall, very generalized view of the types of activities that we've carried on. Critics of the Coordinating Board say that in the coordination of program development, physical plant expansion and funding recommendations, we're taking over the administrative responsibilities of the school. We don't believe this is a valid criticism because the boards and the administrators of the particular institutions have the necessary autonomy to conduct their business. But this autonomy exists within the framework of a state-planned endeavor, not in the confusion and chaos of an unplanned, politically oriented jousting for position.

So, as far as the Coordinating Board is concerned, we're performing functions which the institutions have not and cannot easily perform for themselves. However, we're certainly not doing this without the involvement of the institutions themselves. All segments of higher education in the state - every major institution and most of the smaller ones - have been involved in the development of statewide planning.

Let me emphasize again the Coordinating Board's role is one of joint responsibility, and that cannot take place outside of the (if you'll excuse the expression) educational establishment. It is one that cannot function without involvement of the institutions themselves, and we're very pleased at the response that we've had and the efforts that institutions have made to help make our planning successful.

It's at this point where state plans have been made that the individual institutions pick up their own responsibilities for planning. And we recognize that it is also at this point that the involvement of the Coordinating Board must stop. To become involved in the planning of individual colleges and universities would be, as someone has put it, "where we stop preachin' and start meddlin'". Aside from the administrative soundness of not becoming involved in the individual planning of each institution, it would be physically impossible in a state of this geographic size, with the number of institutions of higher learning that we have, to plan so completely at the state level.

It would be false for me to tell you that we've had unqualified

success in statewide planning. In the four years that the Coordinating Board has functioned, there have been some false starts. There have been some re-evaluations. But I would insist that there have been a number of successes. On balance I believe that we're moving in the right direction, that we can anticipate increased institutional understanding and acceptance of statewide planning and greater participation in statewide planning. I think that we can expect vastly increased staff competence at the Coordinating Board level in meeting our obligations as our basic law charges us to do, and to achieve excellence in teaching at institutions of higher education.

DEVELOPING THE ACADEMIC PLAN: UNIVERSITY OF HOUSTON

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In recent years we have all heard much about the need for developing an academic plan, but we have seen far too little actually done about it. The watch words of higher education have become "constant change" and "the need for good planning". Everyone is for them; they are obviously required in our kind of fast-moving, complex environment.

However, when you know that you ought to do something and are not sure how to go about it, your anxiety level goes up and it becomes increasingly difficult to take any kind of action.

Hundreds of years ago someone said: "There is nothing more difficult to take in hand, more perilous to conduct, more uncertain in its success, than to take the lead in the introduction of a new order of things." The writer was Machiavelli and he was right. However, the introduction of a new order of things has become viewed as Machiavellian which has a different flavor to it altogether. Planning creates anti-planning. A new plan always challenges those who derive their power from the old one and the result is a backlash which all planners fear and which good planners manage to avoid, or at least minimize.

The purpose of academic planning is not the development of a complete written plan, but rather the development of a planning process by which the human, statistical, financial and intangible elements of the educational environment can be brought into effective relationship. If there is too much emphasis on the plan itself (and too little emphasis on the process) the plan is doomed to failure because the planners will have over-estimated the logical appeal of their charts and statistics and will have under-estimated the difficulties of making changes at the operating level with people who have no sense of participation. Effective planning is incomplete planning. Too much blueprinting, too many charts and statistics, too much emphasis on the dollar may put the kiss of death on a program. The charts and statistics are the working tools which can be fed into the human side of the enterprise, which can stimulate and guide, which can fill in the holes in the large gray area of infor-

mation needed, but which cannot, under any circumstances, make the decisions or dominate the process.

The success of any plan, especially in higher education, depends on its capacity to meet the requirements of flesh and blood. The development of an effective planning process requires a good deal more executive skill than simply determination and good intentions. Effective planning is participatory planning and requires the development of a process with the ability to cope with the human problems of the organization. It is people who make the planning work and it is for the benefit of people that plans and programs are designed in the first place. The bloodless criteria of economic analysis, workload projections, space requirements and the like are critically important, but they should not be over-emphasized.

One of the principal reasons that more academic planning has not been done is that notions of "planning" have encountered considerable resistance. This resistance stems in large from the fear of loss of individual freedom and the end of independent planning by separate disciplines and activities. Implicit in this resistance is the feeling that independence can be preserved only if operations remain too complex, too obscure for central evaluation and control. Some of these fears may be smaller than they appear to be. It is now apparent that spiraling costs and sheer inefficiency of operation pose a greater threat to freedom of action than do the exposure of operating details and the loss of some degree of control over resources.

In 1964, the University of Houston began to develop a campus plan. This effort required the development of a planning process and of a concept of planning which has guided our efforts since that time. In July 1967, an Office of Institutional Studies was established to support a continuing planning process. The case study which follows describes what we have done. In presenting this case study, we share with you our successes and failures, because the process that we have gone through has produced both. We have committed ourselves to a continuing planning process which is organized around an annual planning cycle. The commitment is strong, but the application is a little weak. As the limits in our lives bring us to ourselves, perhaps we can strengthen the process and the planning.

Purposes of an Academic Planning Process

In February 1969, the University of Houston completed its first academic planning cycle. Having once gone through the process and accumulated a large amount of data, we feel that a planning process should yield at least nine specific outputs.

1. Establishing University Objectives

One of the primary purposes of any academic plan should be to establish overall university objectives which will serve as a basis for making future major university decisions. When we speak of overall university objectives, we mean objectives such as: The university will (or won't) place maximum educational emphasis upon programs in Business, Engineering, Law, Pharmacy and Optometry; the university will offer, but not attempt to excel in, speech, art, music, etc; the university will maintain its present day-night mix and offer certain night programs to serve the working community of the Greater Houston area; the university will remain a school for full-time and part-time students in order to serve the Greater Houston area; and the university will control enrollment in each major area (for example, 4,000 undergraduates in the College of Business, 2,000 undergraduates in Fine Arts, and so on).

2. Establishing Program Priorities

Once the objectives have been established, priorities among the existing programs and new programs can be determined. The planning data used to establish objectives and priorities will also indicate the order in which program requirements should be satisfied. For example, if the Business program is given priority over the Fine Arts program, new faculty and other requirements to maintain quality in business education will be largely satisfied before the Fine Arts Program is allowed to develop a new Ph.D. area of study.

3. Determining Resource Needs

A plan, by definition, should provide a basis for determining all resource needs, such as manpower, space and dollar requirements, for each operating level within the university.

4. Trade-offs

A planning process should provide a basis for making trade-offs. Once the overall university objectives and program priorities have been established, the supporting planning data should enable the decision makers to trade-off the resource requirements of one major program in order to enhance the development of another program. For example, perhaps by postponing a Ph.D. area of study in one of the lesser emphasized areas, a new Ph.D. area of study could be started immediately in a higher priority area.

5. Resource Allocation

The planning process should provide a basis for resource

allocation. When the university knows where it is going in terms of its objectives, has priorities extablished among the various programs, and understands the feasibility of program trade-offs, then allocation of resources becomes less traumatic as the plans are implemented by way of the annual budgeting process.

6. Communication and Feedback

The planning process should encourage the faculty and professional staff to participate in the process. Once all of the basic inputs have been summarized and analyzed, the administration has an obligation for communication with the faculty and staff. The administration has a commitment, not only because of the long hours that the faculty have put in, but also because the faculty must know the areas of academic emphasis within the University if they are to make the plan work.

7. Extra-University Communication

The academic plan can serve as an excellent resource for communications with the Board of Regents, the State Legislature, major donors and the general public.

8. Interim Management Decisions

The planning process should provide a framework for interim management decisions. Any planning process which is conscientiously developed will yield information which will provide a framework for management decisions at some levels within the organization. The first year's effort at planning may not yield data which will indicate which building is constructed first or which academic discipline is emphasized the most or the least; however, it will surely reveal data which will indicate to a dean or chairman the number of students to be taught over the next five years, the number of faculty that need to be hired, etc. From the planning process will also come data indicating faculty ideas on new areas of study and new degree programs. Eventually, as the planning process becomes more sophisticated, data will be produced which will guide most management decisions.

9. Directions for Future Decisions

Finally, any planning process should result in an approved set of directions which can be used to guide future decisions. The planning process should be so structured that each year updating the process can become more automated and thus allow more time for analysis, reflection and decision making.

Scope of the Academic Planning Process

The scope of the five year planning process covered all

operations of the university and included both capital and operating requirements. There were minor exception. For example, one operation (the Student Association) was inadvertently omitted and the omission was discovered too late to include it in the report.

All capital and operating resource requirements and all sources of income for each department were projected for each year of the five year planning period. Narrative explanations from each department were obtained indicating the existing and future status of the demand for the teaching activity, objectives of the department, image of the department, present and projected teaching methods and human resources. For example, we asked that each department discuss the demand for the teaching activity, indicating the present and projected levels of enrollment, and reasons for the increase or decrease in the demand for the teaching activity. Also, each department was asked to state its present image, i.e., its image as it compared to similar departments in the region, the state and the nation, and what image it could reasonably expect to aspire to within the planning period.

Developing the Academic Plan

The first step in developing the academic plan at the University of Houston was to secure the endorsement of the university's top management to initiate a continuous planning process. We obviously did not want to spend a great deal of time developing a planning process, planning documents, historical data, and so forth, unless we had the commitment of top management to initiate and perpetuate the process.

The second step taken was to develop some basic definitions and program structure that could be accepted by the entire academic community and used as guidelines for completing the planning documents.

Definition of Program Area

Unlike the other primates, humans require a large degree of organization and definitions before launching a new venture. The basic planning unit is the Program which refers to a major grouping of departments which are sufficiently similar in purpose, scope and operation to justify their consideration together as one major part of a Program Area.

Using this definition, we came up with about 50 Programs -- too many to comprehend or deal with together. Another summary level was needed and this level was labled Program Area. Program Area refers to a broad grouping of Programs which are sufficiently similar to justify their consideration together as one major endeavor of the institution.

Program Area Structure

Using these definitions, the following six program areas were developed.

1. Resident Instruction Program Area includes all the budget categories directly associated with instruction plus a few others such as Radio-TV Operations, TV Film Operations, Swimming Pool, Animal Care Operations, the Audio-Visual Center, etc.

2. The Organized Research Program Area includes all the operating budget categories associated with research such as the Office of Research, the Office of Research Accounting, Center for Human Resources, Institute for Urban Studies and a few others.

3. The Library Program Area includes the Main Library and departmental libraries.

4. The General Support Program Area includes all the expenses associated with general administration, general institutional expense, and those expenses incurred in Physical Plant Operations.

5. The Extension and Public Service Program Area includes all the budget categories associated with public service functions such as the Management Development Center, Personnel Psychology Services Center and a few others.

6. The Auxiliary Enterprises Program Area includes those operations which are supported by funds other than student tuition or State appropriations. Included in this area are the Bookstore, Intercollegiate Athletics, Student Health Services, Printing Plant.

Resident Instruction Program Area

Each department within the university (academic and administrative) was assigned to one of the six program areas. The Program Area for Resident Instruction included all academic departments plus a few other. Within this program area, we identified sixteen programs, which in most cases, corresponded to the organization of the colleges, except in the College of Arts and Sciences. Within Arts and Sciences, we broke the departments down into three programs, Fine Arts, Liberal Arts, and Math and Sciences. Under Fine Arts we put the Departments of Music, Art, Drama, Speech and the Speech Clinic. Under Math and Sciences, we put Biology, Biophysical Sciences, Chemistry, Mathematics, Computing Science, Physics and Geology. The remaining departments, such as English, History, Philosophy, Political Science, etc. were put into Liberal Arts.

We are generally satisfied with the program structure, but expect to modify it this year in some details.

The Planning Document

The next step was to develop a planning document. Actually, two planning documents were developed, one for the academic departments and the other for the administrative departments. However, both documents were very similar in purpose and scope. The academic planning document was developed to glean information on the demand for the teaching activities, departmental objectives, and so forth. The document was about 24 pages long and divided into two parts. The first part was aimed at the teaching activities of the department and the second was aimed at the department's research activities. For some items such as human resources, financial resources, space and library resources, we requested a narrative explanation of existing resources and future needs, along with statistical projections. For example, the department chairmen were asked to evaluate, without giving names, the quality of their existing staff, and then on an accompanying page, we asked them to project the number of faculty they needed for each year of the planning period.

This document gave us too much information -- this year it will be simplified.

Objectives of the Economics Department

For illustrative purposes we have selected an objective statement from one of the documents completed during our fiscal 1968-69 planning cycle. The one we choose is from the Department of Economics. The faculty in this department outlined their objectives. The faculty stated from the outset that they recognized the need for continued research and publication but they are primarily committed to fulfilling their teaching obligation to the University.

They divide their objectives into three broad categories: undergraduate majors, graduate majors and service teaching.

1. In the undergraduate majors category, their educational objectives differ with respect to terminal degree seekers and transitional degree seekers. Their objectives as related to terminal degree seekers are: to train them to take their place in business and to make them more responsible citizens in society. The department's objective as related to transitional degree seekers, that is, those students who are planning to continue in graduate work, is to prepare these students for advanced study and research. In order to accomplish these objectives, this department requires their terminal majors to take only a limited number of specific economic courses, thus permitting these students to choose electives from a variety of other courses. The major emphasis here is on flexibility of degree planning by the student.

To accomplish the objective set forth for the transitional

majors a few more specific economic courses are required, and in addition, these students are encouraged to take as much mathematics and statistics as possible.

The Department of Economics states that there are no direct tests of how adequately they are accomplishing their objectives. However, they feel that there are some meaningful indirect measures. Once such indirect measurement is the number of undergraduate majors in Economics. They point out that their majors have increased in number by 41 per cent in two years. Another indirect test of accomplishment is the number of students who go on to graduate studies in Economics. This too, has increased substantially in the past two years.

2. The second major objective of this department is to fulfill the educational needs of its graduate majors. The faculty state that their educational objectives are to prepare students to assume teaching positions in institutions of higher education, and to prepare students for research in industry and government.

Unlike the undergraduate objectives, there are several meaningful ways by which the objectives of the graduate program can be evaluated. Some of the methods are:

A. The number of applications for admission.

B. The number of graduating students.

C. Placement of graduates. A number of the graduates hold responsible positions in industries. Also, many Ph.D.'s currently hold teaching positions at prestigious universities.

D. Publications and research.

3. The third major objective is related to service teaching. Because the demand for service teaching is so great, the Economics Department has had to use large lecture sections for some of the freshman and sophomore level courses. They admit that there are many flaws and shortcomings in large sections, and in some specific courses, the faculty have refused to allow teaching in such sections.

Understandably, the faculty of this department is quite concerned about its performance in fulfilling its service teaching. As a result, one of their primary objectives is to improve the effectiveness of service teaching by hiring additional faculty and reducing class sizes.

Please keep in mind that this is a statement of objectives from one document out of 154 that were completed during our 1968-69 planning cycle. Each one of our academic and administrative departments prepared such statements along

with statements on demand, image, human resources, etc. and statistical projections on workload, space, dollar requirements, etc.

Steps in the Planning Process

There were ten steps in the planning process.

1. Pilot Testing

Before the academic planning documents were distributed to the department chairmen, they were pilot tested in three areas: Biology, Optometry and English. The results of the pilot tests were integrated into the final documents before distribution. These pilot tests allowed us to detect some of our errors before we requested the entire University to complete the documents.

2. Review and Approval

After the pilot tests, the planning documents were presented to the vice presidents and deans. This gave the deans and vice presidents a chance to look at the document and modify it, after which they gave their approval and cooperation in completing the documents.

3. Schedule of Time Requirements and Responsibilities

A flow path was developed which indicated when each major step of the planning cycle was to be initiated, who had the responsibility for initiation and when each step was to be completed. For example, the deans and the vice presidents were to be oriented to the process on a certain date; documents were to be delivered to the department chairmen and meetings with the department chairmen were to be held on certain dates; the documents were to be completed and returned to the dean's office by certain dates; the deans were to have the documents reviewed and in the Office of Institutional Studies by a certain date. Such a flow path is critical for any academic planning process.

4. Registrar's Projection of Headcount Enrollment and Student Credit Hours

At the same time that the Office of Institutional Studies was orienting the vice presidents, deans and department chairmen to the planning process, the Registrar was preparing headcount enrollment and student credit hour projections for each academic program for each year of the planning period. These projections were given to the Budget Director to serve as the basis for projecting income for each year of the planning period. The workload data for each department, however, was prepared by the department chairmen, i.e., the department chairman made his own headcount enrollment projection, projected his own student credit hours, the number of degrees

that his department would be awarding, etc. This allowed the departments to assume any guidelines they thought reasonable in making their projections; i.e., the approach to establishing departmental workload was completely unstructured. We wanted to smoke out their hopes and aspirations - and we did.

