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ABSTRACT

The models presented in this volume were designed to fit the typical situation. Each user of these techniques will have to modify them to ensure their applicability to his institution. Although the material exploits the capabilities of the PLANTRAN system, computer processing is not required for use of the models. The techniques dealt with here can all be implemented manually. Each is treated for its relation to overall planning; its underlying theory, assumptions, and problems; and a diversity of approaches. A micromodel is developed and applied to a set of realistic institutional data via the PLANTRAN system. Information is also provided on methods of data collection and on types of changes and adaptations that can be made in the models. (Author/WM)

Techniques of Institutional Research and Long Range Planning for Colleges and Universities

Volume II

--Facility Planning

--Program Cost Analysis

--Budgeting

Economics and Management Science Division

Midwest Research Institute

PREFACE

The material in this volume was developed by MRI for use in a series of workshops on institutional research and planning for colleges and universities. These workshops were conducted by MRI during the 1971-1972 academic year. These workshops were designed to address real planning problems. Participants were encouraged to collect and use data from their own institutions. As a result, participants not only learned research and planning techniques but also developed analyses which were immediately useful to institutional decision makers.

The workshop sessions made extensive use of computers. This was possible through the use of PLANTRAN. This is a computer simulation system developed by Midwest Research Institute. It was designed to make the power of the computer available to the higher education executive without special computer knowledge. It is in use by several dozen institutions of all levels and sizes.

While the material in this manual exploits the capabilities of the PLANTRAN system, computer processing is not required for use of the models. The techniques can all be implemented manually.

Approved for:

MIDWEST RESEARCH INSTITUTE

John McKelvey, Vice President
Economics and Management Science

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I. Introduction

This volume deals with three specific techniques of institutional research and planning for colleges and universities: facility planning, program cost analysis, and budgeting/finance. Volume I of this series deals with enrollment projections, induced course load matrix, and faculty planning.

Each of these topics receives a seven-fold development as follows:

1. Relation to overall planning. Each technique is placed in a comprehensive scheme for planning. This enables the planner to understand what is required to implement the technique as well as the use of the results.

2. Theory. This is a general discussion of the topics which treats the assumptions and problems of each.

3. Techniques. This is a brief review of the major techniques under each topic. This helps the planner to understand that there are usually several ways to approach a research/planning problem. The review includes criteria for the selection of the most appropriate technique.

4. Micro-Model. One technique is selected and presented in detail. This section includes worksheets to implement the technique as well as descriptions of needed data elements and their likely sources.

5. Case study. The micro-model is applied to a set of realistic institutional data. This implementation is in the PLANTRAN system. Complete documentation of the PLANTRAN model is included.

6. Data collection. In order to assist the planner in using each technique, this section includes a data collection document along with instructions for its use.

7. Model adaptation. This section discusses the reasons for changes in the model and the types of changes which will usually be encountered.

No matter how general it is, no single model is appropriate for every college and university. The models presented in this manual were designed to fit the typical situation. Obviously, each user of these techniques will have to modify them to insure their applicability to his institution. In most cases the required changes will be minor and easily made. In a few, more basic structural changes may be required.

A college planner using this material should always be conscious of the need to make the model fit his college rather than try to make the college fit the model. He should not hesitate to make changes in the structure of the models, the methods of calculation, data definitions, report formats, etc. It is only through this kind of flexibility that the techniques presented here can be useful to higher education.

II. Facilities Planning

A. Relation to Overall Planning

Once the planner has made projections of enrollment, translated these into estimates of student credit hour loads by department, and determined the faculty loading factors, he will turn his attention to the space requirements for the college or university. Figure 1 is one way of relating these planning activities. It shows the place of facility planning in the overall planning project.

Unlike the other planning components, facility planning requires capital rather than operating decisions. A decision to add instructional space is not like the decision to change faculty salaries. It differs in three important respects.

1. Lead time: First, a longer lead time is required to implement the decision. The minimum time from determination of need to occupancy of new facilities is 3 years. Availability of funds and the requirements of major funding sources can increase this time span. The time frame may be even further extended if there are unusual design problems or if the functions of the new space cannot be clearly defined. This long lead time underscores the necessity of advanced planning and projections.

If a planner waits until the enrollment has increased to a level which requires additional space to begin planning for the new space, he will be at least 3 years late in providing the required facilities. Thus facility planning generally requires a wider planning horizon than more operational decisions. Somewhere between 5 and 10 years is usually adequate.

2. Larger cost: Second, decisions about adding physical space generally involve larger dollar amounts than do most operational decisions. Construction of a single facility may easily amount to a significant percentage of the college's annual budget. The more costly the decision, the more attention it receives. This means that the data and research needed to support this decision are often greater than that demanded for operational decisions.

3. Permanence: Third, decisions about physical facilities are relatively permanent compared with operational decisions. Since most structures are designed for a minimum usable life of 50 years, the decision to build cannot be reversed once the building is in use. This is often painfully evident in the form of debt service payments on a structure which is not fully used or which has become outdated.

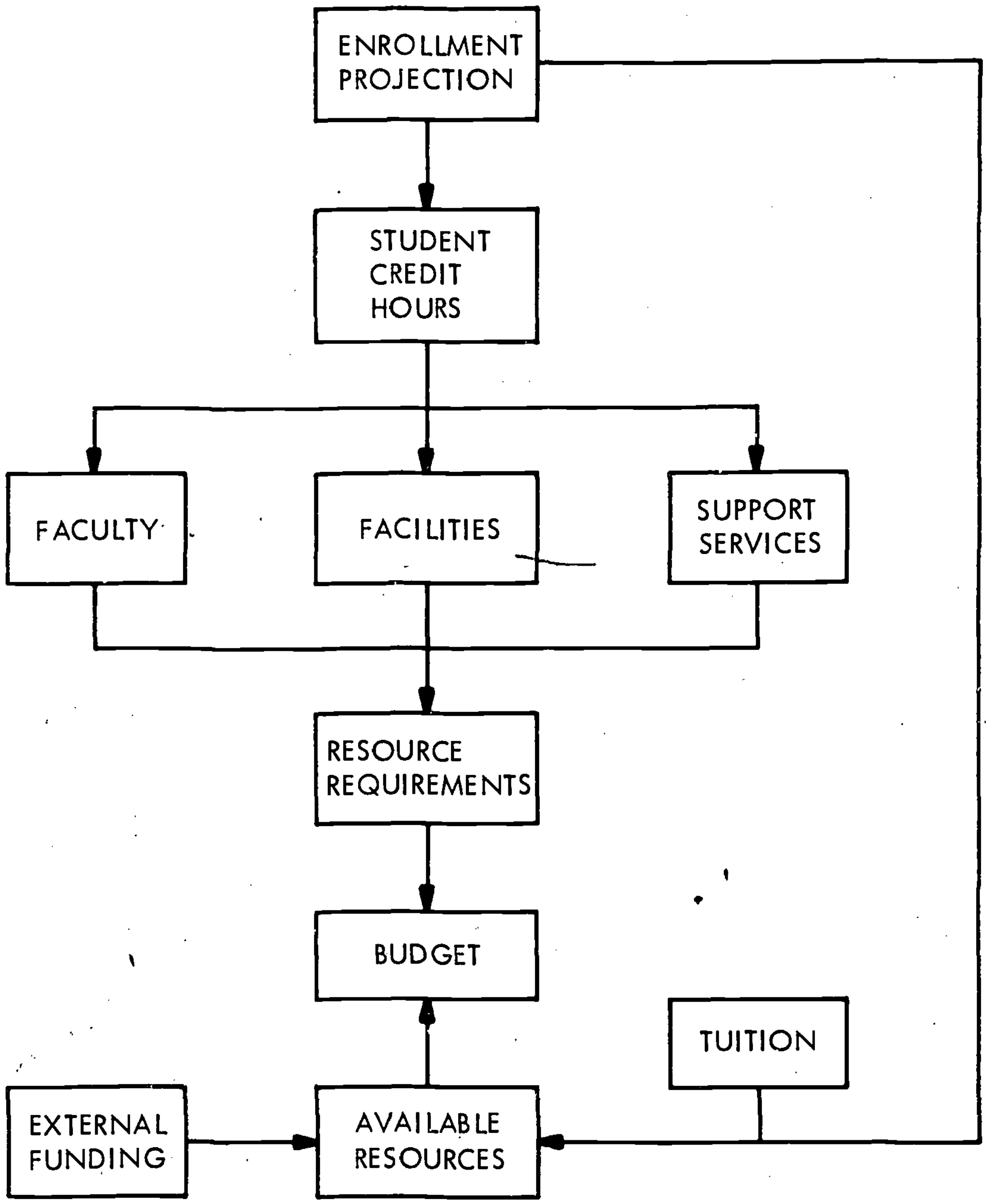
ENROLLMENT PROJECTION
STUDENT CREDIT HOURS
FACULTY
FACILITIES
SUPPORT SERVICES
RESOURCE REQUIREMENTS
BUDGET
TUITION
EXTERNAL FUNDING
AVAILABLE RESOURCES

Figure 1

This characteristic points up the need for long range planning of facilities needs and the use of simulation. Simulation of different space configurations allows the planner to estimate the utilization of facilities and thus the under or over-supply of space.

A 10-year enrollment projection which peaks in the sixth period and returns to its initial level in the tenth period is weak justification for adding space to handle the sixth period peak only to end the tenth period with an over-supply of space. Notice that the relatively short run projections used for operational decisions would have led to a faculty decision. A 5-year projection would have led the planners to estimate increasing need for space and this would have set the wheels in motion. Some of the new facilities would have come on-line before the enrollment decline was clearly seen.

B. Theory of Facility Planning

1. Quantity and quality: This treatment of facility planning will deal only with the quantity of space not with its quality. The quality of the physical space available for an educational program is, of course, important. Various methods of rating the quality of space have been developed. For example, a system developed for the Coordinating Board of the Texas College and University System evaluates the following elements of a building:

I. Primary Structure
   1. Foundation
   2. Wall System
   3. Floor System
   4. Roof System

II. Secondary Structure
   1. Ceiling System
   2. Interior Walls & Partitions
   3. Window System
   4. Door System

III. Service Systems
   1. Cooling System
   2. Heating System
   3. Plumbing System
   4. Electrical System

IV. Functional Standards
   1. Assignable Space
   2. Adaptability
   3. Suitability

V. Safety Standards

Each of the elements is evaluated within a rating system. The results are accumulated for each building which is then rated satisfactory (adequate, remodel) or unsatisfactory (alter, demolish).

The quality of individual rooms can also be evaluated. The prime consideration is the suitability of the space for the educational activities taking place within it. Such an evaluation might deal with seating, chalkboard, air-conditioning, visual aids capabilities, closed circuit television, audio aids. Non-classroom spaces can also be evaluated on their suitability for instruction. For example, a class laboratory can be evaluated on its design, usability, and safety features.

Each type of space will have its own characteristics. This does not mean that they cannot be evaluated but rather that the evaluation scheme must be adapted to the activities taking place in the space.

2. Determinants of quantity:

a. Number of users: While many variables affect the amount of space required, the most important variable is the demand on educational facilities made by users. The number of students enrolled is the single-most important determinant of the amount of space required. Certain types of space will, of course, reflect demands made by non-students or by certain specialized activities. However, these will usually be substantially smaller than the space required to provide students with educational services.

b. Management parameters: While the amount of space required is largely a function of enrollment, this function is constrained by one or more management objectives. The college administration may have set a level of space utilization. Before new space can be justified, the utilization rate must be projected to rise above some upper limit. The administration may have set parameters on class sizes, number of student stations, number of hours per week classes can be scheduled, or the number of credits to be taken by the students. All of these parameters will affect the amount of space needed for an instructional program.

c. Programmatic decisions: Programmatic decisions may create a need for additional space in spite of a low utilization rate. The decision to offer a new engineering degree will generate the need for additional laboratory space which projections show will most likely never be fully utilized. However, to some degree the same type of facility is needed for few students as for many. Thus programmatic decisions can override the decision rules based on utilization rates.

3. Objectives:

The objective of a facility planning activity is to project three quantities:

* Amount of Space Required
* Cost of Providing Additional Space
* Cost of Maintaining Facilities

The administrator wants to know how much space, by specified categories, will be required for projected enrollments. If the space requirements exceed what is currently available, plus what is already authorized and scheduled for occupancy, he wants to know how much additional space, again by specified categories, will be needed and what is the estimated cost for the additional space. Finally the executive will be concerned about maintaining the facilities, both old and new.