5. Historical Data

The Office of Institutional Studies prepared historical data on headcount enrollment and student credit hours for each academic department.

6. Assistance from the Office of Institutional Studies (OIS)

The Office of Institutional Studies staff met with each dean and each department chairman and explained the historical data and assisted, when asked, in projecting the workload for each department. Most of the assistance given by the OIS staff was hand-holding as related to the planning process and not to developing the actual planning data.

7. Completion of the Documents

Once the department chairmen completed their documents, they submitted them to their deans for review and comment. However, one of our ground rules on this first cycle was that the dean would not arbitrarily change any of the data that the department chairmen had included in their documents. The deans often made comments as to the validity and realism of some of the numbers; however, they did not unilaterally change the projections that the departments had made. Next year will be different.

8. Analysis by Supporting Analytical Areas

Once the deans had made their comments, the completed documents were sent to the Office of Institutional Studies for review and editing. The OIS staff on many occasions had to contact the departments to clarify points and in some cases to rewrite some sections. However, after some editing the OIS staff sent the documents to the supporting analytical areas, i.e., the Library, Computing Center, Office of Research and the Office of Facilities Planning and Construction. These areas analyzed a particular resource requirement for each department and prepared reports which were sent back to the OIS for further analysis and consolidation. For example, the Library analyzed all the library requests from each academic department and prepared a report indicating the resource implications of the requests. The Computing Center likewise analyzed all of the computing requirements of the total university and prepared a summary report; the Office of Facilities Planning and Construction performed a similar function with respect to capital requirements.

9. Report Preparation and Presentation

Once all the documents were received from the departments and the supporting areas, OIS analyzed the data and prepared the Preliminary Summary of the Five Year Planning Data. Presentations of the data to the deans and general faculty were made following the publication of the report. A report was also made to the Board of Regents.

10. Feedback and Re-cycle

Several months after the presentation of the planning data, OIS critically reviewed the planning process, and requested feedback from the deans and associate deans on ways to improve it. We received constructive criticism about the planning process, most of which has been conscientiously integrated into the 1969-70 cycle. There is no doubt, that this year's planning cycle will also have flaws and short-comings, but nevertheless, we are committed to pushing ahead with a continuous planning process.

Implementation

In the implementation section of the report we summarized the observations made on the basic data and attempted to identify major short- and long-range issues deserving top administrative attention. For each issue identified in the report, we briefly stated the problem, indicated some of the pertinent facts, and then recommended action steps to resolve the problems. Each action statement included the offices responsible for action and deadlines for submission of solutions to the president and vice presidents.

Several short-range issues needed immediate administrative attention. For example, one of the issues was workload estimates and control; we pointed out that the disparity between the workload estimates of the Registrar and the departments was too great to ignore. We therefore recommended that the Registrar and the academic deans, with the assistance of the Office of Institutional Studies, immediately reconcile enrollment projections. These should be furnished to all deans, directors and academic department chairmen in time to use in the 1969-70 planning cycle.

Each individual issue was handled in a similar manner in the implementation section of the report. Following publication of the report and presentation of the data, several meetings were held with the deans and associate deans to discuss the progress on some of the issues. Following these meetings, a report was given to the faculty indicating the current status of each one of the issues identified in the implementation section of the report.

Accomplishments of the 1968-69 U of H Planning Cycle

We pointed out at the beginning of this case study that we

felt that a planning process should accomplish at least nine specific ovjectives. Now that we have explained our objectives, scope, methodology, we will conclude by discussing our success in accomplishing these objectives.

1. Two-way communication between the faculty and the administration was established.

One of the best products of the 1968-69 planning data was the upward communication that the deans, the vice presidents and the administrators of the university received from the faculty members. The faculty members were formally encouraged to let their objectives be known to the decision makers of the university. In return, the administration summarized and analyzed these objectives and reported back to the faculty via several meetings. The vast amount of data that flowed from the faculty members to the administration concerning their objectives committed the administration to analysis, decisions and feedback to all faculty members. As a result, in the implementation section of the report, we identified short- and long-range decisions which must be dealt with immediately. Some of the decision areas were: workload estimates and control policies, reduction of total requirements, desirable ratio of day-night and part-time students, whether any departmental libraries will be allowed, and if so, which departments will be the libraries first.

2. A basis for determining all resource needs by department, program and program area was created.

By allowing the department chairmen to estimate their workload in an unstructured manner, we feel that we got a good estimate of resource requirements for each department in order to satisfy their objectives. In many cases, the total requirements were completely unrealistic, but nevertheless, we now know what they believe it would take to satisfy them.

3. A basis for resource allocation among the various academic programs was provided, to a limited extent.

Since our planning cycle started late and produced more questions than answers, it was not possible to link planning and budgeting and thus allocate our immediate resources to implement our plans. However, our planning data were used to a limited extent to assist in the 1969-70 budgeting process. For example, budget hearings were held with each academic dean to discuss how his first year planning would effect his 1969-70 budget requests. We asked each dean to consider ways of reducing expenses, to identify the most critical budget needs and to identify how he would accomplish or modify the objectives presented in the planning documents with limited resources.

4. A basis for extra-university communications was created, to a limited extent.

Because we summarized the five year data into a manageable form, it served as a basis for communicating with our Board of Regents, faculty and staff, visiting professors, visiting institutional studies staff, etc. The report is a working tool, not a plan.

5. A framework for interim management decisions was created, to a limited extent.

By going to the department level to collect basic planning data, information was gathered which was essential to the deans in managing their colleges. For the first time, deans received formal written statements from the departments tying objectives to resources. Such detailed information is necessary for college level planning and therefore forms a strong framework for management decisions at the college and department levels. However, in attempting to summarize 154 individual documents, which did not necessarily represent the combined desires of a dean and his faculty, we found that the totals were not necessarily realistic and could therefore not materially aid the decision process at the university level.

Objectives Not Accomplished by the 1968-69 U of H Planning Cycle

1. The planning process did not provide a basis for making trade-offs between major academic programs.

It was not possible to analyze trade-offs between major academic programs because we ended up with 154 individual documents. In order to overcome this in our 1969-70 process, we are consolidating our department documents into program level documents before they are sent to the Office of Institutional Studies for analysis. This means that from the College of Business, for example, we will receive one program level document instead of a document from each individual department. The one document received is to represent the composite attitudes of the faculty and the dean. As a result, decision-makers of the university will have 16 academic programs in which to analyze possible trade-offs in order to accomplish university objectives.

2. The planning process did not provide a basis for establishing university objectives which integrated student and societal demands.

Because we ended up with so many documents with unrelated objective statements, it was impractical to attempt to glean specific objectives which could be applied to the total university. Also, in our first planning cycle, we made no attempt to analyze society's demands for our graduates. Without this input, it would have been impossible for the university to state operationally measurable objectives. For this year's planning cycle, we have undertaken a study to determine the demand in

the Greater Houston area for our graduates. Societal demand probably will influence, but not control, workload decisions.

3. The planning process did not provide a basis for establishing program priorities between existing and new programs.

University objectives were not established in operationally measurable terms, and because we had 154 documents to deal with, it was impossible to establish program priorities. In order to intelligently make such decisions, the human impact of such decisions and the resource requirements to accomplish these priorities must be combined.

4. The planning process did not result in an approved academic plan which could be updated annually.

Obviously, based upon the foregoing shortcomings, it was not possible to bring the data into an approved academic plan. During the 1969-70 cycle, however, we will come much closer to developing a plan which can be approved by the university decision makers. We have moved to a program level document, and we are also analyzing societal demands for our graduates. In addition, the Office of Institutional Studies had developed headcount and student credit hour projections for each year of the planning period. These projections will be presented to each dean for his review and comment. Once the deans and the vice presidents agree on a workload base, these will be used by the departments for projecting their resource requirement. By moving to the controlled workload concept this year, we will eliminate the "pie in the sky" projections which we received in our first process. As a result, the resource needs that we get will be much more realistic and because we will only have 16 documents to contend with, it will be possible to analyze program trade-offs. In addition, the Office of Institutional Studies is developing a computer program which will project headcount enrollment and student credit hours (direct and induced) by program and by area of study within the program. The computer approach to planning will provide the Office of Institutional Studies with a technique for monitoring the projections made by the departments and the deans.

CIRCULATION, PARKING, AND LANDSCAPE PLANNING: THE UNIVERSITY OF CALIFORNIA, IRVINE

GENE UEMATSU
Campus Planner
University of California, Irvine

Thank you for the opportunity to come to this meeting and present the case study on landscaping, circulation and parking for the University of California, Irvine.

The planning and development of the Irvine Campus because of its unique location, three miles inland from Newport Beach, California, offered many opportunities to plan, phase and develop programs to solve the landscaping, circulation and parking elements of the master development plan for this campus.

The circulation, parking and landscaping design is fast becoming an important consideration in the planning of educational facilities. This is particularly true for facilities that are being planned within urban areas. When, at a time people are becoming increasingly aware of the need to conserve our forests, beaches and open spaces, it is important for educational facility planners to take heed and do likewise.

Landscaping

The Regents of the University of California recognizing this need retained the landscape architectural firm of C. Jacques Hahn and J. C. Hoffman to prepare a Long Range Landscape Development Plan for the Irvine Campus. This plan in essence supplements the natural topograph of the rolling coastal hills which are almost devoid of trees and shrubs.

The focal point of the plan was the preservation of a 21 acre open space within the center of the major academic facilities known as the Central Campus Park. The campus park designed as a naturalistic area serves as an outdoor area for study, relaxation and enjoyment.

Radiating out from this central park between the six major academic building areas are open spaces which will extend to the surrounding University community. These areas which are predominantly drainage areas will be planted with plants that require minimum maintenance.

These open spaces as well as the peripheral landscaping along the major campus entrances are being planned to relate to the neighboring community.

The academic building areas radiating from the central park area are also planned to retain the grand vista from the park to the surrounding panoramic views.

The spaces between the buildings are designed to perform the primary function of meeting the student circulation needs, yet providing a pleasant landscape environment. Outdoor classrooms, rest areas and quiet study areas are being provided as required to meet the needs of the students and faculty.

These separate landscape design elements are then coordinated within the basic framework of a total campus arboretum concept.

The major step which the University took to implement the arboretum concept of the landscaping program was in raising a suitable number of trees which were adaptable to this climate but were not available from the commercial growers.

The University in implementing the Long Range Landscape Development Plan early in its planning phase realized the importance of coordinating the planning with maintenance. Landscape Architects know the success of the implementation of any landscape design is almost totally dependent upon the degree and type of grounds maintenance available. Therefore, I cannot overstress the importance of having those responsible for the ultimate maintenance of the landscape development involved in the planning and design of the landscape program. In doing so the Irvine Campus has incorporated design features that have reduced the cost of the maintenance yet maintained the basic design intent.

Much of the success of the landscaping program at Irvine is the result of the successful coordination of the planning, design, cost analysis and maintenance aspects of the total landscaping program.

Circulation and Parking

The Irvine Campus at the ultimate development with the enrollment of 27,500 students will require approximately 20,000 car parking spaces. A great majority of these cars will arrive and leave the campus during a limited time period, therefore, it was necessary to analyze and plan the campus circulation and parking system to serve this need.

An important and vital segment of this study was the need to work with the Governmental Agencies which are responsible for the planning and development of the circulation system required for the surrounding community.

Through the cooperative efforts of the California State Division of Highways and the Orange County Road Department, the circulation system adjacent to the Irvine Campus has been planned to meet the ultimate traffic demand generated by the University as well as the surrounding community.

A major freeway is planned adjacent to the campus and another exists only a couple of miles east of the campus. These two freeways together with the planned County Arterial Highways have all been phased and planned to meet the needs of the University.

To get the cars into and out of the campus is only one of the major traffic problems. To provide for on campus circulation and storage of these vehicles is another.

A loop road and a peripheral parking system has been designed to meet the major parking needs of the campus. Parking structures are also planned adjacent to areas of need within the Health Science and other academic building areas.

Since the parking facilities on this campus are financed and supported by the user, a comprehensive phasing plan was developed to program the types of facilities that could be financed and constructed to meet the needs of the growing campus.

The population of the Irvine Campus is almost entirely dependent on automobile transportation. We had at the outset, utilized facts and information from other campuses which are dependent upon the automobile. Based upon these figures we have provided parking spaces for approximately 65% of our total population. From experience, as the campus grows, a smaller percentage of parking will be required and ultimately parking spaces for only 50% of the population will be required.

The Irvine Master Development Plan also provides for bicycles and open space for other future alternative forms of transportation such as buses, people movers and monorails.

In summary, the landscaping, circulation and parking elements cannot be considered by themselves, but should be planned within the framework of the general development plan. I have briefly covered these areas which can better be shown by pictures, however, the successful implementation of any program depends upon effort that is expended not only in the planning phase, but the detail budgeting, scheduling, coordinating and designing of all elements which must blend together to make a total environment. In essence, the client and all the design professions must cooperatively work together as a team with the understanding that all elements of the total design picture are important to the overall success of any planning venture.

DONALD C. CAMERON
Associate
William L. Pereira and Associates

The creation of a new University campus can be one of the most significant acts in the community building process, in any country, in any period of time. And to be allowed to assist in this process is a privilege few of us can expect. I have been fortunate enough to be able to follow the progress of the new campus of the University of California at Irvine from the time when it was only a gleam in the Regents' eyes to the present moment when it is in its fourth year of operation and we are already revising the original master plan.

It has been a period of almost exactly eleven years since serious planning was started on the project, and for all of us who have worked on the project for that period, they have been interesting and exciting years. I hope that I shall be able to give you some idea of this process that we found so absorbing, and I would like to go back into history a little before we go forward into planning details. Campuses such as Irvine which have been designed with some degree of overall planning control, both on and off campus, are rare - or perhaps more accurately, unique. Consequently, to be able to discuss the results of the planning intelligently we thought we should first discuss the nature of the design process used at Irvine.

Interestingly enough, although the campus is quite well known, its story has not been told often in gatherings such as this and there probably are not more than a handful of people who can discuss it in very great detail. Most of them are at this conference: Barbara Gray, Director of Research for William L. Pereira Associates and the principal author of the "Site Selection Study" that resulted in Irvine campus; Al Wagner, who has been involved as U. C. Statewide Campus Planner from the beginning; Coulson Tough, who was the first Irvine Campus Architect; Gene Uematsu, who has been on the Irvine staff since design began on the first buildings; and myself, who have been in charge of overall planning within our office since the project began in 1961. The statewide staff, the campus staff, and our staff have worked together during this time on a continuous series of individual jobs. We have been members of a team, but we have each had our own separate and distinct roles of play, not always harmoniously but almost always with beneficial results.

The statewide group has acted generally in an advisory and review capacity, interpreting the overall policies of the University and the fiscal policies of the state. The Irvine campus group collectively make up the "client" and define the specific scope-of-work, budget, and schedule for each job. Our office, as the "consultant" has acted out the roles

of general planner, site planner, executive architect, supervising architect, interior designer and graphic designer -- often several of these concurrently.

With such a long, continuous, and constantly active relationship, most of the people involved have developed their own informal methods of communication. Consequently, a great deal of the work is carried out in a relatively unstructured fashion, with formal appearances before the Campus Planning Committee held to a minimum and only at such times that official approval is needed for key staff decisions.

The Irvine project has come a long way in the past eleven years. In 1958, we started looking for a site. In 1965, the campus opened with approximately 1,500 students. Today, we are in the process of completing the first thorough review and updating of the campus Long Range Development Plan.

Important considerations in this planning process have been:

Why the Irvine campus in the first place?
Who are the people to be served?
What were the original goals set for the campus?
What are the site characteristics?
What planning concepts evolved?
What is the nature of the original plan?
How has planning been implemented?
What is the present planning development status of the campus?

The steps leading to the new campus can be outlined very simply:

a. California Master Plan for Higher Education

In 1957, a University administrative committee formulated criteria for selecting three new campus sites. Their report issued in January, 1958, was further developed by the consulting firm of Pereira and Luckman, which had been retained by the University to advise on the selection of two new campus sites, one in San Diego County and one in the southeast Los Angeles-Orange County area.

b. Site Selection Process

The originally recommended site of 500 acres grew to 1,000 acres. The opportunity existed to design a new campus and a new community around it, with maximum interaction between the responsible parties. A major planning factor was the Inclusion Area Concept, which called for interpenetration of campus and community, with residential areas close to academic core, economic protection of low-cost

housing so as not to price University related population out of the area. The negative example of Westwood Village and the UCLA campus in West Los Angeles was a constant reminder of the importance of this idea.

c. Area of Search and Final Recommendations

Twenty-three sites in the southeast Los Angeles-Orange County area were examined in terms of size, shape, physical setting, availability, accessibility, relationship to center of population and potential for planned community development. The three most highly rated were considered by the Regents in March, 1959, and Site #9, located on the Irvine Ranch a few miles inland from Newport Beach, was tentatively selected.

d. Evaluation of Each Site

A weighted criteria was developed to evaluate each site for:

Spirit and nobility of site - sense of place	-10
Potential for development with the framework of a master plan	-10
Civic interest and support	- 9
Accessibility	- 9
Relation to center of population	- 8
Proximity to housing, employment, shopping, cultural and recreational facilities	- 8
Size and shape	- 8
Freedom for nuisances	- 8
Climate	- 7
Availability of services	- 7
Topographical and geological characteristics	- 7
Availability	- 6

The Irvine site received the highest score.

The site is on gently rolling land, with an inspiring outlook to the north and west over the Santa Ana Basin. As Orange County develops, the campus will be situated at the center of a large urban area and will be connected to metropolitan Los Angeles by a network of freeways. Among the principal reasons for the choice of the site were 1) it had the desired nobility and "sense of place"; and 2) it was under one ownership and, therefore, offered a great potential for development within a master plan framework with an opportunity for controlling the surrounding areas through mutual agreement with the owner.

e. Campus and Community Studies - Phases I and II

After the campus site had been tentatively approved, the University and The Irvine Company jointly retained the firm of William L. Pereira and Associates as planning consultants to establish the validity of this location for the East Los Angeles-Orange County campus. The study was conducted in two phases. The report on the first phase, "A University Campus and Community Study", completed in October, 1959, concluded that the development of a university campus on the site was feasible, that the site afforded unique opportunities for an integrated university community, and that support and cooperation from neighboring cities and governmental agencies was assured. The "Second Phase Report", completed in May, 1960, designated the general size and boundaries of the proposed university community and prescribed a master land-use plan with the Regents and The Irvine Company agreed to follow in principle as a guide to development and as a basis for agreements between themselves, the county, municipal authorities, utility agencies, and others.

The studies contained the following major components:

Suitability of site
Tentative boundaries
Political Methodology Recommended (non-annexation by adjoining cities)
Utility guarantees
Commitment of public funds

f. Official Choice of Irvine

When this site was officially approved in July, 1960, The Irvine Company offered 1,000 acres to the University as a gift. The Regents accepted the gift and a deed was signed and recorded on January 20, 1961. Provisions were included in the accompanying contract to allow for land trades in establishing final boundaries acceptable to both the Regents and The Irvine Company. This provided needed flexibility in planning.

In October, 1960, William L. Pereira and Associates were retained as Master Planners for The Irvine Company's lands. Planning was coordinated between the separate groups working for the University and The Irvine Company on:

(1) an overall plan for development of the Irvine Ranch;

(2) a detailed land-use study of the section of the Ranch which included the campus and the university community;
(3) design of the university town center.

A strong incentive for choosing the Irvine site was the opportunity presented by its completely open, undeveloped expanse to have the campus and community grow together. The University-Irvine Company contract recognized the interdependence of "Town and Gown" development and provided for cooperation and mutual participation in this venture. A master plan of land use was a basic element of the contract. The contract also provided for both parties to work towards establishing an area planning commission for the university community under the stewardship of the Board of Supervisors of Orange County. This particular idea later proved to be impossible because of technicalities in California State law (since revised).

As the physical planning process began (November, 1961), two separate, but coordinated groups, stated to work, one on the analysis of the site:

a. Topographical / land forms / drainage

b. Views

c. Lack of natural vegetation

d. Climatic controls

Sun

Wind

"White sky"

e. Search for a "center"

(Established by the location of a natural bowl, traversed by two major drainage courses and containing a large rock out cropping.)

The second group was working to formulate the original planning objectives:

a. To establish a campus "heart" and "sense of place"

b. To establish a sense of "destiny" with the first increment of buildings

c. To establish strong but flexible planning principles to guide campus design

The first plan evolved from the melding of the results of these two groups with the campus program prepared by the University. The primary components of this plan were:

a. A continuous structure to house academic facilities (later, and unfortunately, changed to separate buildings for reasons best described as "University politics").

b. A central park surrounded by the structure.

c. A landscape policy to plant only as you use the site.

c. A series of urban spaces for visual and functional identity.

e. A pattern of greenbelts connecting the academic portion of the campus to the rest of the community.

f. A major plaza (the "Gateway") to connect the campus to the adjacent town center.

In January, 1963, the Long Range Development Plan was presented to (and accepted by) the Regents. The primary components of this report were:

The Master Plan Documents:

In order to provide the basic controls needed to ensure the implementation of the Long Range Development Plan, the following diagrams are especially identified, each illustrating one or two of the design principles to be preserved as the campus is developed. These diagrams are analogous to a city plan, presenting its proposals in terms of long range land-use relationships, zoning controls, and circulation patterns, easements, and design criteria, i.e., architectural vocabulary and landscape vocabulary. Collectively, the diagrams constitute the Campus Master Plan and include:

The Land Use Plan:

Explains diagrammatically the land uses for the 1,000-acre campus.

Automobile Circulation and Parking Plan:

Indicates the major automotive circulation system and the principal parking areas.

Permanent Open Spaces Plan:

Shows how the park and naturally landscaped areas within the campus are tied to the recreation areas and other permanent open spaces in the community beyond.

Central Campus Organizational Pattern:

Indicates the location of the six major quadrangles and the other major land-use areas within the 450 acre Central Campus.

Building Height Zones Map:

Illustrates the high and low building zones which must be maintained to preserve the vistas to and from the Centrum and to separate clearly the urban from the landscaped areas.

Exterior Spaces Plan:

Established the locations and approximate sizes of the malls and plazas which constitute the skeleton of the six quadrangles.

Vehicular and Bicycle Circulation:

Indicates the principal campus roads and bicycle paths connecting the building groups to each other and to the public roads beyond.

Pedestrian Circulation:

Indicates the pedestrian walkways system which connects the building groups in both a circular and radial manner.

Final Central Campus Plan:

A composite of the previous five drawings establishes all of the principles to guide the design of this area.

The Ultimate Development Plan:

Represents a close approximation of what the campus might be like when fully developed (1990±).

The University Precinct Plan:

Shows the relationship between University land (approximately 1,000 acres), the Inclusion Areas (approximately 660 acres), the Town Center, and surrounding community.

Implementation of the Plan

In accordance with master plan goals, the initial buildings have been sited to implement the concept of the central park and the main pedestrian ring and to create an immediate sense of the identity of this campus. The initial building program consists of six major building projects, listed below:

Library Unit 1

Cafeteria

Social Sciences - Humanities Unit 1

Natural Sciences Unit 1

Multi-purpose Unit 1

Residence Halls Unit 1

Subsequent architectural projects, to take campus to an F.T.E. population of 6,000+ by the early 1970's, include:

Residential Apartments Unit 1	1966
Handball Courts	1966
Interim Student Center	1966
Headhouse-Greenhouse Unit 1	1967
Residence Halls Unit 2	1967
Residential Apartments Unit 2	1967
Student Health Unit 1	1968
Physical Science Unit 1	1968
Medical Surgical Facility - Unit 1	1968
Medical Surgical Facility - Unit 2	1969
Residence Hall Unit 3	1970
Student Recreation Center	1970
Center Plant Unit 2	1970
Administration Unit 1	1971
Social Sciences Unit 1	1971

The design details have usually had to be worked out as part of individual building projects. However, specifically funded jobs have been made out of the "graphics program" for signs, kiosks, etc.

The Updated Long Range Development Plan - 1969

In the six years which have passed since the plan was originally accepted, so much has occurred and so many changes have taken

place in the world of education and in the specific situation at Irvine that the need for an updated Long Range Development Plan has become increasingly evident. It has been a period of profound, worldwide re-examination of the function of universities and of the goals and methods of university education. The roles of faculty and students have been re-evaluated and the active participation of both in physical and academic planning of the campus has been strongly encouraged.

Among the most significant factors which caused a need for updating the original plan was the purchase, by the Regents, of the 510 acres of the Inclusion Areas from The Irvine Company in January, 1964. Another new element of major importance to campus development was to relocate the California College of Medicine at Irvine in April, 1967, as the nucleus of a proposed Health Sciences Complex.

The land around the campus, which was cattle range when the first university buildings arose, is now served by a planned network of roads which connect new housing, industry and commercial developments to the campus.

The 1963 Long Range Development Plan established policy guidelines for the orderly growth of the Irvine campus, but it was also flexible, to allow for changes and innovations. The 1969 plan reinforces the guidelines for the physical planning of the campus. It takes into account the development of the academic plan. It considers the complex relationships between teaching, research, recreation, residence, and other campus activities, in order to organize and coordinate them thereby achieving efficiency and economy, proper function, best use of site, most pleasing aesthetic effect, and most logical programming of development. It completes the framework of roads, walks, plazas, open space and building sites, while remaining flexible to allow future planning and development decisions to evolve as conditions require.

The 1969 Long Range Development Plan Documents are in three categories:

Land Use:

Academic areas and housing groups:

Indicates the locations of the two most important components of the plan

Non-academic sites:

Indicates the location of necessary support facilities.

Circulation:

Vehicular circulation and parking:

Indicates the primary roads, service areas and parking areas.

Primary pedestrian circulation:

Indicates the most important pedestrian paths.

Urban Design:

Major urban spaces:

Indicates the spaces that are to be defined by the building groups, and which will give the campus its form.

Open green areas:

Indicates the permanent open spaces to be protected as the campus grows.

The original plan helped us get where we are -- it was a map to the future. The 1969 plan will help get us there faster and better. There will be more plans in the future, but hopefully, they will all respect the original concepts and goals.

ORGANIZING AND STAFFING THE PLANNING OFFICE: HARVARD UNIVERSITY AND OHIO STATE UNIVERSITY

WILLIAM J. GRIFFITH
Division of Campus Planning
Ohio State University

This report is a case study of organizing and staffing the Campus Planning Office at Ohio State University. I will comment in three areas. First, I will describe the problem and its setting by summarizing some basic information about our campus, to help you understand the planning parameters at this University. Secondly, I will describe the development and the current organization and staffing of our Planning Office. Then finally, I will suggest some characteristics which I think an ideal campus planning organization should have and make a few other comments about campus planning in general.

1. Planning Parameters

I think the planning problem on our campus or any other campus can be viewed within certain basic planning parameters. In my opinion, there are four such parameters which delimit to one degree or another the planning problem that one faces on a college or university campus. The first parameter is the education program and its supporting services. This consists of two fundamental parts: the substance, or what the program includes, and the organization, or how the program is organized and administered.

For example, one could put various program parameters on a university campus by deciding to have only undergraduate programs or only graduate programs or some combination of both. We might assign parameters in terms of the disciplines to be offered in the program. This could vary greatly, of course, from basic liberal arts to a whole variety of professional course offerings. In addition, the type of instruction emphasized on a campus affects the planning problem -- whether the main thrust is toward the time honored lecture, demonstration, laboratory approach, or toward individual student progress. This will have a decided affect on the nature of academic space.

The second planning parameter is the number and level of students to be served. We know that the level of student affects the amount of space needed for a given program. Undergraduate students require less space in the same discipline than do graduate students because of research activities

and the lower faculty-student ratios in the graduate school. Studies on our campus indicate that the amount of space required for a graduate student may vary from 1½ to 10 times as much as required for an undergraduate in the same area of study.

The third basic planning parameter is simply time. One could develop a plan for 1980 or 1990, or one might not put a target date on the plan at all.

The fourth and final basic parameter consists of physical and fiscal limits on the planning problem. Included here would be such things as land availability, natural or man-made physical barriers, and the politically determined availability of financial resources. Any and all of these might operate to limit the planning problem to one degree or another.

The complexity of the planning problem is affected by the number of parameters which are defined. The problem of planning would become very complex and difficult, perhaps even impossible to attack, if one is able to determine none of these parameters. The problem becomes consequently more easily defined and attacked the more parameters one is able to determine.

These parameters illustrate, what I think, is an important concept in campus planning. That is, if we look at the planning problem over time from the vantage point of the present, we have to look at immediate plans against the backdrop of what we might call short range plans, plans that go out six, eight, ten years, and still against the backdrop of a more long-range plan which might go out 20 or 30 or even to an undefined time period.

I'd like to illustrate these planning parameters on our own campus. First, our current academic organization. We're currently organized into 15 different degree-granting colleges and a graduate school. Several of these colleges also have schools included under them, such as the School of Music in the College of the Arts, and so on. We have a total of about 137 academic ares of study, the majority of which offer graduate degrees. This indicates the complexity of the problem. We recently consummated rather extensive academic reorganization which created six new colleges out of what was once a very large college of liberal arts and sciences, and as a result of that we've modified our campus development plans.

Second is the enrollment parameter. We have had a modest total student growth, but we're growing more rapidly at the graduate level than we are at the undergraduate level. This, of course, has an important impact on the need for academic facilities.

Third, the campus has several major physical limits on our

planning. We have fully developed residential, a commercial, and industrial areas which limit the expansion of our campus to a great extent. A river, and a major highway and railroad traverse our campus in a north-south direction. These form a series of barriers to the west. We also have, serving a college of agriculture, a number of pasture areas, which present some problems to us also. And in the center of the campus is our service center. This generates a large amount of truck traffic, which we feel is a real burden to us. All of these factors are physical limits with which we must deal in conducting planning on our campus.

We have attempted to deal with some of these physical limitations. We plan to move our service facilities from the academic part of the campus to eliminate much of the heavy vehicular traffic which it generates. We've treated the river as a major campus feature, rather than as a barrier. In fact, we plan to make it the heart of the campus by developing recreation areas along it and by bridging it with both vehicular and pedestrian bridges. The former will connect to our campus loop road, which encircles the main academic area. The highway just mentioned is slated to be moved next to the railroad, so that we have only one barrier there instead of two. We're also planning to tunnel under both of them to connect the east and west sides of our campus. The west campus is now developing and will develop further in the future.

All of these developments are largely projections for the future, but they illustrate how we have attempted to cope with some of the physical barriers with which we must contend.

The volume of construction on our campus over the past 19 years illustrates the fiscal parameter. In that period of we've spent $154,000,000 on total construction on our campus. That averages to a little over eight million dollars per year. That is an impressive figure, but our needs for construction dollars by 1975, if we are going to provide the facilities we need for the programs that we are offering to the students we know are coming, and upgrade what we have, will be on the order of $350,000,000. This is more than twice as much as we have spent in the last 19 years. It sounds like an impossible task and it is. We just know we cannot generate that kind of money. That presents a problem to us: how do we deal with that very real fiscal limitation to our planning efforts?

2. Organization of a Campus Planning Office

Now I will turn to the development and current status of our Campus Planning Office. Prior to 1956, there was no office of campus planning at our institution. What planning was done was handled by the University Architect's Office, which had been in existence since the early days of the University.

There had been a series of master plans developed at the University with the early ones dating back to the first decade of its existence. We had master plans developed, following World War I, in the early 1930's, and then again right after World War II, but there was no effort at continuous planning. Then in 1956, the Office of Campus Planning had its beginnings in an office what was called the Office of University Plant Studies. This office grew from a need for more centralized control of space on the campus because of rapid enrollment growth right after World War II, and because of the need to make better use of the space that we had available. Originally, the purpose of the office was to study the space needs of the University and to develop methods by which physical resources could be used to the best advantage.

Shortly after the beginning of the office, its role was expanded, and more and more duties have been added over the years. The original purpose of the office was assignment of space and studies of space needs. Then, in 1958, campus physical planning was added and the name was changed to Office of Campus Planning. Five task areas now constitute the major responsibility areas of our planning office. Let me explain a few things about these areas.

By university policy, all space on the campus is a university resource and is, therefore, subject to assignment to the various academic departments by the Office of Campus Planning. We are responsible for developing a functional program for each construction project on the campus. This describes what is to be in the project, the number of spaces, what each space is to do, equipment, etc. The program is turned over to the design firm, prior to beginning of design work. We are responsible for continuous study of our campus development plan, or master planning studies, if you want to call them that. Our office also prepares every two years a six year capital plan which describes in detail the projects that we need to implement during a six year period in terms of their cost, location, basic design program and the like.

And finally, the last function is a sort of catch-all, but it's basic to the other four functions, because it provides important input data for them. We maintain a continuous updated inventory of all university space, from which we can produce by computer programs several routine space inventory and utilization reports. We are at work on, and have partially operational, a computer program by which we can produce a statement of space need by various generic categories for any given academic program for a given student population for any selected target year. That is fundamental for both our capital planning function and our master planning function. We also serve as an information source about the campus and the community.