In order to answer these questions, the planner needs to have the following information:

* Inventory of current and past space by specified category.
* Historic utilization of space.
* Management parameters: past.
* Management parameters: future.
* Enrollment projections by appropriate categories.
* Future cost estimates.
* Maintenance factors.

These data will allow him to make estimates of future need and the likely cost, both capital and operating, of fulfilling these needs.

4. <u>Space inventory</u>: A space analysis and planning system begins with and depends upon an adequate space inventory system. The purpose of an inventory system is to provide management information to support rational decision making. In the design of an inventory system, there are three decision areas:

* System of Classification
* Type of Data
* Level of Detail

a. <u>System of classification</u>: A number of classification systems for space inventories have been developed. A standardized system has been developed by the National Center for Educational Statistics and seems to be sufficient for use by most institutions. It is fully described in the <u>Higher Education Facilities Classification and Inventory Procedures Manual</u> published in 1968. The following is a brief display of that system.

	Code Number
Classrooms	
Classroom	110
Classroom Service	115
Laboratories	
Class Laboratory	210
Class Laboratory Service	215
Special Class Laboratory	220
Special Class Laboratory Service	225
Individual Study Laboratory	230
Individual Study Laboratory Service	235
Non-class Laboratory	250
Non-class Laboratory Service	255
Offices	
Office	310
Office Service	315
Conference Room	350
Conference Room Service	355
Library	
Study Room	410
Stack	420
Open-Stack Reading Room	430
Library Processing Rooms	440
Study Facilities Service	455
Special Use Facilities	500
Assembly Facilities	600
Service Facilities	700
Medical Facilities	800
Residence Facilities	900
Unassignable Area	
Custodial	10
Circulation	20
Mechanical	30
Construction	40
Inactive	81
Conversion	82
Unfinished	83

The manual also includes the procedures for measuring space and recording the types of use. The following categories are used to indicate the function of the space being inventoried.

Instruction
Research
Public Service
Library
General Administration
Auxiliary Services
Non-Institutional Agencies

This inventory system also has the capability of assigning certain types of space to departmental units.

b. Type of data: The type of data stored in the system will vary with the exact needs of the college but will generally include the following for individual rooms:

Room Number
Room Type
Assignable Square Feet
Number of Student Stations
Departmental Allocation (if appropriate)

The source for this information will usually be as-built drawings of campus facilities. Where these do not exist, actual measurements must be taken according to the procedures described in the Higher Education Facilities Classification Manual. In either event, an annual updating of the inventory will be required since all of the data elements may change. This can range from change in the number of student stations to a complete change in all elements due to renovation or remodeling.

c. Level of detail: The level of detail required in an inventory system is a function of the use to which it will be put by the college or university. Cost of maintaining the inventory must be balanced against the benefits of the management information provided. Generally as the level of detail increases so does the cost of building and maintaining the system. The point at which these are in balance is the proper level of detail.

C. Techniques of Facility Planning

This section will briefly review the major approaches to estimating space resource requirements, determination of capital expenditures associated with adding space, and projecting the cost of maintaining old and new space.

1. Space resource requirements: Projections of space resource requirements all make use of a space factor which is different in each case and is thus applied to different variables. As mentioned before, all of these variables are somehow related to enrollment or the number of users of the space, since this is the key variable in determining the amount of space required. The following is a review of five methods of estimating space needs.

a. Space/user factors: In this method a space factor (in square feet) per user of the space is determined and used to project future needs. The factor is applied to full-time equivalent (FTE) enrollment projections for future time periods and the result is the total amount of space required. For example, a factor of 100 square feet per FTE student generates a simple and straightforward projection of space needs by applying this factor to projections of FTE enrollment. An enrollment of 10,000 FTE students will generate a need for 1,000,000 square feet.

The factor may be in terms of total gross area or may be broken down in factors for different types of space. For example a 100 square foot factor may include 50 square feet for classrooms, 10 for faculty offices, 20 for administrative space, and 20 for other facilities. Such a breakdown does not, of course, change the total space requirements but does allow the planner to look at different types of space.

The disadvantages of this technique are its inability to take levels of utilization into account and its reliance upon averages. It treats all FTE students the same and may thus miss important variations in space needs and use. The advantage is that the simplicity of the method makes it easily understandable and it can provide relatively accurate projections of gross space needed.

b. Ratios: Once some initial estimates have been made, ratios can be used to develop the specific types of space required. For example, once an estimate for total classroom space has been developed, classroom service areas may be calculated as some ratio of that total. Thus a planner may set needed classroom service area at 15 percent of total classroom space. Having projected total classroom space (using either user factors or other methods), he can estimate the amount of service area required by applying the 0.15 ratio. This is a simple and straightforward method. Since it relies on averages, however, it must be used with care when estimating individual unit needs. It is a useful technique for aggregate estimates.

c. Programmatic: Some space resource decisions are made on the basis of what the program requires rather than the number of users or utilization rates. If an institution decides to offer a special emphasis in a field of chemistry, the proper laboratory will have to be provided. To some extent the amount of space needed for this will not vary directly with enrollment. Because of the specialized equipment, an estimated enrollment of 1 or 10 will need about the same amount of facility area.

Looked at in another way, if enrollment in this special facility was projected never to exceed five, the laboratory itself might be large enough to accommodate a significantly larger number than that. This will make it possible to use the space for other classes and to facilitate conversion of this space to other activities in the future.

2. Utilization parameters: Another method of estimating space resource requirements in scheduled academic facilities involves the use of utilization assumptions. The concern is not simply with the total amount of space available for use by students but also the extent to which that space is being used. The two utilization measures in general use are:

Room Utilization Rate
Station Occupancy Ratio

These two statistics are measures of the extent to which classrooms and laboratories are scheduled and the degree to which the capacity of each room is used to accommodate students. These two statistics are multiplied to produce a third: Station Utilization Rate.

The results of this projection are then compared with the current inventory of space. An estimate of the additional space needed of a space surplus is thus obtained.

a. Combination: The final method is a combination of the above methods. Typically for scheduled academic space, the utilization parameters will be used. For other types of facilities, space/user factors and ratios will be used. This approach allows the planner to select the method most appropriate to his projection problem and the type of information he has available.

3. Cost of adding space:

a. Gross area: After the planner has projected the amount of additional space required by category of space and by use, he should be able to give some rough estimates of the capital cost of supplying that additional space. This is most easily accomplished by using an appropriate unit (square foot) cost factor. Since the space resources required are generally in Assignable Square Feet (ASF), the planner needs to convert them into gross square feet so that the cost of the entire facility can be estimated. A factor for non-assignable square feet can be developed by the planner or estimated by the college's architect. In a recent state-wide study, non-assignable area was 0.33 of total gross area. This can be used to generate gross area from assignable area by subtracting 0.33 from 1.00 and dividing the total assignable area by the result. This estimate can then be used to project costs.

b. Construction costs: Construction costs per square feet are subject to local variation. Sources of information in the local community can supply what current costs are and also some estimate on how these costs will be changing through time. Note that in the recent past, construction costs have been increasing faster than other costs.

This cost factor can be applied to the amount of gross area required to provide the additional assignable area needed. The result is the estimate of capital expenditures required. These estimates are not always precise but are of the proper magnitude in view of the long lead time required for construction of new facilities.

4. Cost of maintaining total space: This cost of space management is not a capital item but an operating one. In order to project this type of cost, the planner needs a projection of the total amount of space to be maintained and an estimate of the unit cost of maintenance. The typical unit is in terms of square feet. Logically we would want to deal with assignable square feet but gross square feet could also be used for projection purposes.

The planner can develop this unit cost information by examining past maintenance costs in terms of the amount of space being maintained. He can then select the base unit cost expenses and make some assumptions about how this cost will be changing through time. Since he has already projected the total amount of space in service, he can apply his unit cost estimate to this total to arrive at a projection of total maintenance cost.

D. Micro-Model

Figure 2 presents the worksheets for implementing one method of projecting space resource needs and their associated capital and operating expenses. As mentioned above these and other techniques rely on some type of space inventory system. The techniques presented here require certain input data items which describe the amount and type of space available on the campus. The level of detail of this data will depend upon the considerations mentioned earlier.

A historic analysis of space utilization is not included in the section because of two factors. Many colleges do not have accurate current inventory of campus space and are, therefore, unlikely to have accurate inventory data for previous time periods. Second, the crucial parameters in projecting space needs are policy variables. While in other types of projections, the crucial variables are external to the institution or otherwise not under the control of the executives, this is not the case with space planning.

Private college administrators do have latitude in setting utilization factors for academic space. In many state supported public systems, the utilization rates required to justify new facilities are set or reviewed by a state-level coordinating agency. In either case, a historical analysis to determine trends and correlations is not especially helpful in projecting the future. What is needed is a framework for projection which will allow the planner to simulate various configurations of space utilization so that he can experiment with the implications of a variety of space use policies. The framework presented in Figure 2 is designed to do that.

1. Input: The actual input items are Lines 1, 2, 3, 5, 6, 7, 12, 13, 14, 18, 20, 22, 23, 25, 26, 28, 32, 34, 36, 38, 40, 42, 43, 45, 47, 49, 51, 53, 55, 56, 58, 60, 62, 64, 66, 68, 70, 73, 75, 80, 83, and 86. A description of each of these data elements and their probable sources follows.

Line 1--Full-Time Equivalent Enrollment (FTE): This item consists of full-time plus part-time students expressed in equivalent terms. The traditional method for computing the full-time equivalents of part-time students is to divide the student credit hours of the part-time students by the "normal" full-time load. This can either be the actual average load of full-time students at the college or some standard figure, 15 for instance. The latter insures comparability of data across institutions. These projected FTE enrollments will be available from the college's enrollment projection.

Line 2--Student Contact Hours in Lecture Sections: This is a measure of the number of hours per week a student has scheduled contact with a faculty member in a lecture or other non-laboratory setting. A course which enrolls 40 students and which is scheduled to meet four clock hours per week will produce 160 student contact hours. Notice that this is different from student credit hours which depend upon the number of credits carried by the course. (Procedures for developing factors to be used in projecting student contact hours are presented in Volume I, Chapter IV.) The number of contact hours in lecture sections can be developed directly from departmental projections if they are done in sufficient detail. In most cases, however, gross estimates can be made on a percentage basis. Assuming stability in the data, the planner can take the current ratio of lecture contact hours to total contact hours and use this ratio throughout the planning periods to estimate lecture contact hours.

SPACE RESOURCE REQUIREMENT WORKSHEET

No.	Item	Source	Academic Year Beginning In: 72	73	74	75	76	77	78	79	80	81	82	83
* 1	FTE Enrollment	Input												
* 2	Student Contact Hours: Lecture	Input												
* 3	Average Section Size: Lecture	Input												
4	Classroom Hours/Week	Line 2 ÷ Line 3												
* 5	Average Room Utilization Rate	Input												
* 6	Average Station Occupancy Ratio	Input												
* 7	Assignable Square Feet per Station	Input												
8	Number of Rooms Required	Line 4 ÷ Line 5												
9	Station Utilization Rate	Line 5 x Line 6												
10	Number of Stations Required	Line 2 ÷ Line 9												
11	Assignable Square Feet: Classrooms	Line 10 x Line 7												
*12	Current Number of Classrooms	Input												
*13	Current Number of Stations	Input												
*14	Current Assignable Square Feet	Input												
15	Additional Classrooms Required	Line 8 - Line 12												
16	Additional Stations Required: Classrooms	Line 10 - Line 13												
17	Additional Assignable Square Feet Required: Classrooms	Line 11 - Line 14												
*18	Ratio of Classroom Support Space to Classroom Space	Input												

* Input item.