The original staff of our office consisted of a director and

a secretary. As more responsibilities were assumed, an urban planner and an educational planner were added to the staff. Within the last three years the staff has been further augmented, so that it now includes, in addition to the director, two physical or urban planners, two educational planners, a systems engineer, two data processing specialists, a draftsman, and the necessary clerical and support personnel. We have built up this staff in direct response to the growth of assigned responsibility.

At the present time, the mission of our planning office at Ohio State could be summarized as planning for the physical resources to support the university's program of teaching, research and public service, plus planning facilities for the required support services. Of course, this planning must produce an environment which is esthetically and functionally adequate. We think that our office really provides more of a service function, and we don't tend to see it as an administrative office in the usual sense of the work.

There are several positive factors which we think assist our office in carrying out its functions. First of all, we think we have staff appropriate to the tasks which our office now carries. Secondly, we think that the comprehensiveness of our office operation enables us to do a better planning job. The fact that we assign space to the operating units on the campus and do the capital plan for the university and carry on the functional planning of the construction projects on our campus enables us to do a better job of physical planning than we might otherwise do, primarily because in the process of doing these other functions, we keep in very close touch with the faculty, students, and administrators.

Another factor that has been very helpful to us, is the University's acceptance of the concept of a continuous planning process under which the office performs its functions on both a long-range and short-range basis. The value of planning has had considerable acceptance throughout the University and the role of our office has reasonably good understanding and acceptance on the part of the faculty and administrators.

I think this acceptance occurs for two reasons. The first is the one I mentioned earlier; we try to see ourselves as a service function rather than an administrative one, and thus be responsive to the needs of the faculty and the students. And the second reason is the fact that we try to keep in mind the campus is, after all, for people. Those of us who operate in the realm of physical planning and are concerned about automobiles, parking, buildings, etc., sometimes forget that fundamental fact. We try to remind ourselves of it constantly.

A further word about staffing: I would not advocate our staffing pattern as any kind of model. Obviously the pattern

should depend upon the task of the office, the size of the campus, and a number of other factors. But I certainly would advocate any university planning office having on its staff, or avilable to it at least, a physical planner or urban planner, an educational planner, and a data processing specialist as a basic minimum, plus required support personnel.

I think the place of the planning office in a university organization is of great importance. At the present time we are working to develop a much more comprehensive approach to planning and trying to integrate academic, fiscal and physical planning into a unified whole. At present, academic planning is in the Office of the Provost and Vice President for Academic Affairs, which is directly responsible to the President. Fiscal planning is directly responsible to the President, and our Office of Campus Planning is responsible to a vice president for administrative operation, which is a staff position in the President's office. Thus the three areas of physical, academic and fiscal planning are directly tied to the President's office, where we can achieve, we hope, the kind of coordination that is important.

One problem we face on our campus is the fact that the Office of the University Architect is organizationally within the Office of the Vice President for Business and Finance. This means, in my opinion, that planning function is bifurcated, because project design is under a separate office from project functional planning. I do not want to imply that we don't think we are able to achieve the degree of integration in physical planning that is desirable. Planning flow is interrupted, when campus planning and project design are not responsible to the same university administrative officer.

3. Ideal Organization

Campus planning to me is a continuous process, moving from physical planning through capital planning, through functional planning, through design to construction and occupancy of a building. These are separate functions, but I think it is vital that the personnel involved in these various planning operations be part of a single team. This permits coordination of all phases and a much better planning process will result.

I tend to see the planning process in three basic phases of conceptual, creative, and implementive planning. I would put physical planning or campus planning and capital planning under the first heading of conceptual planning. Then I would put the functional planning of construction projects and the design process under the heading of creative planning, and then the final two, construction and occupancy of a building, under implementive planning. The entire process should be responsible to a single administrative officer in a university.

An ideal organization, would have an office of university planning, and under this office would come the functions of academic, fiscal and physical planning. Physical planning would have major task areas of space assignment and utilization, project planning and design, and campus physical planning. Physical or campus planning would then be tied to design process, and we could do a better job than we are able to do now, at least on our own campus.

We have a number of steps to take at our university before we have achieved the kind of organization which I think would be more nearly ideal. We should establish a planning office at the vice presidential level and bring under it the functions which I have indicated here.

4. General comments

Let me close by making some additional comments about the unification of planning. As it is on our campus, and I suspect many others, I get the impression sometimes that planners plan, architects design, builders build, without much more than the necessary interaction that is necessary to solve whatever problems emerge in the process.

If we are going to do a better job of planning from conception to implementation, it seems to me that we have to do more than talk about the problems. It's quite possible that the builder might be able to assist the planner or vice-versa, and ideas might emerge which would be of benefit to the academic program of the university, which is what this business is all about anyway.

In other words the planning process to me seems broken into parts, as we now do it on many campuses, and I don't think we can afford to continue in this direction. We really need to develop a planning consortium or planning team approach in which we put together the planner, the designer, and the builder and develop a project from conception through creation to implementation. That might give some people hangups because it is a somewhat radical departure from what we have done in most university planning situations. But I am sure there has been some pioneering in this area in a few places in the country. Perhaps the day may come when we will find a single team, which would include the campus planner, the functional or educational planner, the architect, the engineer, the contractor and a craftsman who might work together to produce a much better project or product than our usual system in which each plays his own individual role, with conversation occurring only when there is a problem to solve. We just simply need to talk more about fundamental ideas and try to pick the brains of one another so that we can produce a better product.

HAROLD L. GOYETTE
Planning Officer
Harvard University

It is impossible to discuss organization and staff requirements of a university planning office without first establishing a context by briefly discussing institutional planning. I trust, as representatives of, or consultants to, colleges and universities, we can agree that institutions of higher education are instruments of change in our society. However, merely to accommodate change is an inadequate response. Educational institutions have a responsibility to establish planning processes designed to promote and to demonstrate the benefits of change.

Historically, institutional planning has concentrated on physical facilities and master plans. Prepared mainly by consultants, these plans seldom recognized academic programs and goals, the requirements of administrative and support units, or the availability of financial and personnel resources. The planning process should involve persons from all parts of the institution. To achieve this objective, the planning office must work with all functional units of the institution. It is useful to categorize potential for planning and change in three ways: institutional objectives, physical resources, and physical facilities. Standing committees periodically must review institutional goals and programs together with relevant resources and facilities. Institutional goals govern the planning of physical facilities but only within the limits of financial resources and construction technology.

Planning is a continuous process. Working with administration, faculty, and students, the professional staff helps the university identify goals, examine available options, establish priorities, and define techniques for implementation. Systematic planning procedures begin with the collection of data and ends with programs and physical facilities which will best enable the university to achieve its goals.

The success of the planning process demands the participation of university personnel at many levels and professional planners. The essence of an institution's planning effort is the policy which the president and governing board establish to define the institution's characteristics and its academic, physical and fiscal objectives. Assisted by academic and administrative staffs, the governing board must remain alert to the evolutionary and revolutionary pressures demanding change within the institution. Whether he is a staff member of a planning office or a consultant, the planner works with the institutional officers and committee members to make decisions which reflect the values of the institution as a whole. He does not try to replace the president, the administrators or the faculty by taking over part of their work, but performs staff services to facilitate

their work.

Throughout this presentation it is my intention to classify the planner as a physical planner. This is suggested not only as a title, but as a means for describing the qualifications of the individual in terms of education and experience. This, of course, may be accepted only as a personal prejudice, but analysis and evaluation, opportunities for choice and priorities, and recommendations regarding physical facilities which shape the institution's environment must not be filtered through business officers or academicians, prior to review by the decision-makers.

Since the planning process deals with the total physical environment of the institution and serves all personnel in every activity, coordinating the designers who contribute to that environment is vital. The kinds of problems the planning staff must evaluate for the institution include efficient utilization of facilities, balancing operating costs versus initial capital costs, appropriate distribution of funds available for specific facilities, and balancing the distribution of funds available for bricks and mortar between buildings and service systems. How many institutions have we seen that have a lot of buildings, but cannot provide the necessary power to them, or get the cars parked to serve the buildings, because the priorities have been slightly confused?

To guide this planning effort the university should establish a working or planning committee representing the president and governing board, the faculty and the administration. The principal tasks of this committee are to review and approve the studies of the planning staff, and to make recommendations to the president and governing board.

A number of specified tasks, as well as their scope and their relationship to the planning process, will illustrate the activities of the kind of planning office I am talking about. These may be listed in functional categories: 1) planning administration and miscellaneous studies; 2) long-range planning; 3) project planning; and 4) architectural and drafting services. Perhaps these categories suggest a structure for the planning office, yet no presumption of structure should constrict the necessary scope of individual staff duties and responsibilities. Communicating information, generating ideas and coordinating work at the lowest staff level will enhance the quality and productivity of the planning team effort.

Planning Studies

The planning office must assemble inventory data which define the existing university. These studies underlie all planning,

including the formulation of options and priorities. Maps, models, photographic files are some of these basic tools.

As far as space scheduling is concerned, I submit that the planning office should not be responsible for daily space management and scheduling. Operational tasks like scheduling classrooms or assigning residential space properly belong to other administrative departments.

Liaison with the community is an important function. I have on my staff one full time project planner assigned to work for a particular neighborhood abutting the university as their community planner. Liaison with municipal, state and federal agencies is also important.

Long-Range Planning

Long-range planning studies, which is the second category, will identify major components of the physical plant, define and analyze their functions, illustrate their physical characteristics, establish physical limits and propose design and construction schedules. Long-range planning studies are interdependent. Presented jointly, they indicate certain development plans. Since the input of each study may change, all development plans to be current entail constant review and updating. These studies include land use, pedestrian circulation, open space, traffic and parking on a variety of scales, land acquisition programs, and redevelopment of university properties.

Project Planning

A third category is project planning which is essentially a process of reviewing the long-range planning problems of a specific project. Once those have been identified and it has been firmly established that it will be a specific project, we go into the project planning and programming stage. We work with the faculties and departments in a very personal way to define the specific program for a building and prepare an architectural program for the architect. Once an architect is hired, we move into the design stage, and the planning office maintains responsibility through the design development stage. When the construction document stage is reached, the architect reports directly to the project supervisor.

In our system the university architect is in the planning office. The Department of Buildings and Grounds has a deputy director for new construction, and he and his project supervisors are responsible for the detailed supervision of the construction document stage, construction, and the turnover for occupancy. At that point, he turns the project over to the deputy director for operations and management, who will operate the building.

Architectural Services

The fourth area or category is architectural services, and since we are the university architect as well as the planning office, we do feasibility studies rather precisely. We are concerned with building standards and codes, whether they be municipal codes, standards established by funding agencies of the federal government, or our own standards. Environmental studies generate some of our own standards, along with building standards and codes. We might do the design construction documents for renovation and addition, but this is limited to very small projects. In many instances even the smallest of projects will be handed out to a local architect. I do not believe a university should run a captured architectural office for any significant or major architectural work on the campus.

Staff and Budget

A physical planning office requires professionals in planning, architecture, and landscape architecture. The number of other professionals who provide input to the planning process may be members of the planning staff or of available staff in other departments of a large institution. Mechanical, construction, civil and electrical engineers for example are usually members of the operating and maintenance sections in the department of buildings and grounds. A plethora of experts, though, may be required for specific problems like acoustics, lighting, subsoils, traffic, etc. Frequently services of these professionals are hired by the planning office or by the architect of a specific project. Planning offices which are responsible for institutional research and analysis, academic programming, facility scheduling and annual fiscal budgeting will require additional staff. Since planning office activities and responsibilities vary among institutions, it is not wise to predict precise personnel requirements based solely on the size of the institution. Clearly, smaller institutions which experience little change will require fewer full time professionals. Many colleges might use private firms as consultants, but the continuing services of an architectural planning firm should be the minimum goal of any institution which hopes to maintain a physical planning effort. Both continuity of knowledge of the university and the rapport established between the institution and the consultant is vital to the planning process.

A brief description of Harvard's planning effort might be helpful. Harvard is a private urban institution with an enrollment of approximately 15,000. The undergraduate enrollment is approximately 5,000, or one-third the total enrollment. The floor area of the existing plant is approximately nine million gross square feet, on a land area of 320 acres. The annual dispersement of funds for new construction and major renovations has been eight to ten million dollars. Currently

there are some 15 architects commissioned by the university at work on some 20 major projects which total in excess of 70 million dollars in project costs. Planning and feasibility studies by the planning office for projects to be completed in the next ten years might approximate 80 million dollars.

The planning staff that we hope to maintain for this program includes, in addition to myself, three assistant planning officers with degrees in architecture and/or planning and several years of professional experience; six project planners with degrees in architecture and a minimum of two years professional experience; two staff planners with degrees in planning and two years professional experience; one landscape architect with a degree in landscape architecture and two years experience; six draftsmen with two years of training subsequent to high school; and an administrative assistant and two secretaries. I might add that we in every instance encourage our younger, less educated or less experienced employees to continue their education. We have an assistance program in which we can pay up to a half of their tuition in night courses or they can attend Harvard extension courses and Harvard summer school for no charge.

The planning office budget can be an uphill experience. A questionnaire of offices handling physical planning for colleges and universities, prepared by the Stanford Planning Office, and some private snooping, permit a few generalizations regarding salaries. The range in the survey for directors salaries was on the order of $15,000 to $30,000. This range does not reflect the difference between impecunious and affluent institutions, but rather the position within the administrative structure.

Associate directors are in the 15 to 21 thousand dollar range. There is a very broad range for architects and engineers of $7,700 to $18.000, with planners ranging from $9,000 to $18,000. Here the salary is a matter of, again, the qualifications of the individual and where he is positioned within the structure of the planning office. Draftsmen may range from five to ten thousand dollars. Sometimes, in some places, we will label as an architect a man without registration, but with a degree. In other places he will be labled a draftsman and possibly paid more. Landscape architects, interestingly enough, fall into a much narrower bracket of about $10,000 to $14,000. I think the principle reason is that there are fewer landscape architects on institutional planning staffs, and that they are generally hired not as a draftsman starting out but on their title as landscape architects. Construction inspectors range from $9,000 to $16,000.

In addition to direct personnel expenses, including fringe benefits, etc., planning office costs include office space, furnishings and equipment, supplies, materials, telephones,

travel, publications, services purchased -- meaning outside experts that might be hired for specific studies. Salaries might amount to somewhere between 60 to 80 percent of the total planning office budget.

I think that it is fairly easy, when you are making a case for a planning office and for a budget, to substantiate your need for funding when you talk about the architectural services that you perform. You have something to measure and you have known measures of cost. In project planning, you are talking about a particular activity as related to a construction effort or renovation effort and you have some opportunity for making a case. The two areas where, of course, it becomes extraordinarily difficult to give a supporting argument for funding would be in planning administration and the long-range planning effort.

BUILDING PROJECT PROGRAMMING: UNIVERSITY OF CHICAGO PHYSICAL SCIENCES BUILDING

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This is a case study of the programming process used in developing a Physical Sciences Building at the University of Chicago.

The University of Chicago is a private institution. Fall 1969 enrollment is approximately 8,500 students, of whom 2,500 are undergraduate and 6,000 are graduate. The graduate students are enrolled in six professional schools and in four major graduate divisions. The four graduate divisions enroll about 4,000. The two largest divisions are the Physical Sciences Division and the Biological Sciences Division.

The building to be discussed will house central facilities for the Physical Sciences Division, and is to be located in a Science Center with other Physical and Biological Sciences Buildings.

The main quadrangles of the University were designed in 1892 and constructed largely over the next 20 years. The buildings generally are neo-Gothic design.

The University is proud of its quadrangles. In 1902, the Olmstead brothers, then consultants to the University, strongly recommended that the quadrangles be developed as originally planned. Today, the University is creating a new quadrangle. The building that we are to discuss today is on the edge of this new quadrangle.

The new quadrangle is located between the research institutes of the University and the University Medical Center. It is not just a matter of architecture that called for the creation of this quadrangle; it is a matter of philosophy as well. The faculty finds that it is not enough to have interdisciplinary interaction within the biological sciences division and separately within the physical sciences division. These two divisions and their sciences must come together and there

must be some kind of interaction between them. Therefore, this quadrangle is being designed to pull the physical and biological sciences together in one location.

Running through the buildings in the quadrangle will be a corridor system that will connect all the buildings at the second floor level. This is not only an environmental consideration, to escape Chicago summers and winters, but it also responds to the major goal of the science center, to bring all the sciences into physical proximity to each other.

There was some discussion in an earlier conference session about involvement of students in planning. Where student housing is being planned, that certainly makes sense. In this particular case, each department chairman in the Physical Sciences was a member of the Building Committee, leading to a rather large committee.