Figure 2

SPACE RESOURCE REQUIREMENT WORKSHEET (CONT'D)

No.	Item	Source	Academic Year Beginning In											
			72	73	74	75	76	77	78	79	80	81	82	83
19	Classroom Support Space Required	Line 18 x Line 11												
*20	Current Classroom Support Space	Input												
21	Additional Classroom Support Space Required	Line 19 - Line 20												
*22	Student Contact Hours Laboratory	Input												
*23	Average Laboratory Section Size	Input												
24	Laboratory Hours/Week	Line 22 ÷ Line 23												
*25	Room Utilization Rate: Class Laboratory	Input												
*26	Average Station Occupancy Ratio: Class Laboratory	Input												
27	Station Utilization Rate: Class Laboratory	Line 25 x Line 26												
*28	Assignable Square Feet/Station	Input												
29	Number of Laboratories Required	Line 24 x Line 25												
30	Number of Laboratory Stations Required	Line 22 x Line 27												
31	Assignable Square Feet Required: Laboratory	Line 28 x Line 30												
*32	Current Number of Laboratories	Input												
33	Additional Laboratories Required	Line 29 - Line 32												
*34	Current Laboratory Stations	Input												

Figure 2 (Continued)

No.	Item	Source	Academic Year Beginning In 72	73	74	75	76	77	78	79	80	81	82	83
35	Additional Laboratory Stations Required	Line 30 - Line 34	___	___	___	___	___	___	___	___	___	___	___	___
*36	Current Assignable Square Feet: Laboratories	Input	___	___	___	___	___	___	___	___	___	___	___	___
37	Additional Assignable Square Feet Required	Line 31 - Line 36	___	___	___	___	___	___	___	___	___	___	___	___
*38	Ratio of Laboratory Support Space to Total Laboratory Space	Input	___	___	___	___	___	___	___	___	___	___	___	___
39	Laboratory Support Space Required	Line 38 x Line 31	___	___	___	___	___	___	___	___	___	___	___	___
*40	Current Laboratory Support Space	Input	___	___	___	___	___	___	___	___	___	___	___	___
41	Additional Laboratory Support Space Required	Line 39 - Line 40	___	___	___	___	___	___	___	___	___	___	___	___
*42	FTE Faculty	Input	___	___	___	___	___	___	___	___	___	___	___	___
*43	Office Assignable Square Feet per FTE Faculty	Input	___	___	___	___	___	___	___	___	___	___	___	___
44	Faculty Office Space Required	Line 43 x Line 42	___	___	___	___	___	___	___	___	___	___	___	___
*45	Current Faculty Office Space	Input	___	___	___	___	___	___	___	___	___	___	___	___
46	Additional Faculty Office Space Required	Line 44 - Line 45	___	___	___	___	___	___	___	___	___	___	___	___
*47	Ratio Faculty Office Service Space to Total Faculty Office Space	Input	___	___	___	___	___	___	___	___	___	___	___	___
48	Faculty Office Service Space Required	Line 47 x Line 44	___	___	___	___	___	___	___	___	___	___	___	___
*49	Current Faculty Office Service Space	Input	___	___	___	___	___	___	___	___	___	___	___	___

Figure 2 (Continued)

No.	Item	Source	Academic Year Beginning In 72	73	74	75	76	77	78	79	80	81	82	83
50	Additional Faculty Office Service Space Required	Line 48 - Line 49	___	___	___	___	___	___	___	___	___	___	___	___
*51	Library Reader Space/FTE Student	Input	___	___	___	___	___	___	___	___	___	___	___	___
52	Library Reader Space Required	Line 51 x Line 1	___	___	___	___	___	___	___	___	___	___	___	___
*53	Current Library Reader Space	Input	___	___	___	___	___	___	___	___	___	___	___	___
54	Additional Library Reader Space Required	Line 52 - Line 53	___	___	___	___	___	___	___	___	___	___	___	___
*55	Number of Library Volumes	Input	___	___	___	___	___	___	___	___	___	___	___	___
*56	Volumes/1 Square Foot	Input	___	___	___	___	___	___	___	___	___	___	___	___
57	Library Stack Space	Line 55 x Line 56	___	___	___	___	___	___	___	___	___	___	___	___
*58	Current Library Stack Space	Input	___	___	___	___	___	___	___	___	___	___	___	___
59	Additional Library Stack Space Required	Line 57 - Line 58	___	___	___	___	___	___	___	___	___	___	___	___
*60	Ratio Library Service Area to Reader and Stack Space	Input	___	___	___	___	___	___	___	___	___	___	___	___
61	Library Service Area	Line 60 x (Line 52 x Line 57)	___	___	___	___	___	___	___	___	___	___	___	___
*62	Current Library Service Area	Input	___	___	___	___	___	___	___	___	___	___	___	___
63	Additional Library Service Area Required	Line 61 - Line 62	___	___	___	___	___	___	___	___	___	___	___	___
*64	Library Administrative Space/ FTE Student	Input	___	___	___	___	___	___	___	___	___	___	___	___
65	Library Administrative Space	Line 64 x Line 1	___	___	___	___	___	___	___	___	___	___	___	___
*66	Library Current Administrative Space	Input	___	___	___	___	___	___	___	___	___	___	___	___
67	Required Additional Administrative Space	Line 65 - Line 66	___	___	___	___	___	___	___	___	___	___	___	___
*68	Other Academic Facilities/FTE Student	Input	___	___	___	___	___	___	___	___	___	___	___	___

Figure 2 (Continued)

SPACE RESOURCE REQUIREMENT WORKSHEET (CONT'D)

No.	Item	Source	72	73	74	75	76	77	78	79	80	81	82	83
			Academic Year Beginning In											
69	Other Academic Facilities	Line 68 x Line 1												
*70	Current Other Academic Facilities	Input												
71	Additional Academic Facilities	Line 69 - Line 70												
72	Academic & General Space	Sum of Lines 11, 19, 31, 39, 44, 48, 52, 57, 61, 65, 69												
*73	Ratio of Maintenance Space to Academic & General	Input												
74	Maintenance Space	Line 73 x Line 72												
*75	Current Maintenance Space	Input												
76	Additional Maintenance Space Required	Line 74 - Line 75												
77	Total Current Space	Sum of Lines 14, 20, 36, 40, 45, 49, 53, 58, 62, 66, 70, 75												
78	Total Space Resource Required	Sum of Lines 11, 19, 31, 39, 44, 48, 52, 57, 61, 65, 69, 74												
79	Total Additional Space Required	Sum of Lines 14, 21, 37, 41, 46, 50, 54, 59, 63, 67, 71, 76												
*80	Gross Area Factor	Input												
81	Additional Gross Area Required	Line 79/Line 80												
82	Accumulated Gross Area	Accumulate Values in Line 81												

Figure 2 (Continued)

SPACE RESOURCE REQUIREMENT WORKSHEET (CONT'D)

			Academic Year Beginning In											
No.	Item	Source	72	73	74	75	76	77	78	79	80	81	82	83
* 83	Construction Cost Per Gross Square Feet	Input												
84	Estimated Capital Expenditure Used Each Year	Line 83 x Line 81												
85	Estimated Capital Expenditure for Accumulated Space	Line 83 x Line 82												
* 86	Maintenance Unit Cost	Input												
87	Maintenance Cost: Current Space	Line 77 x Line 86												
88	Maintenance Cost: Total Space Required	Line 78 x Line 86												
89	Maintenance Cost: Additional Space	Line 79 x Line 86												
90	Classroom Space: Percent Deficient	(Line 16 - Line 11) / Line 11												
91	Classroom Support Space: Percent Deficient	(Line 20 - Line 19) / Line 19												
92	Class Laboratory Space: Percent Deficient	(Line 36 - Line 28) / Line 28												
93	Class Laboratory Support Space: Percent Deficient	(Line 40 - Line 39) / Line 39												
94	Faculty Office Space: Percent Deficient	(Line 45 - Line 44) / Line 44												
95	Faculty Office Service Space: Percent Deficient	(Line 49 - Line 48) / Line 48												
96	Library Reader Space: Percent Deficient	(Line 53 - Line 52) / Line 52												
97	Library Stack Space: Percent Deficient	(Line 58 - Line 57) / Line 57												

Figure 2 (Continued)

SPACE RESOURCE REQUIREMENT WORKSHEET (CONT'D)

			Academic Year Beginning In											
No.	Item	Source	72	73	74	75	76	77	78	79	80	81	82	83
98	Library Service Area: Percent Deficient	(Line 62 - Line 61) / Line 61	___	___	___	___	___	___	___	___	___	___	___	___
99	Administrative Space : Percent Deficient	(Line 66 - Line 65) / Line 65	___	___	___	___	___	___	___	___	___	___	___	___
100	Other Academic Area: Percent Deficient	(Line 70 - Line 69) / Line 69	___	___	___	___	___	___	___	___	___	___	___	___
101	Maintenance Space: Percent Deficient	(Line 75 - Line 74) / Line 74	___	___	___	___	___	___	___	___	___	___	___	___
102	Total Assignable Space: Percent Deficient	(Line 77 - Line 78) / Line 78	___	___	___	___	___	___	___	___	___	___	___	___

Figure 2 (Concluded)

Line 3--Average Section Size: This is the average size of a credit lecture section. Since this is a policy variable, the planner may set arbitrary levels of this variable in order to assess the space impact of changing the average section size. As a beginning point, the current average section size should be used. This will be available from the Registrar's Office.

Line 5--Average Room Utilization Rate (RUR): This is a space management parameter which sets the average number of hours per week a classroom is scheduled. An RUR of 30 indicates that on the average each room will be scheduled 30 hours per week. It is a measure of the extent to which instructional areas are scheduled. Since this is a parameter value, the planner will want to experiment with different values to determine the implications of different RUR's. Reasonable values of this variable will range from 22 to 32 hours per week. Thirty hours has been adopted in several states as a standard for classrooms.

Line 6--Average Station Occupancy Ratio (SOR): This parameter sets the average percentage of the student stations which will be used each week. An SOR of 0.50 means that on the average 50 percent of the student stations in classrooms will be filled during the hours in which the classrooms are scheduled. It is a simple measure of the utilization of space in the sense of student capacity used. Values for this variable will depend upon the type of institution. An SOR of 0.60 has been adopted by some states. Typical values will range from 0.45 to 0.80.

Line 7--Assignable Square Feet per Student Station: This is the number of square feet required for one student station. This is also a policy variable and will be affected by the type and size of institution. The table reproduced below will give the planner some reasonable ranges in this item.

RANGES OF CLASSROOM UNIT FLOOR AREA CRITERIA*
OF STATION COUNT AND TYPE OF STATION

	Assignable Square Feet per Station				
	Tables &	Tablet-Arm Chairs		Auditorium Seating	
Station Count	Chairs	Small	Large	Theatre	Continental
5- 9	20-30	20	30	--	--
10- 19	20-30	18	22	--	--
20- 29	20-30	16	20	--	--
30- 39	20-25	15	18	--	--
40- 49	18-22	14	16	--	--
50- 59	18-22	14	16	--	--
60- 99	18-22	13	15	10-14	18-22
100-149	16-20	11	14	9-12	16-20
150-299	16-20	10	14	8-10	14-18
300+	16-18	9	12	7-10	14-18

* Taken from Higher Education Facilities Planning and Management Manuals.

Line 12--Current Number of Classrooms: The number of classrooms currently available for use on the campus. This information will be available from the space inventory or the Registrar's Office.

Line 13--Current Number of Student Stations: The number of student stations currently available on the campus. This information will come from the space inventory or the Registrar's Office.

Line 14--Current Assignable Square Feet (ASF) in Classrooms: This information will be available from the space inventory.

Line 18--Ratio of Classroom Support Space to Classroom Space: This again is a parameter which will vary from institution to institution. Initially the planner can use the current ratio developed from information in the space inventory. The variable will typically range between 0.07 and 0.15.

Line 20--Current Classroom Support Space: This information will be available from the college's space inventory. In terms of the NCES classification scheme, this will include all space coded 115.

Line 22--Student Contact Hours in Laboratory: These are the contact hours generated in laboratory sections. The procedures used for estimating lecture contact hours can be applied here.

Line 23--Average Laboratory Section Size: This is the average size of laboratory sections in the college. This information should be available from the Registrar's Office.

Line 25--Room Utilization Rate: Class Laboratory: This is the same type of information as that contained in Line 5, except that it will refer to laboratories. It is the average number of hours per week the college's laboratories are scheduled. Typical values for this item may range from 20 to 26. Some states have adopted 20 as a standard to class laboratories.

Line 26--Average Station Occupancy Ratio for Laboratories. This is the same type of information as that contained in Line 6, except that it refers to laboratories. It is the average percentage of the student stations filled during scheduled hours. Typical values will range from 0.50 to 0.85. Some states have adopted a laboratory SOR of 0.80.