Case Study

This is the point where the client group and the architect have gotten together. The stage has been set, and aims have been discussed.

A basic concept, that preceded this particular project of designing the Physical Sciences Central Facility, is the idea that the various disciplines making up the physical sciences are like the spokes of a wheel, with a need for certain kinds of central facilities that serve as a hub or focus of their activities. The rim of the wheel represents the need for strong linkages between the spokes. These linkages will be physically expressed in the bridges that are planned to connect the various buildings and quadrangles.

That concept of the physical sciences central facility is what the physical scientists see, looking at their own needs. At the university-wide level, there are plans to bring together the physical scientists and the biological scientists. The physical scientists generally will be grouped in buildings located in the east half of the science center. Biological scientists will be located in the west and south. Between these groups of buildings, adjacent to and west of the Physical Sciences Building, will be a central teaching facility to serve both groups.

It is an interesting point, in terms of budgeting for a program, that part of the requirements of this specific project related to achieving some university-wide aims. How do institutions solve the problem of carving up a specific building budget in order to carry out university-wide aims, without subtracting from a specific program in the particular building? For instance, this project carries

forward the idea of linking one part of the campus to another with enclosed circulation space. To do so should not require a trade-off in terms of the size of physics labs.

At the point where the architects entered the project, the building committee had already developed a program which listed a great deal of information. Their report was fairly clear about many of the aims of the project, but it was a little confusing in that it mixed minor details and major ideas. The architects were asked to analyze the report, to provide some useful feedback, and to see if the program was a satisfactory basis for designing the project.

Here is an example of the mixing of minor details and major ones:

There was a very clear statement about the necessity for interaction among the various disciplines, and the fact that the facility needed to act as a hub and bridge among them. That is a major idea. At the same time on the same page, there was a statement regarding the need for a certain number of student lockers. That is a minor detail.

At any rate, one of the first things the architects tried to do with the report was to diagram some of the major ideas in it, to be sure that everyone was talking about the same thing. They also got involved with seeing how well the program of space requirements matched the budget.

The listing of spaces required, as developed by the faculty building committee, came to some 200,000 square feet, while the budget was set at $5 million. Those two figures did not match at all. In fact, when the architects tracked down the kinds of space listed in the program, the cost estimate was more like $9½ million. This brought the first serious communication between the client group and the architect group, and there followed several months of trauma while the building committee, which had thought that it had already developed a program, got into the process of completely redeveloping and rewriting it to reflect the reality of economics.

This is a most frequent experience at the University of Chicago, as perhaps it is elsewhere. The faculty always seem to come up with a program stating the net square feet of what they need, and they have in mind some kind of dollar cost which is attached to this square footage. They are just appalled to find out that it costs twice as much as they had thought it would. There is always trauma, and there is possibly a year's delay, while the faculty go back and scratch their heads and ask "How can we cut this back to give ourselves only the most important things?"

In many institutions you find some kind of coordinator for

federal grants, and the University of Chicago is fortunate in having such a coordinator. Nevertheless, one professor had in mind the need for a certain number of square feet of space, and a dollar figure that this space could be built for. He went to Washington, and came back with a grant for a specific number of dollars. The University, if it accepted the grant, was obliged to deliver 66,000 gross square feet of space for $1,937,000 and fortunately was able to do it. But what a situation to be trapped in, where someone goes off and makes a commitment, before the technical people have a chance to look at what the space will really cost.

This suggests that the technical staff need to be on the building committee at a very early stage, to bring in cost information or early warning of some of the ramifications of what the building committee is talking about. It suggests that it is extremely important to get the academics to establish academic plans before there is any talk about physical space or even about physical concepts. The architects and planners have somewhat broader outlooks, having seen perhaps 15 or 20 different kinds of labs that would be appropriate. The professor has also visited a number of institutions, and has seen labs, and he may want to have a lab exactly like the one he saw at University X. However, the architect is usually the person with the broadest experience, and what is important is to separate the tasks: Give to the academics the problem of stating clearly what it is they want to do, with what kind of equipment, and indicate which people are going to be doing it. The architects and planners will help them in determining how much space it is going to take, and what it will cost.

Now, in some cases, and this building is an example, the faculty went a bit further and figured out what they thought the space amounts would be, and they were a little wrong.

So, we would make two pleas. One, for as early an involvement of the architect as possible, and two, for stating the charge to the building committee that the program should describe in terms of people, activities and equipment, and not in terms of space. The architects and planners will translate this statement--about people and activities, methods and equipment--into space requirements.

The building committee started out to develop a program for the central facilities required for the physical scientists to include not only the areas of astronomy and physics, but also of mathematics, statistics, information sciences, and computation center.

When costs became known and it was realized that the program would have to be phased or cut in half, it was decided that physics and astronomy would be included in this project, and the other departments would have to wait.

This cutting-back had to happen before any further investigation of basic aims was made, because it was such a big change in scope. The other elements remain for longer range planning as part of the master plan for developing the entire Science Center, but not as a part of this particular project.

A basic aim of the program, clearly stated in the first document, was that this particular building was to be the front door for the physical sciences division, and that the architecture should make this clear. (That is a good aim and it is a good statement of a problem.)

Likewise, there were three very important basic aims regarding interaction. First, the undergraduate student in the physical sciences would start his study in this facility, remain in it for three years, and continue there with his graduate study and later with research. At all times, he should be aware of the other kinds of activities that were going on, and the interrelationships among them -- to be exposed to them from the time he entered the program.

The second very strongly stated and basic aim of the program was to promote student and faculty interaction. This aim produced a programmatic concept of "interacting suites". Rather than having a group of faculty offices in one place, student offices in another, and research offices in yet another place, these three kinds of activities would be interrelated, exposed, and very accessible to each other.

The third aim dealt with the relationship of these interacting suites of people and activities to the other kinds of facilities, essentially the laboratories where research was going on.

What is important is that the suites have to be adjacent to research laboratories. It is not necessary that the suites be in the middle of the building and the research laboratories be on the outside, which happens to be what the architects' original concept diagram showed. Rather, the important thing is that the two be close to each other. The proximity expressed by the original concept diagram was carried out in design development, but with the laboratories in the middle of the building and the offices on the outside. It is important to keep separate the programming and planning aspects. Sometimes that is a hard distinction to make.

From there, the architects were able to go on and describe various other needs essential to the program, but secondary in terms of importance. These dealt with the relationships among laboratories, and the kinds of facilities needed to support the different kinds of laboratories.

As part of the process, it was useful to diagram these needs and relationships as well as to talk about them; in effect, so

that people really could see what it was they were saying.

For example: A variety of lecture halls were called for, some of which, because of their traffic characteristics, needed more access to the ground floor and to the main building entrance; but all of the lecture halls needed to share certain kinds of services.

It was very effective to diagram, for all to see, what it was that they were really asking for in terms of space, the amounts and what the implications were. This led to changes and trade-offs, budget balancing and rebalancing.

Having studied the major aims, concepts, relationships, and other factors, the architects came to the point of stating the problem. During the process of discriminating about what would be important as a major idea in schematic design as compared to what would be easy to solve later as a minor detail, one out of all the various details loomed as a major design problem. That was the way in which the cosmic ray laboratory would have to be treated. There were two choices. The first was to place the lab on top of the roof, to maximize the amount of cosmic rays that could be collected. The second choice was to bury the lab partly in the building. The only other really specific problem, unique to this kind of facility, was the necessity to shield the accelerator laboratory. These two elements were therefore stated as part of the problem, along with those things inherited from the original program: the wheel idea; the interrelatedness of this facility to its neighbors in the physical and biological sciences; the desire to have this building express itself functionally and visually as the front door to the physical sciences; and the problem of achieving maximum interaction among the various people in the building.

The plan of the third floor shows the schematic design that responded to the programmatic concepts and statement of the problem. It was decided for various reasons (the view, the kinds of spaces that could be buried in the building, and the kinds that needed more exposure to the outdoors) that it made more sense to put the interacting office suites on the perimeter of the space, with the laboratories in the center. At the same time, the design achieved some by-product advantages: the location, in the center of the building, of those uses that need flexibility in wall and utility arrangements, for example; and the funneling of traffic in a way that permits people to go through the building and observe its activities without being disruptive.

The basic architectural concept, however, is that the building is a bridge connecting the research institutes on one side, and the geophysical sciences on the other. Rather than placing a building on the site and then connecting it to other buildings with bridges, the idea of interaction is strongly

implemented by making the whole building into a bridge.

In fact, the initial notion was only to have bridge connections at the second floor, because that is the level on which connections can be made to other buildings down the line. It became possible, with this design, to make connections to the two adjacent buildings at three levels.

It was not our intention to analyze the design of this building, but rather the programming. Very briefly, however, the cosmic ray lab ended up on the roof, the accelerator ended up in the basement where it could get the best shielding. Then, from top to bottom, the more specific research labs with less relationship to other activities, and toward the center of the building, more centrally used the more public activities. A small library was added to the program, as a temporary space to be convertible to laboratory use later.

At the ground floor, which serves also as the entrance to the physical sciences quadrangle, are the more public oriented facilities, the large lecture halls. In the basement are the various support activities that make the lecture halls, and the whole building, "go".

Just a word about some of the design problems:

The architects got a little too far along in the building before looking more closely at some of the City code requirements. They had conceived a building which was all glass at the exterior of the second, third and fourth floors, and was supported on pillars and a limestone base. Everyone like this idea architecturally because the limestone related to the other buildings on the campus, and the glass would reflect one of the neo-Gothic buildings across the street. What was forgotten was that, with a glass facade, the building has to be 30 feet away from an adjacent building, a fire code requirement. The architects are now in the position of either pushing the building 15 feet closer to the street than they would like, because of this distance requirement, or of doing away with the notion of a glass facade on the west side of the building.

The site is very prominent, at a major intersection of city streets in the heart of the University. Along the major street leading through the campus are buildings of four or five stories, all in stone, quite ponderous, creating a canyon effect. The architects originally suggested that the building be set back, and given a glass facade, to relieve the canyon effect. Yet, the requirement for 30 foot separation between buildings will to some extent negate the setback.

The bridge also became a little complicated by other City requirements. There is a major sewer in 57th Street. If the City has to repair the sewer, their equipment has to be able

to work under the bridge. The City asked for 21 feet of clearance over the street. The University is faced either with placing expensive sheet piling along the existing sewer now, so that if repairs are needed later, the City can use a lower rig; or the building has to clear the street by 21 feet. Well, the floor levels in buildings on either side of this bridge building are established. The architects are now struggling with whether to install the sheet piling which adds to the cost, or whether to raise the building a little, which creates some problems where the buildings meet.

You can certainly see that codes and other City requirements can be very important factors in shaping or re-shaping basic aims and design concepts.

Some comment is necessary about the budget. The building is now estimated to cost $7.3 million, not 5.4 as targeted, and there are three reasons for that.

One is that the faculty and the program went through the trauma of a one year's delay, at a cost escalation of 10% a year, or $540,000.

Secondly, part of the extra cost lies in the richness of the building. It is a little bit richer than we had anticipated.

Everybody at the beginning has the best of motives, willing to live with a very austere building in order to get this facility that is so basic to the physical sciences division. But closer to the home stretch, you find you really want that additional item or two. And so, the construction cost plus fixed equipment for this building has risen about $5 a square foot.

A third item is that in working out the program, after the initial cut from 200,000 gross square feet, all were ready to live within 111,000 gross square feet. But, just as the addition of items within the offices and laboratories took place, so too the area somehow crept up to 123,000 gross square feet, just by adding innocuous little bits and pieces. For example: we cannot quite get this down to a 40 person classroom. What if we have 43 seats, is that so bad? And, we really only need a 160-seat lecture hall, but this space works out so nicely, and it would look good if we had 180. Add all those up, the square footage goes up, and that is the third way that the cost increased.

At the same time, the University gained a great deal. It lost something because of escalation over time, but it gained by stopping in the middle of the program process and going back and cutting out major elements that could not be afforded and could be left for a later phase. As a result, we have not a $9.5 million building, but a $7.3. If we had gone ahead in planning for the $9.5 million, would it be 11

or 12 now?

This gets us into a discussion about contingency planning that is somewhat beyond programming. There are two kinds of contingencies. One is what some architects call a design contingency. You know there are going to be extras added in the laboratories, and that 40 seats will become 43, so you allow in the cost estimates 10 or 20% for those elements that creep into the design. This contingency is reduced as the design becomes more specific. After working drawings are completed, you then have to go into construction with a construction contingency which will take care of change orders. On a very large building, you might need a contingency of only 3 or 4%. On a smaller building, you may need to allow 5% or more.

In summary, what are some of the things that the case study has brought out? For one, an early emphasis on the major aims and the major programmatic concepts has resulted in strong physical solutions. Second, the case for establishing a strong and clear programming process at the outset is pretty well made by the loss of a year's time which cost the University $540,000. Remember, in terms of setting up committees, and the processes of decision making, that delays in making decisions on a million dollar building these days costs about $300 a day.

COMPUTER APPLICATIONS: DUKE UNIVERSITY / EDUCATIONAL FACILITIES LABORATORIES INCORPORATED

ALAN C. GREEN
Secretary
Educational Facilities Laboratories, Inc.

In this session we will talk about computers, models, simulation; we will talk about a real university, complete with students, faculty and what are commonly known as student uprisings. We have a student representation on the program today, but I must say it is not tokenism by an means, because both Jeff Lazarus and Judy King, vintage 1948, have been actively involved in the project. I think adding a little note of intrigue to the show this afternoon is the fact that the project was funded by a foundation, and you know if you have been listening to some of the things emanating from the banks of the Potomac River, foundations are somewhat sinister.

As Dick Dober has said, EFL "small change" foundation, supporting research and experimentation in the development of facilities for education. We are concerned with buildings, site, furniture, equipment -- the so-called hard things or durable things of education. But we are not only concerned with these; we are also concerned with the hows, because we have to research the ways by which we do things. How we conduct our processes of creating educational facilities. We have got to ensure through these processes the most effective use of resources, that we are building within our time constraints, that we have the right information available at the right time for the right people in decision making. So, Educational Facilities Laboratories is also concerned with process and with planning tools.

Three years ago, a germ of an idea emerged for a project. It seemed obvious that there are some important ways a computer data system could assist in the process of campus planning. The thought was not to go to a study project, not to support a paper study, but rather to go to a real case study. So these components were put together. Duke University, a real institution undergoing change, with planning in hand, put together a team consisting of an architectural planning group, and a firm of computer programmers to create this real project.

The team has researched five basic items in this whole survey of applications of computer technology in campus planning:

One, the development of a computer based inventory of facilities

and resources; secondly, the development of techniques for analyzing and understanding non-scheduled activities -- the so-called B data that they will be talking about this afternoon; three, the development of an evaluator model; four, a notion of space pricing, and five, putting all of these things in the context of a planning policy framework.

I have had a great deal of fun and pleasure working with this team. This is the story we are going to tell this afternoon.

WALTER MATHERLY
Department of Physical Planning
University of Florida

I went to lunch last week with a friend, a professor of political science at the University of Florida, a specialist in public administration, and of fairly radical persuasion with regard to the way the University and universities in general ought to be run. The conversation turned to our institution's response to legislative demands that we institute program planning and budgeting. I went through a spiel about my feelings on the matter, that regardless of what has to be done or who does it or what it is called, the entire structure seems to rest on an extensive information base, or it should do so. I become complacent about the obvious usefulness of information. My exposition was replete with diagrams drawn on napkins. She pointed to my blocks and arrows and lists and said, "What an instrument of evil! You make such a thing available to those nuts in the administration over my dead body! All you will do is increase the rate at which they can make mistakes, and eventually lead to the ruin of the entire educational establishment!" She would not even allow me to pay for my lunch to assuage my guilt. I mention the story simply by way of acknowledging that though planning information must be used by somebody in order to be of any value, the planner should not count on the unanimous support of the power structure, at least for his initial efforts.

The development of an information base of the type we shall be discussing requires a bit more than just a mere systems design. The planner's courage and his convictions are very useful resources.

Facilities planning procedures of some description exist in all institutions, we felt, or else the institutions could not survive. All we wanted to do is to find out what the essential features of these procedures and the related data were, and then attempt to make them more explicit and more responsive to institutional aims.

A great deal of effort by a number of people and agencies has gone into facility inventory systems in the last 15 or 20 years, but little into definitions and collection of data on activities.

We found that some theoretical work has been done describing the institution as a system, demanding resources and generating definable outputs, but that little had been accomplished in the way of computer driven model that could accept and manipulate real data and give results useful to facilities planners. This we attempted to do.

The specific tasks we devoted our time to turned out to be five in number, each designed to meet at least one of the EFL charges. In describing the planning process, rather than collecting information from other institutions on the procedures they have used to develop plans, we attempted to identify the data needed by planners in a big university, regardless of whether or not they were getting it.

We looked for the manipulations the data must go through to be put into useful form. We used Duke University as an information resource, thus describing the planning process.

Basing our ideas on the existing publications of the USOE and Henley reports, we designed a space inventory and collected the requisite data. Our final product differs in several important aspects from both the USOE and Henley works, but enables reporting at least as extensive as that envisaged by their suggested coding structure. Jeff Lazarus covers this later in this paper.

Earlier inquiry pointed to the fact that scheduled activities generate records that make them relatively easy to analyze: classes, labs and attendance at certain events, but that activities of a non-scheduled variety occupy more than 95% of the physical facilities on the average campus. It was one of our primary goals to find some practical way to collect and use data on these activities that could be matched with available and planned facilities. Judy King will give you a glimpse of our work on this task a little later.

Now using this concept of matching activities with compatible space, a computer model seems feasible which would simulate to some extent observed and projected activity levels, if not in detail, at least in general terms. And such a model is a formidable undertaking for any institution, and a generalized one even more so, as it is beset with methodological booby traps of the most seductive variety.

Even when an institution writes and uses such a model it becomes a cumulative thing: it must be refined and validated over a span of years by dedicated users. Even so, there are other studies, (static analyses in the same sense that the

model attempts to be dynamic) of equal importance to planners. We have attempted a few of these as well. Bob Mattox will go over these with you in the last part of the program.

At last a concept arose in the course of the project that we felt might do two important things: (1) decentralize decision making about space assignment and use, and (2) ensure efficient utilization of space, both at the same time. This is something that I cannot cover in this paper for lack of time, but I urge you to read the appendix of our final report for its details. The concept casts the institution in the role of landlord, pricing and selling space, to use our programs in a market environment. Not a new idea perhaps, but one we feel is practical, and particularly appropriate to program planning and budgeting.

It became apparent early in our work that in order to be most useful, our ideas, information file designs, and data collection methods should all be consistent with some one single concept of the university, what it is trying to do, how it uses information. An unusually apt description of a university -- or indeed any organization made up of people and material resources devoted to accomplishing some set of goals -- is provided by what is called the adaptive organism, in literature of elementary systems theory. Such an organism actively seeks some state of being, say simply survival, or some other definable goals, and moving toward its goals it uses up resources and stores others against future needs. It keeps track of, that is it processes, data regarding the rate of flow of these resources, into and out of its control, and where it -- the organism -- is in regard to its aims.

What is called a sensor function picks up, edits, and stores requisite information. A monitor compares it to a set of rules. We probably call these rules policies or guidelines, indeed a plan. If the information received by the monitor does not match the rules, the effector simply assures that certain activities are interrupted. If the monitor detects significant deviations from the plan, an appeal is made to the control function which, based on its experience, its instinct and the information at hand, can change the dictates of the plan contained in the monitor, and thereby change the course of real events. We make no attempt in our analogy here to suggest in whom the control function should be vested or how it should be constituted, but merely pray that it exists at all, and is responsive to shouts of alarm from the monitor.

We are not dealing with just any abstract theoretical organism. We are trying to reduce information about real campuses to a manageable form, and to use it in meaningful ways.

Now what sort of data are we interested in? Well, to begin with, as monitors we wish to keep track of the flow of resources used up in various activities conducted by the organization.

Traditional resource accounting keeps track in categories. A table may be the format for an institutional dollar budget of interest to the topmost administrators of the institution -- in other words, the control function we were speaking of. The rub comes in the fact that everything is reduced to a useful, but limiting, number or dollars.

As facilities planners, we seek to relate the actions of people to the supply of facilities. We might match the activities of different kinds of people with supplies of compatible facilities designed to house them.

As an overriding guideline in developing our data, we attempted to relate types of space, existing and planned, to programs, or the parts of different activities that use them. As I said earlier, this matching process is being done every day in all institutions, and does not need planners to make it happen. It is done in many different ways, depending on the school.

Most data we record for use in planning must be valid to anyone who uses it, not just the planners. Data used in day to day management of the institution, if it is used consistently will generally be valid. How we record data -- that is, in what terms, and using what symbols -- becomes a more pressing problem the nearer we get to actual data collections, and the creation of banks of data we expect to use in developing and administering a plan.

Some resources are indeed best measured in dollars. Money itself, for example, and the unmanageable variety of materials consumed in a short term. But others yield to analysis better when described in terms of hours of human effort, square feet of room space, or hours of use in the case of capital equipment.

In short, the organization must collect and process three types of information: information concerning its resources, the activities that are performed within the groupings of recources, and the goals or aims of the institution. We, the facilities planners, are particularly interested in the facilities and the activities that use the facilities, and in particular, the non-scheduled activities. But it is extremely important, we have felt from the beginning, to view the information that we are collecting as part of a much larger and more important whole.

JEFFREY S. LAZARUS
Student
Duke University

The project's purpose was to look at the relationships among time, activities, and facilities, and thus to make a room

inventory file. The room inventory file actually serves a dual purpose -- it supplies data to this particular project and also satisfies management's needs for facilities information. The data can be divided up into four main categories.

1) Room Identifier

2) Assignment Data - Something that is not inherent in the room itself, so much as part of the room be design of other people. Assignment data include the use of the room and the people occupying the room.

3) Physical Data - Standard information which includes plumbing, electrial facilities, air control facilities and dimensions.

4) The Space Tank - Function of the physical facilities of the room.

To collect the assignment data we developed a procedure that requires people's cooperation in reporting what a room is used for and who is in there. As that data changes we have developed procedures to record those changes, so that the file can be kept current. Similarly, for the physical data, every time there is a request for the changing of a facility - taking out a wall or putting in a faucet - we have a procedure for collecting that kind of data. Of course, in addition to both of these, the same procedure applies to the collection of new data for new facilities.

Now some details or examples of the kinds of data that fall into these particular categories. In the room identifier, we have the building number, floor, room and suffix of the room. For the assignment data, we collect such things as the department that uses the room in a code that is compatible with the rest of the university information system, the use of the room and its functions, the people in the room, what types of people -- secretaries and so forth -- and whether research goes on in that room or instruction -- things of that nature. In other words, everything there is to know.

For the physical data, details of plumbing, the number of stations, electrical and heating data, and area and square feet were collected. When this data was collected there was a lot of dissension that some of these things were not really necessary in an inventory of physical facilities. But one of the primary purposes of this file is to serve as a source of data for matching facilities to activities, and before the project started nobody really knew what kind of data would be required, and what interesting things we had turned up.

Now let me describe a little more slowly the business of the space type. We have defined six types of space. Most common is general or standard space, and without going through each physical detail of the room that generates that type of space,

let me just explain that general space or standard space is four walls and electricity lights, heat, and just some of the basic things. So for example, an office is general space, a classroom is general space, and a bedroom is general space. Special use space, which is anything that is not one of the others. Theater lecture space -- that is the type that has steps down, with seating arranged as in a theater. Janitor's closets, which are small and have special plumbing facilities in them that you would not ordinarily find anywhere else. And laboratory space, which has any number of air, water, gas and oxygen inlets and outlets and so forth.

The philosophy of this is kind of interesting, because if you stop and think about it for six months, like I did, you can decide that in any given kind of space you can do several different kinds of activities, and different types of space can be put to different uses. That is important, because a lot of people get hung up with the idea that they are going to build classrooms, and they are going to build bedrooms, and they are going to build offices, and they miss out on the fact that sometimes, depending on other considerations, such as size and location, the nature of those rooms makes them such that they are interchangeable.

And so that is really what the inventory file looks like. It is quite cumbersome; nevertheless it's got all the necessary information for both the activity relationship study and for management's recording the stuff that everyone does all the time.

JUDITH E. KING
Student
Duke University

It is important to find out what the students do with their scheduled activities. In fact, it is important to find out everything that is non-scheduled about the university.

So we began, and we had a universe from which we had a sample, setting what the non-scheduled activities were all about. We tried to describe what kinds of people use the facilities on campus. We came up with all sorts of different kinds: the undergraduate students, the graduate students, the faculty, staff, the administrators, then the townspeople and the alumns. And each different organization had different uses for the campus that centered around different areas and types of buildings.

But the undergraduate students used the campus most. In our university they live there, so they were using the university

in one way or another 24 hours a day for at least 9 months of the year. So we figured they were the people we would look at first.

We chose a sample of 500 students, to whom we gave diaries. We explained to them that we wanted to know at what time they were doing what activity, and in which location, for 24 hours each day for a week. They stayed with it, amazingly enough, because we made it fairly easy. We gave them diary sheets, all made out -- it was merely necessary to fill in the blanks. Across the page we provided columns of 23 activities that we felt fairly well described what they would probably be doing, and we provided space for writing in other activities. Along the side of each page they had to fill in the location of each activity. Buildings were to be identified by numbers. They also gave us information about group size, which turned out to be a quite interesting field to analyze.

The students filled out the diaries, and most of them were fairly faithful throughout the week. It is interesting to note that very few people found that they had to use Column 23 -- the "Other Activities" column -- in filling out this diary book. Most of them carried the diaries around with them -- they were about the size of a notebook.

Our next problem was to make the diaries into something that the machine could read. The sheets we used can be fed directly into the machine -- a special digitech machine -- which can read and interpret the data immediately rather than having to go through a long keypunch procedure. The information the machine could not interpret immediately was the location information, which we located in the far right column. This information we coded on other digitech sheets. This we found not to be the ideal idea, the accuracy was not good. We recommend to anybody who wishes to do this sort of thing that they keypunch the information rather than code it on digitech forms. We think accuracy will be greatly improved without any significant loss of time.

In processing this data, the first thing we had to do was use a routine to get everything in nice order. In the back of the booklet there is a questionnaire, which gave information on the students' backgrounds, their socio-economic backgrounds, what they planned to do, their interests and their attitudes and opinions about the university. This information we wanted to use to correlate various activity patterns with interests, so that we could understand which kinds of students were acting in particular ways on the campus, so that we would be able to determine, based on projections of a particular kind of student, what kinds of additional space would be needed. So the questionnaire information was also coded on digitech forms. (Here again I think it would probably be better to have used keypunch procedures.)

After using our scramb program, which unscrambles digitech information to put it into logical order, we had three files,

The questionnaire file was now ready to go, after adding the SAT scores which we had asked the students if they would please release to us. And we had two files, one on activity information, and one on location information, that had to be coded separately.

Using the match routine, we merged these two files into one. At this point we discovered bad records. At this time it was decided that digitech was not the thing for location records. The problem was coding mistakes.

I realized that digitech, while it offered a lot of good qualities, had a major bad quality in that the rate of human error was much higher with it.

We thus had the program which, for lack of a better name, got dubbed Alfie somewhere along the line. Alfie's purpose was to take Jeffrey's room inventory file, and information about space type and room use codes, and tack that on to the end of our records. At this point our records had the student identifier, the day, the beginning time of the activity, what the activity was, the room identifier (or the room that the activity was located in), the room use, and the space type codes for that particular room. This then is sort of a synthesis of the two batches of information, so that in other runs we would not have to also use the room inventory file. At this point we had a master diary tape, that was ready for analysis.

ROBERT F. MATTOX
President
Computing Research Systems Corporation

You know, one of the traps that people in data processing fall into is that they collect too much information and then sit back and say, "What are we going to do with it?" Well, we wanted to look for some patterns in the data that we collected, and some of these patterns had to do with traffic, use of space, distribution of time over the period of the week, and so forth. Some of these perhaps many of you are familiar with, but I would like to review them quickly.

You might be aware that Duke University is split between two campuses -- the West or the Gothic style campus, and the East or Women's College. One of the questions often asked is how much travel is there between the two campuses, and within each campus itself. Because the diaries collected information sequentially, we are able to follow students from location to location during the course of the week. This to me has an advantage over the traditional O and D studies, where a person

interviews someone going across the campus and gets only the origin and destination at that point.

The trips from the diaries were summed from the magnetic tape and a program drove a mechanical plotter which produced an overlay for use with a campus map. The lines are straight lines, they do not follow the patterns of the natural roads or sidewalks; however, with extensive programming that could be accomplished as well. This provides a static view of one point in time: the total student traffic at that one diary. The diary could be broken down into subsets, and analyzed by kind of student, by time of day. Another very simple kind of overlay -- again driven by a mechanical plotter -- indicated space use density.

Another way to analyze the data is to determine the distribution of the time over the four weeks. Here we found that academic time is responsible for 26% of the total time, and that includes lecture, laboratory, study, and counseling. Residential activities accounts for 42% -- these are sleeping, eating, and personal hygiene activities. Recreational activities accounted for 17%. Transportation, including walking, bicycling, driving, bus travel, and so forth accounted for 7% of total time. (These might be a little high because at Duke the two campuses permit 20 minute class breaks to travel between campuses.) Miscellaneous activities accounted for 8% of total time. Taking just the academic portion, we see that lecture represents 26% of that category, lab is only 6%, and study, significantly, is 65%. But overall, we still have something like 6% for lecture, 2% for lab, in the general distribution the student's total time on the campus.

Apart from just showing the total distribution of time, we are also interested in patterns. The patterns seem reasonable to us for the activities which we know to be fairly discernible; this gives us confidence in the other patterns about which we do not know so much. We can codify precise measurements, or more precise measurements, of the activities. We looked at the hour of the day for each hour of that day and the amount or number of man hours (student hours), going into that activity at that time of day. (Each student hour may be comprised of one student for one hour, two students each for 30 minutes, and so on.)

So we see that the lecture begins promptly at 8 o'clock and takes on a pattern of the most popular hours, and tapers off towards the end of the day. Laboratory predictably is less frequent in the morning; the use of these facilities increases in the afternoon and peaks in the early evening. Study, on the other hand begins to build up in the afternoon, and continues into the night, as you might suspect, and does not taper off until 1 or 2 in the morning. Sleeping, amazingly enough, turned out to be on the average of 8 hours a day. Apparently there is a little bit of a nap in the afternoon.

Eating is quite predictable. Personal hygiene, bull sessions peaked late in the evening, concurrently with study. Movies and games, this sort of thing, peaked in the evening as well.

Now, why do we want these patterns? One reason is to know the peakloads for utilization of facilities. We can expand the sample until it represents the total student body, and match that against the space that is available, and in some sense get a better understanding of total utilization of space. I would like to see this kind of information moving towards simulation, where we would simulate the actions or the activities of students, even faculty and staff, and how they might interrelate with the space types and locations on campus.

Again, this kind of analysis is a static viewpoint at one point in time, and for planning to be a dynamic process we would like to make this kind of analysis more dynamic and interactive. What we have been able to do in this project is suggestive; we hope that it spurs others to do more studies in depth.

We have the space inventory on the one hand, and the collection of activities on the other. We have done some analysis, relating the activities to the different kinds of space. For instance, the classroom space on campus was used by our diary respondents 84% for lecture and 15% for study time. Study space on the other hand, was used 97% for the activity of study. That is looking at the space and its use. Looking for instance at study as an activity, unfortunately we found that two-thirds of the responses went to spaces which were undefined. This resulted in part from the design of the instrument itself, which did not give us sufficient room information to identify, or was illegible, or was absolutely non-existent. However, of the information that was obtained, the other third, 18% of study time was spent in classrooms, and 60% was spent in residential spaces, and only 18% was spent in those spaces identified in room inventory as study spaces.

In order to refine the information of the instrument, I think we could reduce the number of unidentified spaces. What we are after is a cross section or a profile of the use of kinds of spaces. What we call classrooms or laboratories today might in fact be used for many other activities. In fact, activities occur in many kinds of spaces, so we are trying for two-way cross sections, mostly to generate questions about what we ought to be planning for on the campus. This will not predict nor tell us precisely what is needed, but it will generate questions.

One of the items collected on the diary was group sizes. In our first diary we found that we collected information on what that student was doing, but we also came up with the question after that as to with what group size did he identify

while engaging n that activity. We phrase the question this way, but we find that the response might be somewhat suspect. Nevertheless, preliminary analysis shows that study was 82% alone, 12% was identified as being with another student, and negligible percentages with two or more individuals, which might say something about the kinds of facilities we designed.

Eating, 46% along, 16% with one other, and 32% with a larger group of 2 to 10. Bull sessions was interesting. It seems that at Duke a lot of students go around talking to themselves, because 24% of the responses said they had bull sessions alone, 28% with one other, 49% with a group of 2 to 10, which is what you would expect.