Line 28--Assignable Square Feet per Laboratory Student Station: This is the number of square feet required for one student station. This is also a policy variable and will be affected by the type and size of institution. Unlike classrooms, assignable square feet per station for laboratories will vary with the discipline using the laboratory and the level of instruction. Tables are available which suggest factors in this format. For general planning purposes, typical values will range about 50. The planner can calculate his institution's present figure and use that for initial planning.

Line 32--Current Number of Laboratories: The number of laboratories currently available for use on the campus. This information will be available from the space inventory or the Registrar's Office.

Line 34--Current Number of Laboratory Student Stations: The number of student stations in laboratories currently available on the campus.

Line 36--Current Assignable Square Feet in Laboratories. This information will be available from the space inventory.

Line 38--Ratio of Laboratory Support Space to Total Laboratory Space: This is a parameter which will vary from institution to institution. Initially the planner can use the current ratio developed from information in the space inventory. The values will typically range around 0.25.

Line 40--Current Laboratory Support Space: This information will be available from the institution's space inventory. In terms of the NCES classification system, it will include all space coded 215.

Line 42--Full-Time Equivalent (FTE) Faculty: This item consists of full-time plus part-time faculty expressed in equivalent terms. The traditional method for computing the full-time equivalents of part-time faculty is to divide the teaching load of part-time faculty by the "institutional" full-time load. For example, a faculty member teaching 6 credit hours at an institution where the normal full-time load is 12 credits is described as 0.5 FTE faculty number. Methods of projecting this item are presented in Volume I, Chapter IV.

Line 43--Office Assignable Square Feet per FTE Faculty: This is the amount of area required for office space for one faculty member. As with the other factors, this will vary from institution to institution. The planner should consider using the current factor. Some states have adopted 125 square feet as a standard.

Line 45--Current Faculty Office Space: This information will be available from the space inventory system. It will include all space coded 310 and assigned a function code of 10.

Line 47--Ratio of Faculty Office Service Space to Total Faculty Office Space: This is a parameter which will vary from institution to institution. Initially the planner can use the current ratio developed from information in the space inventory. The values will typically range around 0.25.

Line 49--Current Faculty Office Service Space: This information will be available from the space inventory and will include all space coded 315 with a function code of 10.

Line 51--Library Reader Space per FTE Student: This is the amount of area required for reader space for one FTE student. As with other factors, it will vary from college to college. The planner can use the current factor for initial planning. Some institutions have adopted a factor of 8.33 as a standard.

Line 53--Current Library Reader Space: This will be available from the space inventory.

Line 55--Number of Library Volumes: The projected values of this variable will be available from the library staff.

Line 56--Volumes per One Square Foot: The value of this factor will vary from college to college. The planner might want to use his college's current value for initial projections. A standard of 15 has been adopted by some institutions.

Line 58--Current Library Stack Space: This will be available from the space inventory.

Line 60--Ratio of Library Service Area to Reader and Stack Space: This is a parameter which will vary from institution to institution. Initially the planner might use the current ratio developed from information in the space inventory. Values will tend to range around 0.25.

Line 62--Current Library Service Area: This information will be available from the space inventory system.

Line 64--Administrative Space per FTE Student: This is the amount of area required for administrative activities for one FTE student. This value will vary from college to college. The planner might consider using the current value at least in initial projections. A factor of 5 has been adopted by some institutions.

Line 66--Current Administrative Space: This will be available from the space inventory.

Line 68--Other Academic Facilities per FTE Student: This factor refers to a variety of academic space including special class laboratories, individual study laboratories, armory facilities, athletic-physical education facilities, audio-visual or radio or T.V. facilities, clinic facilities, assembly facilities, and data processing facilities. This factor will vary from college to college. Some institutions have adopted a factor of 24.

Line 70--Current Other Academic Facilities: This will be available from the space inventory.

Line 73--Ratio of Maintenance Space to Academic and General Space: This factor will vary from college to college. The current factor can be used. Some institutions have adopted a factor of 0.075.

Line 75--Current Maintenance Space: This will be available from the space inventory.

Line 80--Gross Area Factor: This factor will be applied to total assignable area to produce gross area. Non-assignable area will average about 0.33 of gross area. Thus a factor of 0.67 can be used to develop total gross area by dividing it into total assignable area.

Line 83--Construction Cost per Gross Square Feet: This factor will vary from community to community depending upon labor supply and contracts. Estimates of current value can be obtained from architects or from the college's own data if recent construction is under way. Projections of this factor can be obtained from knowledgeable construction people in the local community.

Line 86--Maintenance Unit Cost: This is the cost in terms of labor and supplies of maintaining 1 square foot of assignable area. An institutional average should be used. The current value can be easily calculated and assumptions about future salaries and supplies costs made on the basis of recent experience.

2. Output: The output of this projection routine will provide the planner with the following types of information:

Total Assignable Square Feet Required by Space Category
Additional Assignable Square Feet Required by Space Category
Number of Classrooms and Laboratories Required
Additional Classrooms and Laboratories Required
Number of Student Stations Required
Additional Number of Student Stations Required
Total Gross Area
Additional Gross Area Required
Construction Cost of New Area
Maintenance Cost of Current and Additional Assignable Area
Percent Deficiency for Assignable Space by Category

E. Case Study

The techniques discussed above have been applied to a set of data. This application could have been done manually using the worksheets and directions given in Section D. The same projection, however, can be accomplished in the PLANTRAN system. The computer not only increases the speed and accuracy of the calculations but, with PLANTRAN, also permits easy modification of structure and assumptions.

Figure 3 shows the PLANTRAN system input required to conduct the projection. Figure 4 presents the "Analysis of Planning Matrix" for the projection. Figure 5 shows the summary output.

F. Data Collection

Figure 6 is a copy of a data collection document for the projection of space requirements. Figure 7 is a sample of a completed data collection document which conforms to the data used in the case study. The planner should review section D carefully before completing the document.

No single data collection document, just as no single model, will be appropriate for every institution. Planners should modify the data collection specifications rather than modify the data to fit the document or not collect data at all. To the greatest extent possible input and output from the model should resemble the operational data of the institution with which the decision makers are familiar. If an institution operates under a specific set of space factors and standards, these should be utilized.

G. Model Adaptation

No matter how good the data and no matter how sophisticated and precise the statistical methodology, as planners and decision makers review the projected results they will suggest changes. Some will be changes that reflect a distrust of the projected values; others will constitute inputs of experience and judgment which were not included earlier; still others will simply be expressions of interest in what would happen if....? All of these concerns are important to the model builder.

He should be particularly interested in the third type of response. The decision maker who wants to investigate a number of alternatives just to see what would happen realizes how to use a simulation technique. The chart in Figure 8 graphically represents this plan refining cycle which is the hallmark of a successful simulation effort.

Changes in the model can be of two types. The structure of the model itself can be changed in order to more closely approximate the real

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PLANTRAN II DATA SHEET

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MRI

IDENTIFICATION

ORGANIZATION	MODEL DESCRIPTION	DATE	BASE PERIOD T H R	RUN NO.
EXAMPLE	SPACE NEEDS	CURRENT DATE	1971	

T - TIME PERIOD
H - HEADING
R - REPLACEMENT

COLUMNAR HEADINGS - OPTIONAL

PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	PERIOD 5	PERIOD 6	PERIOD 7	PERIOD 8	PERIOD 9	PERIOD 10	PERIOD 11	PERIOD 12

MODEL SPECIFICATION

LINE NO.	PLANNING ITEM	BASE LEVEL	FREEFORM METHOD OF COMPUTATION
1	FTE ENROLLMENT	11450	DATA 12371, 13330, 14258, 14949, 15493, C
			16011, 16516, 16992, 17497, 18001, C
			18570, 18950
2	STUDENT CONTACT HRS-LECT	160586	EQUATION: 16.5 L1 * .85
3	AVERAGE SECTION SIZE	35	CONSTANT
4	CLASSROOM HOURS PER WEEK	4588	EQUATION: L2/L3
5	AVE ROOM UTILIZ RATE	30	CONSTANT
6	AVE STATION OCCUPANCY	65	CONSTANT
7	ASSIGN SQ FT PER STATION	20	CONSTANT
8	NUMBER OF ROOMS REQUIRED		EQUATION: L4/L5
9	STATION UTILIZATION RATE		EQUATION: L5 * .01 L6
10	NUMBER OF STATIONS REQD		EQUATION: L2/L9
11	ASF-CLASSROOMS		EQUATION: L10 * L7
12	CURRENT NO OF CLASSROOMS	153	CONSTANT
13	CURRENT NO OF STATIONS	8235	CONSTANT
14	CURRENT ASF-CLASSROOMS	164700	CONSTANT
15	ADDITIONAL CLASSROOMS RQ		EQUATION: L8-L12
16	ADDITIONAL STATIONS REQ		EQUATION: L10-L13

SUMMARY REPORTS

REPORT TITLE	FREEFORM REPORT LINES
SPACE DEFICIENCY	91-103
ADDITIONAL SPACE	17, 21, 37, 41, 50, 54, 59, 63, 67, 71, 76, 79
COST ESTIMATES	85, 86, 88, 89, 90

Figure 3

NAME ______

PLANTRAN II DATA SHEET

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IDENTIFICATION

ORGANIZATION (1–24)	MODEL DESCRIPTION (25–40)	DATE (41–56)	BASE PERIOD T (57–60)	H (61–63)	R (63–65)	T - TIME PERIOD H - HEADING R - REPLACEMENT	RUN NO. (78–80)

COLUMNAR HEADINGS - OPTIONAL

PERIOD 1 (1–6)	PERIOD 2 (7–12)	PERIOD 3 (13–18)	PERIOD 4 (19–24)	PERIOD 5 (25–30)	PERIOD 6 (31–36)	PERIOD 7 (37–42)	PERIOD 8 (43–48)	PERIOD 9 (49–54)	PERIOD 10 (55–60)	PERIOD 11 (61–66)	PERIOD 12 (67–72)

MODEL SPECIFICATION

LINE NO. (1–4)	PLANNING ITEM (5–28)	BASE LEVEL (29–40)	FREEFORM METHOD OF COMPUTATION (41–80)
17	ADDITIONAL ASF-CLASSRMS		EQUATION: L11-L14
18	SUPPORT/TOT CLSRM ASF	10	CONSTANT
19	SUPPORT ASF REQUIRED		EQUATION: .01L18 * L11
20	CURRENT SUPPORT SPACE	15500	CONSTANT
21	ADDITIONAL SUPPORT ASF		EQUATION: L19-L20
22	STU CONT HRS LABORATORY	28400	EQUATION: 16.5L1 * .15
23	AVE LAB SECTION SIZE	30	CONSTANT
24	LAB HOURS PER WEEK	947	EQUATION: L22/L23
25	ROOM UTILIZATION RATE-LB	20	CONSTANT
26	AVERAGE STATION OCCUP	80	CONSTANT
27	STATION UTILIZ RATE		EQUATION: L25 *.01L26
28	ASF/STATION	35	CONSTANT
29	NUMBER OF LABS REQUIRED		EQUATION: L24/L25
30	NUMBER OF LAB STATIONS		EQUATION: L22/L27
31	ASF-LABORATORIES		EQUATION: L28*L30
32	CURRENT NUMBER OF LABS	47	CONSTANT
33	ADDITIONAL LABS REQ		EQUATION: L29-L32
34	CURRENT LAB STATIONS	1775	CONSTANT

SUMMARY REPORTS

REPORT TITLE (1–24)	FREEFORM REPORT LINES (25–80)
SPACE REQUIREMENTS	105, 8, 10, 11, 19, 106, 29-31, 39, 107, 44, 48, 52, 57, 61, 65, C
	69, 74, 78
INSTRUCTIONAL FACTORS	105, 3-7, 18, 106, 23-28, 38

Figure 3 (Continued)

PLANTRAN II DATA SHEET

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IDENTIFICATION

ORGANIZATION (1–24)	MODEL DESCRIPTION (25–40)	DATE (41–56)	BASE PERIOD T (57–60)	H (61–63)	R (65)	T - TIME PERIOD H - HEADING R - REPLACEMENT	RUN NO. (78–80)

COLUMNAR HEADINGS - OPTIONAL

PERIOD 1 (1–6)	PERIOD 2 (7–12)	PERIOD 3 (13–18)	PERIOD 4 (19–24)	PERIOD 5 (25–30)	PERIOD 6 (31–36)	PERIOD 7 (37–42)	PERIOD 8 (43–48)	PERIOD 9 (49–54)	PERIOD 10 (55–60)	PERIOD 11 (61–66)	PERIOD 12 (67–72)

MODEL SPECIFICATION

LINE NO. (1–4)	PLANNING ITEM (5–28)	BASE LEVEL (29–40)	FREEFORM METHOD OF COMPUTATION (41–44 / 45–80)
35	ADDITIONAL STATIONS REQ		EQUATION: L30-L34
36	CURRENT ASF-LABS	52175	CONSTANT
37	ADDITIONAL ASF REQUIRED		EQUATION: L31-L34
38	SUPPORT/TOTAL LAB ASF	25	CONSTANT
39	LAB SUPPORT SPACE REQ		EQUATION: .01L38*L31
40	CURRENT LAB SUPPORT SPACE	13040	CONSTANT
41	ADDITIONAL LAB SUPPORT		EQUATION: L39-L40
42	FTE FACULTY	541	EQUATION: L1/21
43	OFFICE ASF/FTE FACULTY	125	CONSTANT
44	FACULTY OFFICE ASF REQ		EQUATION: L43*L42
45	CURRENT FACULTY OFF ASF	70000	CONSTANT
46	ADDITIONAL FAC OFF ASF		EQUATION: L44-L45
47	SERVICE/TOTL FAC OFFICE	25	CONSTANT
48	FAC OFF SERVICE SPACE		EQUATION: .01L47*L44
49	CURRENT FAC OFF SERVICE	14000	CONSTANT
50	ADDITIONAL FAC OFF SERV		EQUATION: L48-L49
51	LIBRARY READE SP/FTE ST	8	CONSTANT
52	LIBRARY READER SP REQ		EQUATION: L51*L1

SUMMARY REPORTS

REPORT TITLE (1–24)	FREEFORM REPORT LINES (25–80)
OTHER AREA FACTORS	43,47,51,56,60,64,68,73
COST FACTORS	84,87

Figure 3 (Continued)

NAME ______________

PLANTRAN II DATA SHEET

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IDENTIFICATION

ORGANIZATION (1–24)	MODEL DESCRIPTION (25–40)	DATE (41–56)	BASE PERIOD (57–60)	T (61)	H (63)	R (65)	T-TIME PERIOD H-HEADING R-REPLACEMENT	RUN NO (78–80)

COLUMNAR HEADINGS - OPTIONAL

PERIOD 1 (1–6)	PERIOD 2 (7–12)	PERIOD 3 (13–18)	PERIOD 4 (19–24)	PERIOD 5 (25–30)	PERIOD 6 (31–36)	PERIOD 7 (37–42)	PERIOD 8 (43–48)	PERIOD 9 (49–54)	PERIOD 10 (55–60)	PERIOD 11 (61–66)	PERIOD 12 (67–72)

MODEL SPECIFICATION

LINE NO. (1–4)	PLANNING ITEM (5–28)	BASE LEVEL (29–40)	FREEFORM METHOD OF COMPUTATION (41–80)
53	CURRENT LIB READER SPACE	85000	CONSTANT
54	ADDITIONAL LIB READER SP		EQUATION: L52-L53
55	NUMBER OF LIB VOLUMES	800000	INCREASE 10000 PER YEAR
56	VOLUMES PER SQUARE FOOT	15	CONSTANT
57	LIBRARY STACK SPACE		EQUATION: L55/L56
58	CURRENT LIB STACK SPACE	40000	CONSTANT
59	ADDITIONAL LIB STACK SP		EQUATION: L57-L58
60	LIB SERV/READER + STACK	25	CONSTANT
61	LIBRARY SERVICE AREA		EQUATION: .01L60 * (L52 + L57)
62	CURRENT LIB SERV AREA	10500	CONSTANT
63	ADDITIONAL LIB SERV		EQUATION: L61-L62
64	ADMIN SPACE/FTE STU	5	CONSTANT
65	ADMIN SPACE REQ		EQUATION: L64 * L1
66	CURRENT ADMIN SPACE	54300	CONSTANT
67	ADDITIONAL ADMIN SPACE		EQUATION: L65-L66
68	OTHER ACAD FACIL REQ		EQUATION: L68 * L1
68	OTHER ACAD FACIL/FTE ST	14	CONSTANT
[illegible]	CURR OTHER ACAD FACIL	170000	CONSTANT

SUMMARY REPORTS

REPORT TITLE (1–24)	FREEFORM REPORT LINES (25–80)

Figure 3 (Continued)

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IDENTIFICATION

ORGANIZATION (1–24)	MODEL DESCRIPTION (25–40)	DATE (41–56)	BASE PERIOD (57–60)	T (61)	H (63)	R (65)	T- TIME PERIOD H- HEADING R- REPLACEMENT	RUN NO. (78–80)

COLUMNAR HEADINGS - OPTIONAL

PERIOD 1 (1–6)	PERIOD 2 (7–12)	PERIOD 3 (13–18)	PERIOD 4 (19–24)	PERIOD 5 (25–30)	PERIOD 6 (31–36)	PERIOD 7 (37–42)	PERIOD 8 (43–48)	PERIOD 9 (49–54)	PERIOD 10 (55–60)	PERIOD 11 (61–66)	PERIOD 12 (67–72)

MODEL SPECIFICATION

LINE NO. (1–4)	PLANNING ITEM (5–28)	BASE LEVEL (29–40)	FREEFORM METHOD OF COMPUTATION (41–80)
71	ADDITIONAL ACAD FACIL		EQUATION: L69-L70
72	ACADEMIC + GENERAL ASF		SUM OF 11, 19, 31, 39, 44 48, 52, 57, 61, 65, 70
73	MAINTENANCE / ACAD + GEN	7.5	CONSTANT
74	MAINTENANCE SPACE REQ		EQUATION: .01L73 * L72
75	CURRENT MAINT SPACE	66500	CONSTANT
76	ADDITIONAL MAINT SPACE		EQUATION: L74-L75
77	TOTAL CURRENT SPACE		SUM OF 14, 20, 36, 40, 45, 49, 53, 58, 62, 66, C
			70, 75
78	TOT SPACE RESOURCE REQ		SUM OF 72, 74
79	TOT ADDITIONAL SPACE RQ		SUM OF 17, 21, 37, 41, 46, 50, 54, 59, 63, 67, C
			71, 76
80	GROSS AREA FACTOR	67	CONSTANT
81	ADDITIONAL GROSS AREA		EQUATION: L79/.01L80
82	ANNUAL CHANGE GROSS AREA		EQUATION: (L78-L83)/.01L80
83	WORK LINE		SHIFT L78
84	CONSTRUCTION COST/GR FT	20	PERCENT INCREASE OF 6
85	EST CAP EXPENDITURES		EQUATION: L84 * L81
86	EST CAP EXPEND (ANNUAL)		EQUATION: L82 * L84

SUMMARY REPORTS

REPORT TITLE (1–24)	FREEFORM REPORT LINES (25–80)

Figure 3 (Continued)

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MRI

IDENTIFICATION

ORGANIZATION (1–24)	MODEL DESCRIPTION (25–40)	DATE (41–56)	BASE PERIOD T (57–60)	(61)	H (63)	R (65)	T - TIME PERIOD H - HEADING R - REPLACEMENT	RUN NO (78–80)

COLUMNAR HEADINGS - OPTIONAL

PERIOD 1 (1–6)	PERIOD 2 (7–12)	PERIOD 3 (13–18)	PERIOD 4 (19–24)	PERIOD 5 (25–30)	PERIOD 6 (31–36)	PERIOD 7 (37–42)	PERIOD 8 (43–48)	PERIOD 9 (49–54)	PERIOD 10 (55–60)	PERIOD 11 (61–66)	PERIOD 12 (67–72)

MODEL SPECIFICATION

LINE NO. (1–4)	PLANNING ITEM (5–28)	BASE LEVEL (29–40)	FREEFORM METHOD OF COMPUTATION (41–44, 45–80)
87	MAINTENANCE UNIT COST	1	PERCENT INCREASE OF 5
88	MAINTENANCE COST CURR SP		EQUATION: L77 * L87
89	MAINT COST TOT ASF REQ		EQUATION: L78 * L87
90	MAINT COST ADDIT SPACE		EQUATION: L79 * L87
91	CLASSRM ASF PCT DEFIC		EQUATION: 100 L14/L11-100
92	CLASSRM SERV ASF PCT DEF		EQUATION: 100 L20/L19-100
93	LAB SPACE PCT DEFIC		EQUATION: 100 L36/L31-100
94	LAB SERVICE PCT DEFIC		EQUATION: 100 L40/L39-100
95	FACULTY OFF SP PCT DEFIC		EQUATION: 100 L45/L44-100
96	FACULTY OFF SERV PCT DEF		EQUATION: 100 L49/L48-100
97	LIB READER SP PCT DEFIC		EQUATION: 100 L53/L52-100
98	LIB STACK SP PCT DEFIC		EQUATION: 100 L58/L57-100
99	LIB SERV AREA PCT DEFIC		EQUATION: 100 L62/L61-100
100	ADMIN SPACE PCT DEFIC		EQUATION: 100 L66/L65-100
101	OTHER ACAD AREA PCT DEF		EQUATION: 100 L70/L69-100
102	MAINTENANCE SP PCT DEF		EQUATION: 100 L75/L74-100
103	TOTAL ASSIG SP PCT DEF		EQUATION: 100 L77/L78-100
105	CLASSROOMS		HEADING

SUMMARY REPORTS

REPORT TITLE (1–24)	FREEFORM REPORT LINES (25–80)

Figure 3 (Continued)

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IDENTIFICATION

ORGANIZATION	MODEL DESCRIPTION	DATE	BASE PERIOD T	H	R		RUN NO
1 – 24	25 – 40	41 – 56	57 – 60	61 – 63	65	T - TIME PERIOD H - HEADING R - REPLACEMENT	78 – 80

COLUMNAR HEADINGS - OPTIONAL

PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	PERIOD 5	PERIOD 6	PERIOD 7	PERIOD 8	PERIOD 9	PERIOD 10	PERIOD 11	PERIOD 12	
1 – 6	7 – 12	13 – 18	19 – 24	25 – 30	31 – 36	37 – 42	43 – 48	49 – 54	55 – 60	61 – 66	67 – 72	

MODEL SPECIFICATION

LINE NO. (1 – 4)	PLANNING ITEM (5 – 28)	BASE LEVEL (29 – 40)	FREEFORM METHOD OF COMPUTATION (41 – 44)	(45 – 80)
106	CLASS LABORATORIES		HEADING	
107	OTHER		HEADING	

SUMMARY REPORTS

REPORT TITLE (1 – 24)	FREEFORM REPORT LINES (25 – 80)

Figure 3 (Concluded)

EXAMPLE
SPACE NEEDS
RUN

ANALYSIS OF MATRIX
FOR A
12 PERIOD FORECAST

CURRENT DATE

BASE YR. 1971

LINE	DESCRIPTION	BASE	METHOD OF COMPUTATION
1	FTE ENROLLMENT	11450	DATA12371,13330,14258,14949,15493,C 16011,16516,16992,17497,18001,C 18570,18950
2	STUDENT CONTACT HRS-LECT	160586	EQUATION: 16.5L1 * .85
3	AVERAGE SECTION SIZE	35	CONSTANT
4	CLASSROOM HOURS PER WEEK	4588	EQUATION: L2 / L3
5	AVE ROOM UTILIZ RATE	30	CONSTANT
6	AVE STATION OCCUPANCY	65	CONSTANT
7	ASSIGN SQ FT PER STATION	20	CONSTANT
8	NUMBER OF ROOMS REQUIRED		EQUATION: L4 / L5
9	STATION UTILIZATION RATE		EQUATION: L5 * .01L6
10	NUMBER OF STATIONS REQD		EQUATION: L2 / L9
11	ASF-CLASSROOMS		EQUATION: L10 * L7
12	CURRENT NO OF CLASSROOMS	153	CONSTANT
13	CURRENT NO OF STATIONS	8235	CONSTANT
14	CURRENT ASF-CLASSROOMS	164700	CONSTANT
15	ADDITIONAL CLASSROOMS RQ		EQUATION: L8 - L12
16	ADDITIONAL STATIONS REQ		EQUATION: L10 - L13
17	ADDITIONAL ASF-CLASSRMS		EQUATION: L11 - L14
18	SUPPORT/TOT CLSRM ASF	10	CONSTANT