We try to put all this together in one way to suggest how bringing together various kinds of information can be made more useful to the planner, and immediately the idea of concept of system comes to mind. It is a rather overused word, and some people, say an underused process. But a system essentially is a logically ordered set of items or events which operate together within structured procedures for some common purpose. We must attempt to use this approach, and part of this project has presented a planning process. Essentially it boils down to this kind of string of events: beginning with the definition of goal, finding facts and analyzing them, about the resources and the policies which govern their use, formalizing concepts, bringing together educational concepts, cost considerations, design considerations, into some meaningful use of the resources. Based on that, how we are going to use them, project the needs, bring them together to describe alternative plans, evaluate them, and eventually select and implement.

We suggest that there are several parts of this process which are most adaptable for use with computers. Not all aspects are, however, and one of these, in which no computer program exists for physical facilities planning, is in evaluation. The design process could be described as proposing alternative plans to solve the problems defined in a plan or architectural program. If programming presents the problem, then design seeks the solution to that problem. It must be a dynamic operation, in which we suggest alternative plans, and evaluate those plans in the light of the goals of the institution. So the purpose of design or the planning process is to determine the most appropriate course of action which will most nearly achieve the set of stated objectives with the resources available.

Now, why use a computer? Obviously with the mass of information available to the planner today, and the desire to investigate alternative schemes before implementing one of them, the computer could be put to good use. We have tried to describe one such approach, and it is just that, an approach. It is not going to be the kind of program which will be available for solving everyone's needs; it is no

panacea, but it demonstrates the capabilities of integrating planning data with computer technology.

Essentially our resources, as has been said, are the people, space, time and money which go into describing and comprising our campus. We have these resources that can be described individually with their characteristics; more importantly, they have inter-relationships, and these we want to define. Assuming those resources and a description of the campus, we find that resources or activities grow over a period of time and bring pressures to bear on the resources available to the institution. The objective is to find what use of those resources is most appropriate. The input data available, or required, in this particular model which we are describing, are these:

1) Basic times, over which the simulation is to occur. Most often this will correspond to the budgeting period.

2) Money, the capital funds available in each of these cycles described as our unit cost for maintenance, renovation, new construction, by space type.

3) Activities, described as those human and mechanical functions which generate needs for space on the campus.

4) Space assignments, made to each activity, by location, in terms of geographic zones of the campus.

5) Density, specified for each zone. These indicate how much space we want by space type within each zone. The planner can begin to describe some zoning requirements and the density which he would seek before he plans.

6) Distances, between centers of activities in the zones.

7) Affinities, between activities. This is the attraction or repulsion of one activity or another. Some are codifiable through academic interchange: the reliance of one department on other departments for instruction, for example, and these are obtainable through summarizing registration records. There are others which can be obtained only through subjective means -- what is the desire for one department to be next to the other, what is the relationship of a joint use of facilities, and so forth.

The pressures that are brought to bear suggest actions, and

simulate the execution of those actions for a given plan. So we start with describing the campus in terms of its activities, its resources, and the money available. The projection rules are devised to determine how each of these activities will grow. Next we simulate, increasing the time period, calculating new activity levels, and finding what pressures are brought to bear on space through utilization, through funds, in renovating as space grows older and needs attention, or the requirements for capital expenditures in new construction. Finding those pressures, we then suggest actions, simulate the execution of these over time, and re-describe the campus, to find some measure of effectiveness of the actions which we have taken. There are possibly three such measures:

1) How carefully and accurately are we assigning space to the activities in the zones in order to best satisfy this relationship of the affinity which we have described?

2) To maintain the desired density level, are we over-building in one area, are we neglecting other areas, with regard to the criteria as established by the planner?

3) Is the utilization of space -- the relationship of total activity to total space assigned to it, by activity type and by space type -- being controlled?

As we said, it is a dynamic process; it is not a one time shot. So, if we go through the programming, design, and evaluation steps, we must feed back with some new information. It is a repetitive process and again, one reason for using computers. Eventually we hope to have a solution, which immediately begins the process all over again.

So we have described alternative plans, through evaluation, through the model such as we described here. We could choose the one plan which looks best to us at that point in time. Although we are dealing with numbers to describe many of these activities, we have in fact a symbiotic relationship here. We have man on one hand, trying to plan and design an environment for his fellow men, and on the other hand we have computers or machinery which are an alien sort of device to us. Yet we have to bring them together, and the new technology of computing science I think can do some of this. I am sure many of you are convinced of that as well.

The real test is the overlapping area where they exist together. We would like to talk about compassion in computing, where we consider the fact that we are dealing with people. While we are still dealing with people, we suggest that computers <u>can</u> handle some of those problems.

CAPITAL AND OPERATIONAL BUDGETING: MACALESTER COLLEGE AND UNIVERSITY OF CALIFORNIA

JAMES B. SHARP
Office of Analytical Studies
University of California, Irvine

What I do want to talk about today is the need to coordinate capital outlay and operating budget plans, and to show you the basic principles of the system we have developed for interfacing academic plans with plans for resource allocation at Irvine.

The one basic, underlying principle of the system that we have developed is that the budget and the budgeteers should not set academic policy and institutional goals, unless it is absolutely necessary. It is a real world fact that budgets must be made and approved by certain deadlines in order for resources to flow in time to implement plans. If policy-makers cannot decide in time, someone else must. Our system is designed to get the horse before the cart, and the academic plan before the budget.

This took a little doing, because it meant that the system would have to encourage academic, physical and financial planners to talk to one another throughout the planning process. It also meant breaking with tradition in a number of areas. First of all, we had to convince academic planners that it was important to communicate their long-range plans within the context of resource inputs and program outputs; that is, what the costs are, and what the benefits are, not only for today, but for some reasonable time ahead.

Secondly, this concept of intermediate range planning had to be sold to the operating budget people also. They had to break from the traditional method of budgeting not only for next year's needs, but begin to show future costs and needs as well. Those of you who have worked with operating budgets know by heart the old standard justification for starting a new program. The proposal always is, "We have a grant to cover the cost, and it is not going to cost any more than that which we are doing at present." Those of you who know about this approach also know that the grant will lapse in two years, and then the needs will be significantly greater than those that were stated initially. By then--at least in my experience--everyone is involved in the problem, because after all, the program was approved and we were all in on that approval, so it becomes a very common problem at that point. For this

reason our system provides for a ten-year projection of needs, in order to show both the startup and the longer range needs for resources.

Another principle, one which was more familiar to most of us when we were designing this system, was that there should be a cycle to our planning. We knew that academic plans, costs, and the political environment, are ever changing situations, and our new system should be flexible enough to allow for change, and still preserve our institutional goals. We also knew that a number of people had to be involved with the development of this system right from the start. We had to have the interest, and hopefully the cooperation, of the academic planners, and we sought that cooperation by including academic participation in the preliminary phases of our system's design. Our Vice-Chancellor of Academic Affairs provided overall guidance, and two faculty members -- one from engineering and one from the Graduate School of Administration -- worked with our staff on an equal basis. Our budget director was also involved from the very beginning.

This then was the team that developed the system which I will describe. I would like to emphasize that the primary purpose of this system is to promote the best possible coordination of academic plans with those for resource requirement -- both capital and operating. I would also like to point out that our system was implemented this year for the first time. We know that it is far from perfect, and that improvements are bound to come as we continue to work with it.

We begin in October with our academic planning cycle, as soon as the fall enrollments are in. We begin to study these to see if there are any patterns changing, or possibly changes in a significant way which can affect our overall planning.

But we get that settled about November, and we begin then to produce a set of resources with schedules. There are about four schedules in a set. They project in a rather gross way the resources which would be necessary for on-going programs, such as the School of Engineering, the Graduate School of Administration, etc.

We back these up with about four years of history, in a rather fine display: salaries by level of faculty, salaries for staff, and all of those details, so that the dean and his planners, when they receive this information, can at least determine the basis for a status quo projection.

Now in total, for all the schools, our projection is pretty much equal to that which we feel in our experience is the resources which will be available to our campus as a part of the university system over a ten-year time period. Once we have this information together, along with a five to ten

page written description of the philosophy and the objectives of this particular academic program, we send it through the Vice-Chancellor of Academic Affairs Office to each dean, in the form of an academic plan proposal request. It is a request for him to make some proposals concerning his academic plans for the next ten-years. The deans get this information about the beginning or the first of February, and spend the months of February and March working with their staffs and planners to determine whether the status quo projections that we have shown are the same that they feel they will need (this is resources now) to sustain their on-going programs. If they contemplate within the ten-year period the establishment of a new program or sub-program which would have a significant impact on the financial resources of the campus, then they also develop a set of resource input schedules for that new program, so that it can be separated from the costs which are associated with the continuation of their present programs. They then return these proposals to the Vice-Chancellor of Academic Affairs and his support and analytical staff. The proposals are all summarized at this point, to determine whether or not the recommended changes in any one program fit within the total resources that we have projected for that purpose for the campus. Then a preliminary priority schedule is set up for all of the new programs which fall out of that amount of resources which are necessary for the on-going programs, and which then have to be funded from other sources.

This takes about a month to be completed. At that point we send a summary to our Resource Planning and Allocation Committee. At Irvine this is a committee composed of the chancellor, three vice-chancellors -- Academic Affairs, Business and Financial Affairs, and Student Affairs -- and a number of other administrative officers. Each member has the material for about two weeks before the committee meets to consider it formally. At the meeting -- usually around the first week in May -- they are given a presentation, by the Vice-Chancellor of Academic Affairs, of what he feels the academic program for the campus will be for the next ten-years, and a summary of the financial requirements or the resources that will be necessary to produce that ten-year program.

There will hopefully be a list of the on-going programs and the cost for them, which will reflect the resources that have been allocated into for developing the on-going programs. There will also be a list of new programs, and the costs necessary to bring those on and to sustain them over the ten-year time frame.

One of the jobs of the Resource Planning and Allocation Committee is to establish priorities for the new programs in such a way that, hopefully, the most beneficial ones will be included within the resources that are available. At this point, many trade-offs will have to be considered; some new program requests may have to be postponed; some may have to be

changed in scope; some may even have to be dropped.

As soon as this process is completed, then decisions have to be made concerning the general resource levels for the on-going programs, and those new programs which should be considered for implementation in the new ten-year plan. The financial information that supports these decisions is rather gross; it is restricted to probably five to six very general lines. All faculty salaries, for instance -- there is no attention given to a mix of ranks or any of these things. But once these decisions are made, concerning which programs are in and which are going to have to wait, and which have had some scope changes, we can then move to the second phase of the academic planning cycle, where these approvals go back to the schools and the deans that made them. They are then asked to produce a rather detailed five-year academic budget. They would at this point take the gross projection of resources necessary for the faculty, and begin to break it down by rank and by st p, and the other details in putting together a five-year budget. Running throughout this with the operating budget information is a projection of the building space that is necessary to support both the on-going programs and the new programs.

The period between, roughly the middle of June and the end of August, is spent by the academic deans and their planning staffs to convert these academic planning decisions into a detailed budget for five-years of operations. About the same time that same information goes to the Office of Physical Planning and Construction, which will develop a five-year major capital improvement program in order to set up the buildings and facilities that will be necessary to support the staffs that are proposed to be hired from this budget, and to support the academic plans which have been prepared and approved.

The budgets are approved on campus again by the Resource Planning and Allocation Committee, and submitted to our university-wide offices, where they undergo further review.

In summary, I would like to point out the basic elements of our system as we see them, as being: (1) a cooperative coordinated system for academic, capital and operational budgeting and planning; (2) a system which relates resources and costs to benefits; (3) a semi-continuous system which can be updated every year to reflect recent experience and change in institutional goals; and (4) one that is based on a modified management-by-exception principle, which gives status quo projections as we see them, fitting within the total resource allocation to the campus, and then allowing the academic planners to make the necessary academic plan corrections to these. Areas which are continuing to grow at rather normal rates and with very little change in curriculum are accepted as given. It at least gives them a point of departure, and

it is not merely a blank question, "How much do you need to run the program for ten-years?"

In closing, I would like to say that for those of you who would like to learn more about the system we have developed at Irvine and that we are beginning to implement, a handbook is available, which contains an explanation of the system, directions on how to use it, and an example of an academic program statement and the resource input and output tables which go together to support it. We developed the handbook to assist the deans and other budget planners in working with the system. It has been fairly popular on campus and off; we printed about 500, and I think we are in fairly short supply now. If you would write to the Office of Analytical Studies, University of California, Irvine, Irvine, California, you can get a copy of the handbook. There may be a slight charge, because they are in short supply at present, but it is being reprinted. The University might have to charge a nominal fee to cover the cost of the reprint.

JOHN M. DOZIER
Vice President for Financial Affairs
Macalester College

I thought that I would use as a label for my talk this afternoon the name Patsy. I am sure you know what a patsy is. I do not mean pansy, I mean patsy, the fall guy, the fellow that is always taking the blame for everything. You know, the budget director is always the guy that made all the wrong estimates on the revenue side, he is always the character that overlooked the expenditure that makes a budget go down the drain in the red; he is the guy that really is under the gun. But I am suggesting that patsy has more subtle implications than those that I have mentioned as being so obvious.

And I get patsy out of talking about Pace, Authority, Technique, Style and Yerk. An examination of each one of these key words, I think, is well worth a few minutes.

Pace (Tempo)

What makes an organization run? Every organization has a basic problem of establishing pace or tempo. Very few organizations view this as a problem, or for that matter even recognize it as a problem. The speed at which an organization moves and reacts to new problems, opportunities and pressures, is a vital element in the development of a budget, just as it is important in the operation of a budget. Colleges are not immune to this problem of pace. No college or organization really moves any faster than its people. Generally the pace

is set by the head of the shop.

If you do an analysis at your own shop of the management types, you will likely discover that they are very optimistic about using limited blocks of time; they are accustomed to working against deadlines, and they expect everybody working with them to do the same. In any event, because a change in tempo or pace can create catastrophic results if you do not recognize this shift, it is essential that each budget officer create a budget pace which is the reflection of the college tempo, and one which is realistically conceived against the president's concept of pace. In this connection, many institutions develop, circulate and live by a budget calendar.

There are several measures of this matter of pace. Recently, in the summer 1969 issue of Channels, a Northwestern Bell Telephone Company publication, I found an article that related to pace, and I was not above stealing some of it. One of the tests suggested in this material is a teast that says: "Try that some time, take a present problem or one you just solved, and look at it and say, could this have been resolved in half the time that we took?" If the answer is yes, you have got a tempo problem. There are several other measures of pace described in this same article, several signs which all of us would recognize. Executives working long hours is frequently a symptom of work load being stretched out, rather than making the necessary time investment to get the job done now. Another symptom of slow tempo is the cluttered desk. Does your institution have a repetitive pattern of long meetings, and individual business discussions which include interesting but unnecessary background information, excessive theorizing, and other tangents that stray from the meat of the discussion, indicating that no one is in a real hurry to get back to the business of doing? This also spells slow tempo.

Often we accept present attitudes and known work habits as being normal and right. But "my people work hard" is not an answer to the problem of pace. Frequently the people must work harder when the tempo is wrong, but they are working at the wrong things.

Pace is important, and I think it is essential that we look at the matter of pace as we develop a budget calendar or a cycling of what we are going to do.

Authority

Basically the budget officer must know on his campus just who decides who decides. Governance in higher education has become a favorite subject everywhere. Patterns of control have changed, and most administrators at whatever level find themselves caught in the middle. Faculty and student groups are often self-appointed vigilantes, and the two things that they are certain of, is that they know more about developing a

budget and more about architecture than anybody else on the campus.

So when you sit down with the planner and the budget maker you must first know what the authority on the campus is, and how the power structure works. In an article from the November, 1968 issue of the Research Reporter, entitled "Governance and Factions - Who Decides Who Decides?" the following comments appeared: "Our data indicate that one of the major sources of friction at most institutions of higher learning is the budget, and how information regarding it is distributed. Because information about the total budget is in most situations restricted, many faculty members feel, often with some justification that the institution's business manager or the bursar is making decisions about academic policy. The department chairmen and deans of schools have only their budget allocations in mind; when they go to the central administration to argue for more funds for their units and do not know what total funds are available and what requests have been made by other departments or schools, they are in no position to argue the matter, and the business manager announces flatly that 'we cannot afford it'. Possibly as a consequence, many faculty members especially feel that there seems to be more money available for conservative programs than for more experimental ones. Also, the president's heavy responsibility for the acquisition of funds may make him dependent on the business manager or bursar who alone may know the intricate procedures of disbursement of funds."

Any person with specialized knowledge, whether it is a business manager or a secretary, who has been there a good long while with a mysterious filing system wields a lot of influence if they keep this to themselves.

"Against this difficult governance problem one must place a dedicated professional administrator prepared to do his job."