Figure 4

EXAMPLE
SPACE NEEDS
RUN

ANALYSIS OF MATRIX
FOR A
12 PERIOD FORECAST

CURRENT DATE

BASE YR. 1971

LINE	DESCRIPTION	BASE	METHOD OF COMPUTATION
19	SUPPORT ASF REQUIRED		EQUATION: .01L18 * L11
20	CURRENT SUPPORT SPACE	15500	CONSTANT
21	ADDITIONAL SUPPORT ASF		EQUATION: L19 - L20
22	STU CONT HRS LABORATORY	28400	EQUATION: 16.5L1 * .15
23	AVE LAB SECTION SIZE	30	CONSTANT
24	LAB HOURS PER WEEK	947	EQUATION: L22 / L23
25	ROOM UTILIZATION RATE-LB	20	CONSTANT
26	AVERAGE STATION OCCUP	80	CONSTANT
27	STATION UTILIZ RATE		EQUATION: L25 * .01L26
28	ASF/STATION	35	CONSTANT
29	NUMBER OF LABS REQUIRED		EQUATION: L24 / L25
30	NUMBER OF LAB STATIONS		EQUATION: L22 / L27
31	ASF-LABORATORIES		EQUATION: L28 * L30
32	CURRENT NUMBER OF LABS	47	CONSTANT
33	ADDITIONAL LABS REQ		EQUATION: L29 - L32
34	CURRENT LAB STATIONS	1775	CONSTANT
35	ADDITIONAL STATIONS REQ		EQUATION: L30 - L34
36	CURRENT ASF-LABS	52175	CONSTANT
37	ADDITIONAL ASF REQUIRED		EQUATION: L31 - L34

Figure 4 (Continued)

EXAMPLE
SPACE NEEDS
RUN

ANALYSIS OF MATRIX
FOR A
12 PERIOD FORECAST

CURRENT DATE

BASE YR. 1971

LINE	DESCRIPTION	BASE	METHOD OF COMPUTATION
38	SUPPORT/TOTAL LAB ASF	25	CONSTANT
39	LAB SUPPORT SPACE REQ		EQUATION: .01L38 * L31
40	CURRENT LAB SUPPORT SP	13040	CONSTANT
41	ADDITIONAL LAB SUPPORT		EQUATION: L39 - L40
42	FTE FACULTY	541	EQUATION: L1 / 21
43	OFFICE ASF/FTE FACULTY	125	CONSTANT
44	FACULTY OFFICE ASF REQ		EQUATION: L43 * L42
45	CURRENT FACULTY OFF ASF	70000	CONSTANT
46	ADDITIONAL FAC OFF ASF		EQUATION: L44 - L45
47	SERVICE/TOT FAC OFFICE	25	CONSTANT
48	FAC OFF SERVICE SPACE		EQUATION: .01L47 * L44
49	CURRENT FAC OFF SERVICE	14000	CONSTANT
50	ADDITIONAL FAC OFF SERV		EQUATION: L48 - L49
51	LIBRARY READER SP/FTE ST	8	CONSTANT
52	LIBRARY READER SP REQ		EQUATION: L51 * L1
53	CURRENT LIB READER SPACE	85000	CONSTANT
54	ADDITIONAL LIB RDER SP		EQUATION: L52 - L53
55	NUMBER OF LIB VOLUMES	800000	INCREASE 10000 PER YEAR
56	VOLUMES PER SQUARE FOOT	15	CONSTANT

Figure 4 (Continued)

EXAMPLE
SPACE NEEDS
RUN

ANALYSIS OF MATRIX
FOR A
12 PERIOD FORECAST

CURRENT DATE

BASE YR. 1971

LINE	DESCRIPTION	BASE	METHOD OF COMPUTATION
57	LIBRARY STACK SPACE		EQUATION: L55 / L56
58	CURRENT LIB STACK SPACE	40000	CONSTANT
59	ADDITIONAL LIB STACK SP		EQUATION: L57 - L58
60	LIB SERV/READER + STACK	25	CONSTANT
61	LIBRARY SERVICE AREA		EQUATION: .01L60 * (L52 + L57)
62	CURRENT LIB SERV AREA	10500	CONSTANT
63	ADDITIONAL LIB SERV		EQUATION: L61 - L62
64	ADMIN SPACE/FTE STU	5	CONSTANT
65	ADMIN SPACE REQ		EQUATION: L64 * L1
66	CURRENT ADMIN SPACE	54300	CONSTANT
67	ADDITIONAL ADMIN SPACE		EQUATION: L65 - L66
68	OTHER ACAD FACIL/FTE STU	14	CONSTANT
69	OTHER ACAD FACIL REQ		EQUATION: L68 * L1
70	CURR OTHER ACAD FACIL	170000	CONSTANT
71	ADDITIONAL ACAD FACIL		EQUATION: L69 - L70
72	ACADEMIC + GENERAL ASF		SUM OF 11,19,31,39,44,48,52,57,61,65,70
73	MAINTENANCE/ACAD + GEN	7.5	CONSTANT
74	MAINTENANCE SPACE REQ		EQUATION: .01L73 * L72
75	CURRENT MAINT SPACE	66500	CONSTANT

Figure 4 (Continued)

EXAMPLE
SPACE NEEDS
RUN

ANALYSIS OF MATRIX
FOR A
12 PERIOD FORECAST

CURRENT DATE

BASE YR. 1971

LINE	DESCRIPTION	BASE	METHOD OF COMPUTATION
76	ADDITIONAL MAINT SPACE		EQUATION: L74 - L75
77	TOTAL CURRENT SPACE		SUM OF 14,20,36,40,45,49,53,58,62,66,C 70,75
78	TOT SPACE RESOURCE REQ		SUM OF 72,74
79	TOT ADDITIONAL SPACE RQ		SUM OF 17,21,37,41,46,50,54,59,63,67,C 71,76
80	GROSS AREA FACTOR	67	CONSTANT
81	ADDITIONAL GROSS AREA		EQUATION: L79 / .01L80
82	ANNUAL CHANGE GROSS AREA		EQUATION: (L78 - L83) / .01L80
83	WORK LINE		SHIFT L78
84	CONSTRUCTION COST/GR FT	20	PERCENT INCREASE OF: 6
85	EST CAP EXPENDITURES		EQUATION: L84 * L81
86	EST CAP EXPEND(ANNUAL)		EQUATION: L82 * L84
87	MAINTENANCE UNIT COST	1	PERCENT INCREASE OF: 5
88	MAINTENANCE COST CURR SP		EQUATION: L77 * L87
89	MAINT COST TOT ASF REQ		EQUATION: L78 * L87
90	MAINT COST ADDIT SPACE		EQUATION: L79 * L87
91	CLASSRM ASF PCT DEFIC		EQUATION: 100L14 / L11 - 100
92	CLASSRM SERV ASF PCT DEF		EQUATION: 100L20 / L19 - 100
93	LAB SPACE PCT DEFIC		EQUATION: 100L36 / L31 - 100

Figure 4 (Continued)

EXAMPLE
SPACE NEEDS
RUN

ANALYSIS OF MATRIX
FOR A
12 PERIOD FORECAST

CURRENT DATE

BASE YR. 1971

LINE	DESCRIPTION	BASE	METHOD OF COMPUTATION
94	LAB SERVICE PCT DEFIC		EQUATION: 100L40 / L39 - 100
95	FACULTY OFF SP PCT DEFIC		EQUATION: 100L45 / L44 - 100
96	FACULTY OFF SERV PCT DEF		EQUATION: 100L49 / L48 - 100
97	LIB READER SP PCT DEFIC		EQUATION: 100L53 / L52 - 100
98	LIB STACK SP PCT DEFIC		EQUATION: 100L58 / L57 - 100
99	LIB SERV AREA PCT DEFIC		EQUATION: 100L62 / L61 - 100
100	ADMIN SPACE PCT DEFIC		EQUATION: 100L66 / L65 - 100
101	OTHER ACAD AREA PCT DEF		EQUATION: 100L70 / L69 - 100
102	MAINTENANCE SP PCT DEF		EQUATION: 100L75 / L74 - 100
103	TOTAL ASSIG SP PCT DEF		EQUATION: 100L77 / L78 - 100
105	CLASSROOMS		HEADING
106	CLASS LABORATORIES		HEADING
107	OTHER		HEADING

Figure 4 (Continued)