Friction? Yes, indeed. Many faculty and students are not willing to allow the competent administrator to use his expertise to full advantage in the allocation of critically short resources, but rather adopt a "Hooray for me!" attitude. The budget planner must be more aware of this potential danger, and be clever enough and determined enough to prepare a good budget anyway.

Technique

A discussion of budgeting techniques on a clear day could go on forever. There really are few basic standard techniques. One that works on one campus would be anathema on another. However, basic principles apply universally. Some good ideas work widely, but each campus planner and each campus budget officer must work out his own salvation. The first approach to any budget, is to make certain that the basic plan of action is in hand and understood. For the operating budget this means that the academic plans for the period to be budgeted has been

developed. For the capital budget this means that the construction program and the equipment budgets for the period have been developed in a relatively precise fashion. Without the plan of action in hand, the budget becomes a policy-making document, when in reality it should be a policy-supporting document. After plans are in hand, it is essential to get a delineation from the president and/or other resource allocation committees or groups, of a general division of the available funds. This step is tricky, and the planner or budget officer should get in writing a delineation of program support, again on a broad scale.

There are a lot of techniques available to planners and budget officers. A number of these, if used, will set academic administrators, faculty members and students mumbling obscene epithets because they bring into the light of day those departments with low enrollments and higher costs. These successful boondoggles are not really worth further support. Staffing tables for both faculty and supporting groups should be done on some formula basis with any variations from the norm determined and by an overriding of subjective considerations.

Formulas developed should relate to the use of time and not to the specious measures that are often used, such as the student-teacher ratio, which is probably the most meaningless statistic in all of higher education, because it does not measure quality or workload.

Charting of various patterns of the past can be useful in estimating income amounts, and in keeping administrators and trustees aware of shifting trends. For example, when I came to Macalester I was told, "We do not have any government money in our budget." We only had about $400,000 of government money in the budget, and I was told we did not have any; that is because nobody bothered to really look and see what was happening to the income allowance coming in. Nobody bothered to chart it and project it to see what it really was like and what it was being used for.

On the capital side, I found the construction cost estimator a very useful device. This cost estimator was developed because I got tired of having people charge into my office and say, "We want to build a chemistry building, how much will that cost?" After picking their brains in terms of the concept of size and that sort of thing, and saying, "I cannot do that without a lot more information" and then being told that, "A week from now we have to have an estimate, because we are going to make an application to the XYZ Agency or whatever", I found that I was falling into the unconscious trap of using what I then knew about cost, even though the building was going to be built eight years later.

So I used the replacement cost values from the insurance tables that are available in terms of what had happened to building

cost and construction cost over the last 25 years, and I used the information of the projects on our own campus and the information from the construction reports and others of the area. I then projected what I thought the building cost was going to be, and used this handy-dandy cost estimator. If somebody asked me this sort of thing, I then had at least some base on which to make rough but reasonable estimate. If you play this game you would be surprised at how accurate you can become at forecasting cost on your own campus, and it will save you some mistakes in terms of not reading the future correctly.

Long-range planning and long-range budgets requires estimates made to date to reflect inflation and economic pattern anticipated for the future. How do you determine these things unless you play this kind of game in some relatively precise fashion? You cannot really go back and remember how you arrived at the estimate if you do not put it down and do not have something to go by.

I think we also need to remember that we should coordinate plans of this sort when we look at long-range budgets, and when we are looking at capital budgets we need to coordinate this with the fund raising and development aspects of the college.

Style

President Richard Gilman of Occidental College in his convocation of September, 1966 chose as his topic "The Elements of Style", and I quote from his speech:

"Style is that which is distinguished or distinguishing. Style in this sense is a way of thinking and a way of acting, which serves to characterize, to mark as distinctive an individual or an institution. A college curriculum, it can be said, exhibits a certain style; it reveals a set of attitudes and beliefs about what is necessary and what is important as far as learning is concerned. I prefer to speak of a learning environment as intellectual rather than academic; to me intellectural connotes a kind of vitality and liveliness which cannot be contained within form and structure; it involves a searching and a probing, an emphasis on seeking rather than finding, a reaching out, not being satisfied, and pressing on."

I agree with this general sentiment. We must know what our institution's style is as well as its specific academic programs, because these two things go hand in hand, as far as I am concerned. If style were not important, we could devise one effective teaching method for the basic curriculum, and have each of the more than 2,000 colleges and universities teach the same thing in the same fashion. The budgeting process must reflect the style of an institution, just as it reflects specific academic programs.

There is another aspect of style which is important -- the style or manner in which the responsible budget administrator gets his job done. If the job is done well it will reflect the professional qualities of the man and the professional standards of the administrator. Budgeting is not a democratic process, as some of the academic community would have it; it is a process requiring professional skill, political savvy, and verbal dexterity -- you know, "speak with forked tongue" sort of thing.

Two quotations help make my point. Again from Dr. Gilman:

"First among these is a recognition that a college community is not and cannot be a democracy in the ordinary sense of the term. The demands for complete equality and true democracy are not applicable to the social order of a college or a university. As teachers and as students and as administrative officers, we have different roles and different relationships to one another and to the community as a whole. In large measure the nature of our role is determined by the degree of our competence and the extent of our accountability in dealing with the issues at hand."

From the April, 1962 issue of the New Republic, an article by Robert Brewstein, "The Case for Professionalism":

"It is often observed that the word amateur comes from the Lation word to love, presumably because the amateur is motivated by passion rather than by money. Today's amateur, however, seems to love not his subject but himself, and his assault on authority on the application of professional standards in judgment of his intellectual development, is a strategy to keep this self love unalloyed. The permanent dream of this nation -- a dream still to be realized -- has been a dream of equal opportunity, the right of each man to discover wherein he might excel. But this is quite different from that sentimental egalitarianism that assumes that each man excels in everything. There is no blinking the fact that some people are brighter than others, some are more beautiful, and some are more gifted. Any other conclusion is a degradation of the democratic dogma and promises a bleak future, if you universally insisted on a future of monochromatic amateurism in which everybody has opinions, you have facts, and nobody has an idea. Yes, the style of the professional planner and budget administrator is a vital ingredient in any budget preparation. Professionalism demands that the budget maker have facts, and in addition ideas."

Yerk

How many of you knew this is a real English word? You thought I made that up, but it is a perfectly proper word, as you can find in Mr. Webster's dictionary. The late Mr. Webster defines it as to mean "to work or think hard".

Certainly budget making is hard work, and it requires hard thinking. Besides, I had to have some word to wind up, giving me Patsy. It took me about an hour to find it.

Paul Davis, an educational consultant, sends to his friends a simple two page set of randoms. These are interesting random thoughts; wherever he hears one, he jots it down. Usually he does not identify it by name, but by title of the people making these Mount Olympus observations. And it also makes me think of the chemistry professor, late of Duke University, who used to take his notes and charge off to class saying, "I am off to cast imitation pearls before genuine swine." For example:

> A vice-president for academic affairs - "If a department becomes dominantly weak, we starve it. No raises, and a minimum of everything in anything until they come forth with a plan or a proposal which convinces us that they intend to bring in top talent and new leadership." How may of you have got vice-presidents like that?
>
> Peter Drucker, making a speech at the University of Oregon: "Ability and knowledge rarely correlate with performance."
>
> "The plodder performs while the rest of us exchange planning memoranda." That makes one think.
>
> "If one puts uncertainty into a computer, then the computer will produce codified uncertainty." Of course that is a variation of "garbage in, garbage out".
>
> "In organizational effectiveness, the administrator is usually the limiting factor." It is humbling, to say the least.
>
> Alexander Hamilton - "Men give me credit for some genius; all the genius I have lies in this: when I have a subject at hand I study it profoundly, day and night it is before me, my mind becomes pervaded with it; then the effort which I have made is what people are pleased to call the fruit of genius. It is the fruit of labor and thought."

And now a few of my own, which are not nearly so good. These really are imitation pearls.

> "Budgeting like planning is a continuous process, in spite of the calendar; if you ever stop the budget process anywhere along the line you are dead."
>
> "Only when a venture is well planned and the plan

understood by the campus, can there be real thrust for institutional goals."

"The skills of management must include the ability to gain support of the people in the organization."

The budget of a college or a university is a president's budget. I insist on this, as a defensive mechanism. Yet it is a reflection of the politics and practices which have official approval, and is a mirror of the academic plan of action. And as far as I am concerned, no matter how you slice it, it always comes out that way, it does not matter how it is arrived at.

So much for our through stimulators. Let me conclude by returning to the key word Patsy, that reminds you that Pace, Authority, Technique, Style and yes, Yerk, are valuable words in the vocabulary of a sophisticated budget officer or planner. In the final analysis, however, professional knowledge of the facts combined with imaginative ideas, will make the budget process successful. Without these ingredients, the budget is apt to be a misshapen political football. If we all become Patsys, this will not happen. Happy budgeting.

BANQUET ADDRESS

JONATHAN KING
Vice President
Educational Facilities Laboratories, Inc.

The Education Facilities Laboratory has been in business for ten years and in that time many changes have occurred in its program, objectives, and outlook. I would like to describe some of these changes - what was going on then and what is happening now.

At the beginning we were concerned with college housing, for example. We have been building thousands of two-student rooms all over America, on double loaded corridors, and suddenly people began wondering whether that was really the right way for college students to live, or whether we could do something that would make the housing we were building at such extraordinary expense all over the country more educationally productive. I look back on that as a really very simple time, because today we are wondering whether educational institutions ought to be in housing at all, and if so what kind of housing, where, and for whom. For example, we are involved in a project in Montreal to take over the redevelopment of a 25 acre site in downtown Montreal, which will serve as an area for, among other things, housing for five colleges. The housing however, will not be operated by those colleges, and will therefore be free of some of the constraints that make college housing seem frightfully archaic on most campuses today.

An aspect of housing which we are not involved in at EFL, but seems to me to be one of the most promising things going on in the United States today, is the possibility of colleges and universities moving into community housing, not only for students, but for non-campus people as well. We might take some lead in the renewal of a city.

Another thing we were interested in back then in 1959 was space utilization, which was one of the enchanting games at the time. It seemed a good deal deeper then than it does now, when our involvement in space utilization is essentially the development of new tools for planning, and trying to evaluate the great variety of needs that we have on college campuses for space. Back in those days we did not think a space was used unless someone was assigned to it. The fact that we are now willing to accept the fact that a space is utilized if somebody is using it, is a vast improvement in sophistication. This improvement in sophistication is leading to a great deal less scheduled class activities and more generalized learning.

Another thing we worried about then was the growing size and

impersonality of higher educational institutions. These institutions that were growing up so fast seemed cold and inhospitable to the intellectual and educational purposes that we assigned them, and we are still worrying about that. The small liberal arts college, tucked away in a small quiet community, 2,000 students, etc., at that time seemed to be a viable alternative to the large institution. Now it just seems totally irrelevant to the needs of American students, research, and intellectual activity.

We were then worried about the campus as a subculture, and how to use planning and facilities to positively direct that subculture to more satisfying and more intellectually challenging ends.

Now I think we recognize that instant communication has changed all that. A student subculture seems to exist on a national -- indeed, almost international -- basis, and there is little that we can do about it.

We were then concerned with the problem of the relationship of the college or university to the city, and sometimes the non-city community. These enclosures seem to be slum generators. Think if you can about how many of our colleges and universities are surrounded by affluent areas: it is hard to tell which is cause and which is effect, but somehow or other colleges did not seem then to be good neighbors. We are still concerned with whether they are good neighbors or not. We had a recent project at EFL to develop a prototype college for Bedford-Stuyvesant community in Brooklyn, New York. A plan was developed, not to build a typical establishment, but to string the college through the community so that it would help improve the community, to develop a relationship between the community and the college such as does not normally exist, and to help create an aesthetic and economic renewal of the Bedford-Stuyvesant area. The report which was greeted with rather good reviews from most of the people in planning, but the people in Bedford-Stuyvesant did not accept it. They wanted a college like Rice University, with grass, trees and other familiar elements around it. I think we made the tactical mistake of assuming that the poor will exercise a leadership role in taste and aesthetics. I was reminded of the fact that neither the Volkswagon nor the miniskirt made it big by way of the slums -- that those people who are interested in design innovation tend to be the bright and the rich. If we are going to make such an experiment a success, we have got to do it in a rich neighborhood, and then transport our experiences into the inner city.

In 1959 we were concerned with improving campus planning. We were interested in developing a campus planning process that dealt with more of the problems of the campus than planning had tackled before; a process which dealt with the adaptability of campuses and buildings to the changing programs that have

become commonplace in the last few years. We were concerned with it being more sensitive to the students and the faculty. I think we followed the simplistic policy of assuming that campus planning then was something that sort of happened and was later built upon. Now we recognize that campus planning is a process, not an event.

We were concerned then with the problems of new media, and their introduction. New media always seemed to be involved in teaching large groups of people at the time. We are still involved in the question of new media and its use, but now it seems to be a computer terminal for one student, or a device which enables students to deal one by one with audio-visual material. We do not herd people into large groups to watch television as they used to do in the early bar-room period of American non-academic television. We have enough money to buy devices for individuals now.

Finally, I would like to talk about three interrelated problems, in which we are interested now at EFL, and which did not seem of the utmost importance a decade back.

These are time, inflation of building costs, and lack of money. To take up the lack of money first, it is quite clear on campus after campus that there is a diminution of academic spending. This has been caused by the war, by anti-inflationary measures taken across the country, and by a general distaste on the part of boards of directors and legislators for the current quality of the students and for the students' revolt. I think current figures from the Engineering News Record indicate that educational building is down 8 to 9% this year. My guess is that it will be down a good deal more next year. One university that I am quite familiar with, which normally has $700,000,000 going through the pipeline of building and development, currently has $30,000,000. The only thing we accomplished by this as a nation is to simply postpone and magnify the problems we will have in the future, because this diminution of building funds has not been accompanied by any diminution of the expectations of the people for university services and programs.

Speed is another problem that is very closely tied to inflation. It takes us too long to get through the budget, planning, design, and building cycle: we really need new technology, new techniques for design and bidding in order to save time. There is essentially no reason, with the kind of flexibility we are now designing into buildings, to wait until we have placed the last duplex receptacle on our drawings before we send anything out for bids. Let me take an example from one board of education. They recently hired a consultant to prepare a critical path chart to show how long it takes and what is necessary to get a building constructed. It starts in the middle, after the budget, and shows that if everything goes all right, it takes 54 months to get a high school designed and built.

Usually, however, everything does not go all right and so, in fact, in this example it takes almost 8 years on the average to get a high school from the budget stage through the construction phase. This means that if a mother is concerned with the high school that her child goes to, she has to start picketing when he is in kindergarten.

This brings me to my final point, the very serious question of inflation of building costs. The building needs in this country are not being met now. This partly is due to the war and to the anti-inflationary measures that have been taken in Washington and locally. The most serious manifestation of this is in housing.

The Kaiser Commission has examined the housing question, and has suggested that a national policy be established to build 26 million dwellings over the next decade; this is 2.6 million housing starts per year. We have never started more than 2 million houses in the United States in any one year, and this year the present figures indicate that we will make 1.4 million housing starts. One of the indications of the fact that failing to meet national needs is that 75% of the single family dwellings that sell for under $15,000 are mobile homes today.

George Christie, who is the chief economist of the McGraw-Hill information system, tells us that in 1980 the construction market will be 2/3rds bigger than the 90 billion dollar business it is today, in constant prices. If he is correct, and I think this is a conservative estimate, we will need twice the growth rate in the building industry we now have. We are currently growing at the rate of 2¼ percent per year; we will need to grow at a mannual rate of 4½ percent. This will be the biggest building boom since the post World War II housing era. But unless there are radical improvements in technology, in productivity of labor and materials, and in financing, we will simply drive up costs beyond anything that now seems reasonable. For example, in 1965-68, the value of building went up 17 percent, but 14½ percent of that was inflation; only 2½ percent represented an increase in productivity. This is less than 1 percent a year increase in productivity, which is 40 percent of the national economic average.

Without significant productivity increases, costs will skyrocket, and with the increasing cost of money the situation will be very serious indeed. I think one part of the answer to this problem must lie in better processes of planning, in faster building programs. But another part will be an increased reliance on industrialized building systems, which permit increases in the productivity of labor - that is, both labor in the factory and labor on the site. I think it is up to us to see that education is in the forefront of new developments in building technology. The federal government has put us in the experimental housing business in a big way, but the Congress has not yet provided the funds.

There will probably be some major new programs in industrialized housing systems, and the question which will face education is whether we can keep pace with these new housing developments. In any event, I hope that such developments are used for the benefit of education; for the benefit of institutions and their students. But this will require new habits, aggregating of markets, joining together for design and building of components. And this will mean a new and different ball game for all of us.