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THE FOLLOWING REPORTS ARE REQUESTED
SPACE DEFICIENCY             91-103
ADDITIONAL SPACE             17,21,37,41,50,54,59,63,67,71,76,79
COST ESTIMATES               85,86,88,89,90
SPACE REQUIREMENTS           105,8,10,11,19,106,29-31,39,107,44,48,52,57,61,C
                             65,69,74,78
INSTRUCTIONAL FACTORS        105,3-7,18,106,23-28,38
OTHER AREA FACTORS           43,47,51,56,60,64,68,73
COST FACTORS                 84,87
```

Figure 4 (Concluded)

EXAMPLE
SPACE NEEDS

SPACE DEFICIENCY

CURRENT DATE
RUN

LINE NO.	PLANNING ITEM	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
91	CLASSRM ASF PCT DEFIC	-7.45	-14.11	-19.70	-23.41	-26.10	-28.49	-30.67	-32.62	-34.56	-36.39	-38.34	-39.58
92	CLASSRM SERV ASF PCT DEF	-12.90	-19.16	-24.43	-27.92	-30.45	-32.70	-34.76	-36.59	-38.42	-40.14	-41.97	-43.14
93	LAB SPACE PCT DEFIC	-22.10	-27.70	-32.41	-35.53	-37.80	-39.81	-41.65	-43.29	-44.92	-46.46	-48.10	-49.15
94	LAB SERVICE PCT DEFIC	-22.12	-27.73	-32.43	-35.55	-37.82	-39.83	-41.67	-43.30	-44.94	-46.48	-48.12	-49.16
95	FACULTY OFF SP PCT DEFIC	-4.94	-11.78	-17.52	-21.33	-24.09	-26.55	-28.80	-30.79	-32.79	-34.67	-36.67	-37.94
96	FACULTY OFF SERV PCT DEF	-23.95	-29.42	-34.02	-37.07	-39.28	-41.24	-43.04	-44.63	-46.23	-47.74	-49.34	-50.35
97	LIB READER SP PCT DEFIC	-14.11	-20.29	-25.48	-28.93	-31.42	-33.64	-35.67	-37.47	-39.28	-40.98	-42.78	-43.93
98	LIB STACK SP PCT DEFIC	-25.93	-26.83	-27.71	-28.57	-29.41	-30.23	-31.03	-31.82	-32.58	-33.33	-34.07	-34.78
99	LIB SERV AREA PCT DEFIC	-72.54	-73.96	-75.21	-76.08	-76.75	-77.35	-77.91	-78.42	-78.93	-79.41	-79.93	-80.28
100	ADMIN SPACE PCT DEFIC	-12.21	-18.53	-23.83	-27.35	-29.90	-32.17	-34.25	-36.09	-37.93	-39.67	-41.52	-42.69
101	OTHER ACAD AREA PCT DEF	-1.84	-8.91	-14.83	-18.77	-21.62	-24.16	-26.48	-28.54	-30.60	-32.54	-34.61	-35.92
102	MAINTENANCE SP PCT DEF	11.59	5.73	0.62	-2.90	-5.52	-7.89	-10.10	-12.08	-14.09	-16.00	-18.06	-19.39
103	TOTAL ASSIG SP PCT DEF	-11.53	-16.17	-20.23	-23.02	-25.09	-26.97	-28.72	-30.29	-31.89	-33.40	-35.03	-36.09

Figure 5

EXAMPLE
SPACE NEEDS

ADDITIONAL SPACE

CURRENT DATE
R.P.

LINE NO.	PLANNING ITEM	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
17	ADDITIONAL ASF-CLASSRMS	13252.19	27045.94	40395.94	50335.59	58160.94	65612.19	72876.38	79723.50	86987.69	94237.56	102422.38	107888.56
21	ADDITIONAL SUPPORT ASF	2295.21	3674.68	5009.59	6003.56	6786.08	7531.21	8257.63	8942.34	9668.76	10393.75	11212.23	11758.84
37	ADDITIONAL ASF REQUIRED	65202.31	70394.44	75418.69	79159.81	82105.06	84909.50	87643.63	90220.69	92954.81	95683.50	98764.13	100821.44
41	ADDITIONAL LAB SUPPORT	3704.32	5002.35	6258.41	7193.70	7930.01	8631.12	9314.65	9958.91	10642.45	11324.62	12094.77	12609.10
50	ADDITIONAL FAC OFF SERV	4409.21	5836.29	7217.24	8245.51	9055.04	9825.87	10577.37	11285.70	12037.18	12787.18	13633.91	14199.38
54	ADDITIONAL LIB RDER SP	13968.00	21640.00	29064.00	34592.00	38944.00	43088.00	47128.00	50936.00	54976.00	59008.00	63560.00	66600.00
59	ADDITIONAL LIB STACK SP	14000.00	14666.66	15333.33	16000.00	16666.66	17333.33	18000.00	18666.66	19333.33	20000.00	20666.66	21333.33
63	ADDITIONAL LIB SERV	27741.99	29826.64	31849.32	33397.99	34652.64	35855.32	37031.99	38150.64	39327.31	40501.98	41806.64	42733.31
67	ADDITIONAL ADMIN SPACE	7555.00	12350.00	16990.00	20445.00	23165.00	25755.00	28280.00	30660.00	33185.00	35705.00	38550.00	40450.00
71	ADDITIONAL ACAD FACIL	3194.00	16620.00	29612.00	39286.00	46902.00	54154.00	61224.00	67888.00	74958.00	82014.00	89980.00	95300.00
76	ADDITIONAL MAINT SPACE	-6906.55	-3605.20	-408.56	1987.69	3887.44	5699.38	7467.44	9137.56	10905.63	12670.25	14654.44	16000.31
79	TOT ADDITIONAL SPACE RQ	152052.55	212798.00	271608.95	315629.00	350475.06	383698.40	416110.57	446712.82	479124.90	511474.59	547880.84	572491.85

Figure 5 (Continued)

EXAMPLE
SPACE NEEDS

COST ESTIMATES

CURRENT DATE
RUN

LINE NO.	PLANNING ITEM	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
85	EST CAP EXPENDITURES	4811213	7137303	9656434	11894752	14000440	16247267	18676896	21253488	24163312	27342464	31046000	34387040
86	EST CAP EXPEND(ANNUAL)	27027568	1587106	1628989	1294361	1087760	1099725	1137445	1138911	1278052	1352169	1611570	1158724
88	MAINTENANCE COST CURR SP	793500	833176	874834	918576	964505	1012730	1063366	1116535	1172361	1230979	1292528	1357154
89	MAINT COST TOT ASF REQ	896882	993896	1096631	1193210	1287625	1386810	1491808	1601766	1721168	1848428	1989491	2123609
90	MAINT COST ADDIT SPACE	159655	234610	314421	383649	447305	514192	585509	659998	743280	833138	937062	1028113

Figure 5 (Continued)

EXAMPLE
SPACE NEEDS

SPACE REQUIREMENTS

CURRENT DATE
RUN

LINE NO. PLANNING ITEM	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
105 CLASSROOMS												
8 NUMBER OF ROOMS REQUIRED	165.24	178.05	190.45	199.68	206.94	213.86	220.61	226.96	233.71	240.44	248.04	253.12
10 NUMBER OF STATIONS REQD	8897.61	9587.35	10254.80	10751.79	11143.05	11515.61	11878.82	12221.18	12584.39	12946.88	13356.12	13629.43
11 ASF-CLASSROOMS	177952.19	191746.94	205095.94	215035.69	222860.94	230312.19	237576.38	244423.50	251687.69	258937.56	267122.38	272588.56
19 SUPPORT ASF REQUIRED	17795.21	19174.68	20509.59	21503.56	22286.08	23031.21	23757.63	24442.34	25168.76	25893.75	26712.23	27258.84
106 CLASS LABORATORIES												
29 NUMBER OF LABS REQUIRED	51.03	54.99	58.81	61.66	63.91	66.05	68.13	70.09	72.18	74.25	76.60	78.17
30 NUMBER OF LAB STATIONS	1913.64	2061.98	2205.53	2312.42	2396.57	2476.70	2554.82	2628.45	2706.57	2784.53	2872.55	2931.33
31 ASF-LABORATORIES	66977.31	72169.44	77193.69	80934.81	83880.06	86684.50	89418.63	91995.69	94729.81	97458.50	100539.13	102596.44
39 LAB SUPPORT SPACE REQ	16744.32	18042.35	19298.41	20233.70	20970.01	21671.12	22354.65	22998.91	23682.45	24364.62	25134.77	25649.10
107 OTHER												
44 FACULTY OFFICE ASF REQ	73636.88	79345.19	84869.00	88982.06	92220.19	95303.50	98309.50	101142.81	104148.75	107148.75	110535.69	112797.56
48 FAC OFF SERVICE SPACE	18409.21	19836.29	21217.24	22245.51	23055.04	23825.87	24577.37	25285.70	20037.18	26787.18	27633.91	28199.38
52 LIBRARY READER SP REQ	98968.00	106640.00	114064.00	119592.00	123944.00	128088.00	132128.00	135936.00	139976.00	144008.00	148560.00	151600.00
57 LIBRARY STACK SPACE	54000.00	54666.66	55333.33	56000.00	56666.66	57333.33	58000.00	58666.66	59333.33	60000.00	60666.66	61333.33

Figure 5 (Continued)

EXAMPLE
SPACE NEEDS

SPACE REQUIREMENTS

CURRENT DATE
RUN

LINE NO.	PLANNING ITEM	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
61	LIBRARY SERVICE AREA	38241.99	40326.64	42349.32	43897.99	45152.64	46355.32	47531.99	48650.64	49827.31	51001.98	52306.64	53233.31
65	ADMIN SPACE REQ	61855.00	66650.00	71290.00	74745.00	77465.00	80055.00	82580.00	84960.00	87485.00	90005.00	92850.00	94750.00
69	OTHER ACAD FACIL REQ	173194.00	186620.00	199612.00	209286.00	216902.00	224154.00	231224.00	237888.00	244958.00	252014.00	259980.00	265300.00
74	MAINTENANCE SPACE REQ	59593.45	62894.80	66091.44	68487.69	70387.44	72199.38	73967.44	75637.56	77405.63	79170.25	81154.44	82500.31
78	TOT SPACE RESOURCE REQ	854174	901493	947312	981658	1008888	1034859	1060202	1084140	1109482	1134776	1163216	1182507

Figure 5 (Continued)

EXAMPLE SPACE NEEDS — INSTRUCTIONAL FACTORS — CURRENT DATE RUN

LINE NO.	PLANNING ITEM	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
105	CLASSROOMS												
3	AVERAGE SECTION SIZE	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
4	CLASSROOM HOURS PER WEEK	4957.23	5341.52	5713.38	5990.27	6208.27	6415.83	6618.20	6808.93	7011.29	7213.25	7441.26	7593.53
5	AVE ROOM UTILIZ RATE	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
6	AVE STATION OCCUPANCY	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00
7	ASSIGN SQ FT PER STATION	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
18	SUPPORT/TOT CLSRM ASF	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
106	CLASS LABORATORIES												
23	AVE LAB SECTION SIZE	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
24	LAB HOURS PER WEEK	1020.61	1099.72	1176.28	1233.29	1278.17	1320.91	1362.57	1401.84	1443.50	1485.08	1532.02	1563.37
25	ROOM UTILIZATION RATE-LB	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
26	AVERAGE STATION OCCUP	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00
27	STATION UTILIZ RATE	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
28	ASF/STATION	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
38	SUPPORT/TOTAL LAB ASF	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00

Figure 5 (Continued)

EXAMPLE
SPACE NEEDS

OTHER AREA FACTORS

CURRENT DATE
RUN

LINE NO.	PLANNING ITEM	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
43	OFFICE ASF/FTE FACULTY	125.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00
47	SERVICE/TOT FAC OFFICE	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
51	LIBRARY READER SP/FTE ST	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
56	VOLUMES PER SQUARE FOOT	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
60	LIB SERV/READER + STACK	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
64	ADMIN SPACE/FTE STU	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
68	OTHER ACAD FACIL/FTE STU	14.00	14.00	14.00	14.00	14.00	14.00	16.00	14.00	14.00	14.00	14.00	14.00
73	MAINTENANCE/ACAD + GEN	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50

Figure 5 (Continued)

EXAMPLE
SPACE NEEDS

COST FACTORS

CURRENT DATE
RUN

LINE NO.	PLANNING ITEM	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
84	CONSTRUCTION COST/GR FT	21.20	22.47	23.82	25.25	26.76	28.37	30.07	31.88	33.79	35.82	37.97	40.24
87	MAINTENANCE UNIT COST	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55	1.63	1.71	1.80

Figure 5 (Concluded)

DATA COLLECTION DOCUMENT
SPACE RESOURCE REQUIREMENTS PROJECTION

No.	Item	Current Value
1	Average Section Size: Lecture	
2	Average Room Utilization Rate: Classrooms	
3	Average Station Occupancy Ratio: Classrooms	
4	Assignable Square Feet per Station: Classroom	
5	Number of Classrooms	
6	Number of Stations: Classrooms	
7	Assignable Square Feet: Classrooms	
8	Classroom Support Space	
9	Ratio of Classroom Support Space to Classroom Space	
10	Average Laboratory Section Size	
11	Room Utilization Rate: Class Laboratories	
12	Average Station Occupancy Ratio: Class Laboratories	
13	Assignable Square Feet per Station: Class Laboratories	
14	Number of Class Laboratories	
15	Number of Stations: Laboratories	
16	Assignable Square Feet: Laboratories	
17	Laboratory Support Space	
18	Ratio of Laboratory Support Space to Laboratory Space	
19	FTE Faculty	
20	Faculty Office Space	
21	Office Assignable Square Feet per FTE Faculty	
22	Faculty Office Service Space	

Figure 6

DATA COLLECTION DOCUMENT
SPACE RESOURCE REQUIREMENTS PROJECTION (Cont'd)

No.	Item	Current Value
23	Ratio of Faculty Office Service Space to Faculty Office Space	________
24	FTE Students	________
25	Library Reader Space	________
26	Library Reader Space per FTE Student	________
27	Library Volumes	________
28	Library Stack Space	________
29	Volumes per Square Foot	________
30	Library Service Area	________
31	Ratio of Library Service Area to Total of Reader and Stack Space	________
32	Administrative Space	________
33	Administrative Space per FTE Student	________
34	Other Academic Facilities	________
35	Other Academic Facilities per FTE Student	________
36	Maintenance Space	________
37	Ratio of Maintenance Space to Academic and General	________
38	Maintenance Costs	________
39	Maintenance Costs per Assignable Square Foot	________

Figure 6 (Concluded)

DATA COLLECTION DOCUMENT
SPACE RESOURCE REQUIREMENTS PROJECTION

SAMPLE

No.	Item	Current Value
1	Average Section Size: Lecture	35
2	Average Room Utilization Rate: Classrooms	30
3	Average Station Occupancy Ratio: Classrooms	65
4	Assignable Square Feet per Station: Classroom	20
5	Number of Classrooms	153
6	Number of Stations: Classrooms	8235
7	Assignable Square Feet: Classrooms	164700
8	Classroom Support Space	15500
9	Ratio of Classroom Support Space to Classroom Space	10
10	Average Laboratory Section Size	30
11	Room Utilization Rate: Class Laboratories	20
12	Average Station Occupancy Ratio: Class Laboratories	80
13	Assignable Square Feet per Station: Class Laboratories	35
14	Number of Class Laboratories	47
15	Number of Stations: Laboratories	1775
16	Assignable Square Feet: Laboratories	52175
17	Laboratory Support Space	13040
18	Ratio of Laboratory Support Space to Laboratory Space	25
19	FTE Faculty	541
20	Faculty Office Space	70000
21	Office Assignable Square Feet per FTE Faculty	125
22	Faculty Office Service Space	14000

Figure 7

DATA COLLECTION DOCUMENT
SPACE RESOURCE REQUIREMENTS PROJECTION (Cont'd.)

SAMPLE

No.	Item	Current Value
23	Ratio of Faculty Office Service Space to Faculty Office Space	25
24	FTE Students	x x
25	Library Reader Space	85000
26	Library Reader Space per FTE Student	8
27	Library Volumes	800000
23	Library Stack Space	40000
29	Volumes Per Square Foot	15
30	Library Service Area	10500
31	Ratio of Library Service Area to Total of Reader and Stack Space	25
32	Administrative Space	54300
33	Administrative Space per FTE Student	5
34	Other Academic Facilities	170000
35	Other Academic Facilities per FTE Student	14
36	Maintenance Space	66500
37	Ratio of Maintenance Space to Academic and General	7.5
38	Maintenance Costs	732690
39	Maintenance Costs per Assignable Square Foot	1

Figure 7 (Concluded)

PLAN REFINING CYCLE

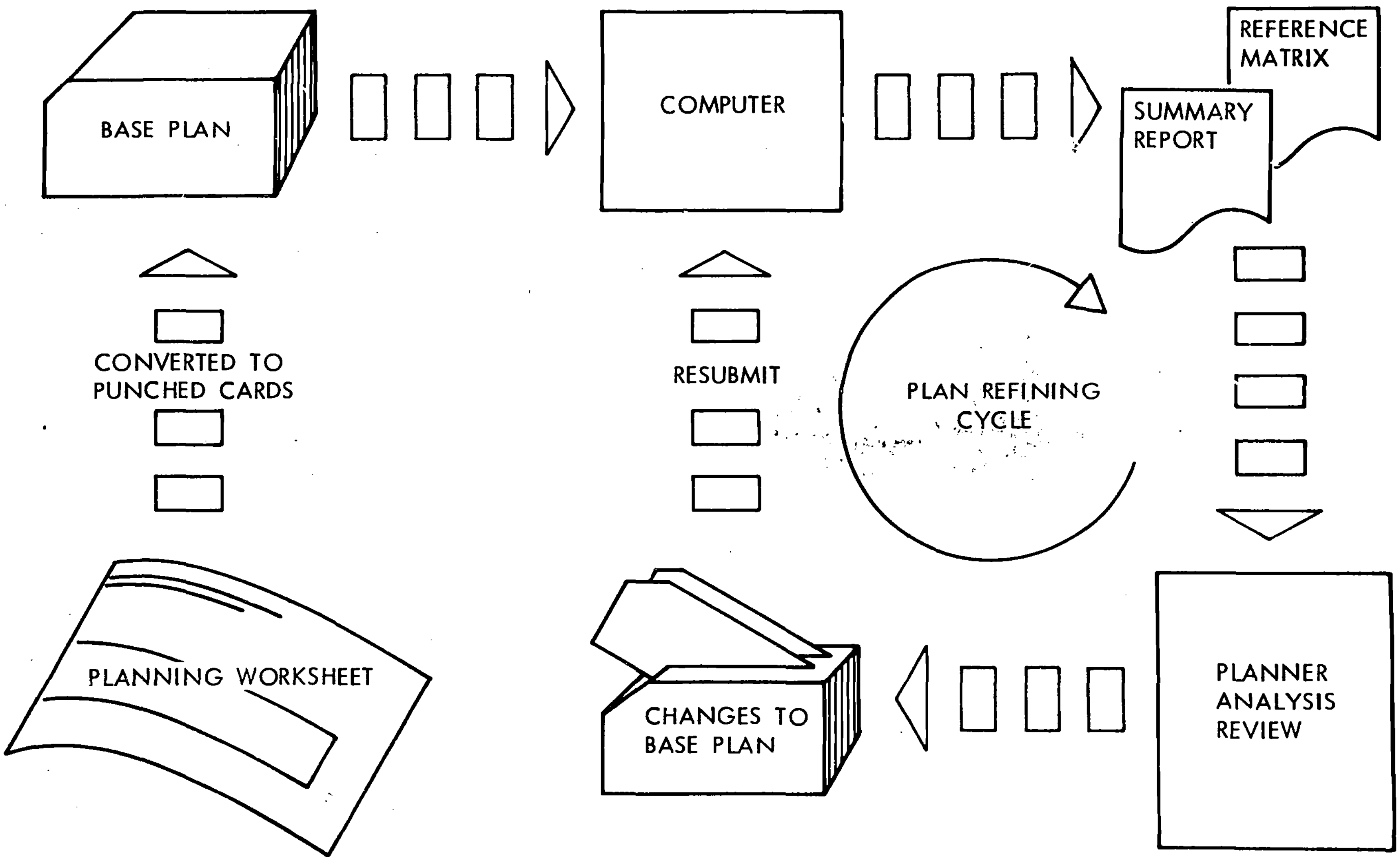

Figure 8

world situation. For example, it may turn out that the utilization factors are not useful in projecting space needs. In that case the structure of the model needs to be changed.

The second type of change is the result of the application of informed judgment. Projections which seem unrealistic to the decision makers will often need to be adjusted so that they more realistically reflect the actual or implied policy constraints. A wide range of values can be used for the many factors involved in space projections.

III. Program Cost Analysis

A. Relation to Overall Planning

Before the planner brings all his analysis and projections together, he has a final task. He needs to develop a method of analyzing the costs of each department or program represented in his overall resource requirements. Such a procedure is needed so that key decision makers will have some rational basis for deciding which departments/programs are to receive emphasis, which will be de-emphasized, and which will remain at current levels. The cost of these programs is a critical factor in such decisions.

Such an activity involves looking at historic information on program cost and then projecting future levels of cost for the department/program concerned. Since this is often difficult to work with, the planner also needs some structured method for decision makers to use in evaluating the future program development.

B. Theory of Program Cost Analysis

The fact that most institutions of higher education are in a state of financial crisis has been painfully clear for some time. That crisis is resulting in a need for the individual institutions to examine the problem of allocation of scarce resources.

The problem is complicated by trends and events within higher education, and within the economy in general, which require the institutions of higher learning to operate more effectively than they have in the past. While the specific problems are different in the public and private sectors, the ultimate problem is the same--how to best utilize the institutional resources. Cost analysis is one way to examine the institution's operation to a significant level of detail.

Cost analysis is a powerful, but often misused technique. This misuse stems from its very power, for it gives superficially simple, quantitative "answers" to highly complex problems, whose sources and repercussions are often subtle and not fully understood. To use the results of cost analysis most wisely in educational planning, it is necessary to know how to structure, conduct, and interpret the analysis.

The goal of cost analysis is not to provide the educational planner with the alternative that "maximizes" or "minimizes" specific characteristics. The goal is to provide information, which, together with the judgement of educational planners, permits a rational selection of alternatives. The range of alternatives is a function of environmental constraints, such as budget level academic policy, and political atmosphere.

The result of such an approach will be estimated measures or indicators of resource requirements, with ranked aspects of effectiveness projected over the time period of interest for each program/department and for alternative futures.

The display of this information, along with supporting, subjective judgements and explanations, provides educational planners with the means of making informed decisions. This carefully designed display and explanatory presentation is a significant part of cost analysis. Only in such a way can the educational planner guard against the indiscriminate use of a single cost effectiveness "number" so far removed from its limitations that it is not only useless, but dangerous.

Basically the examination of costs on a program/department level might be broken into three phases. The first phase involves obtaining some historic information--where the institution has been, in terms of the faculty, students, and expenses on an individual program/department basis. This information is needed to identify trends and the associated changes of that program/department as it relates to the overall operation of the institution.

The trends and changes might logically be derived in terms of cost in dollars per student credit hour. These values, which reflect how much it costs to teach a student one credit hour of any subject, are needed as the basis for an examination of costs on a program/department level. There are obviously reasons why, for example, it costs more to teach physics courses than to teach history courses, but the costs should be expressed in a common way.

Once cost values have been derived for each program/department, the second phase begins--consisting of comparing these values, both between programs/departments and against some objective evaluation criteria for decision making. These criteria should be similar to those used in making the decision as to whether a new program/department should be initiated.

With the information as to the cost per student credit hour of various programs/departments and the evaluation criteria, the decision as to which programs/departments are to receive more future emphasis and which are to receive less emphasis can be made more objectively.

The realities of incorporating such a procedure require a time phasing of the expansion of certain areas and the contraction or even elimination of others. Expansion might require time to develop resources, while contraction requires considerations of personnel and other resources which may not permit immediate action.

The systematic approach mentioned above uses as the prime component the educational plan of the institution. That educational plan affects the organizational structure and penetrates the facilities and financial components to identify possible changes that might enhance educational development. Second, and of immediate importance, it aids in the identification of program emphasis. Obviously, in order to survive, higher education is going to have to take a much closer look at its operation. That survival is going to be aided by asking some direct questions--questions about costs, and where the money goes.

This approach will culminate in the third phase, which consists of the establishment of a hierarchy of needs, problems, and deficiencies. From this hierarchy, objectives will be measured against the current status of the institution. The needs, problems, and deficiencies will be identified and ranked according to the order in which they are to be alleviated in the effort to reach the institution-wide objectives.

C. Techniques of Cost Analysis

While there are a number of cost analysis methods, they generally are of two types. They either deal with total expenditures for a function or program or with unit costs for a function. Both of these forms of analysis are valuable and neither is necessarily superior to the other. Each has its own strengths and weaknesses and each is designed to answer certain questions.

1. Total expenditures: In this technique the planner aggregates all the expenditure items for a certain function or brings together all similar expenditure items. For example, he may bring together all the expenditures made by the English department for a specified time period. Or he can aggregate faculty salary expenditures across all departments. Both of these total expenditure items provide useful information about the institution. In the one case he knows the total dollar amount of resources allocated to the English department and in the other the total resources allocated to instructional salaries. The planner can subject this aggregate expenditure figure to a number of analyses the most common of which are time series analysis and proportional analysis.

a. Time series analysis: In the time series analysis the planner will attempt to determine if the variation in the level of expenditures can be correlated with variation in time periods or other independent variables. He may be able to isolate a trend in total faculty salary expenditures which is related to time. This can be used to project future faculty salary expenditures. This is a familiar type of analysis to anyone who has tried to look at the future from the past. The section on enrollment projections of Volume I made extensive use of this kind of analysis.

b. Proportional analysis: A proportional analysis is simply looking at the aggregate cost as an element of a larger aggregate. For example, the planner might calculate the share of total expenditures accounted for by the English department expenditures. This single point value could be used to estimate future expenditure levels for the department given future total expenditures. This statistic could be computed for a time series and subjected to trend analysis again with the objective of projecting future shares and thus departmental expenditures.

These aggregates and their analyses provide useful information in a form easily understood by most decision makers. The results of analysis may assist decision makers in forming decisions. More typically this type of expenditure analysis is more useful in displaying to decision makers some of the implications of their decisions rather than assisting in framing the decisions. Budget decisions are rarely made on the basis of a department's share of total expenditures. Such an approach has several flaws and could lead to an ineffective budgeting/planning effort.

2. Unit cost analysis: In addition to aggregate expenditures, the planner can elect to analyze unit costs. The objective of this analysis is to determine how much it costs to produce a unit of output. There are two key considerations involved in this type of analysis: selection of the unit of output and selection of the costs to be included.

a. Unit of output: With regard to educational programs, most planners will select from three different units of output: full-time equivalent (FTE) student, student credit hour, and degree winner.

b. Full-time equivalent (FTE) student: If a planner is using the full-time equivalent student as his unit of output, he simply divides the appropriate expenditures by the number of FTE students. These can be either actual or projected as can the expenditure figure. The resulting statistic is the average amount of resources required to provide educational services to one full-time equivalent student. Since the definition of full-time equivalent student and the selection of appropriate expenditures will vary from college to college, expenditures per FTE student must be used with caution to compare institutions although this is probably its most frequent use. If the statistic is to be used in this way, care must be taken to insure that common definitions of full-time equivalency and categories of expenditure are used.

c. Student credit hour: The second type of unit of production is the student credit hour. This statistic has been used throughout this manual and Volume I. It is the number of credits carried by a course times the enrollment of a course. It can be aggregated to the course level, department, or larger unit. If the planner can develop expenditure aggregations which correspond to the student credit hour aggregations, he can produce expenditures per student credit hour.

For example, if he can determine the number of student credit hours produced by the English department and if he can determine the expenditures allocated to the English department, he can easily develop the cost of producing one student credit hour in English by dividing the expenditures by the student credit hour total. This can be done on a course-by-course basis; it can be done by level of course, by departments, by schools, by university, and all of these over a number of time periods. The only requirement is that the expenditure aggregation and the student credit hour aggregation must be comparable.

This unit cost measure is typically used to make comparisons among academic departments. It brings together a measure of productivity (student credit hour) and the resources consumed by the department (total departmental expenditures). The result is a ratio of input-output for the particular department which may be compared with a similarly calculated ratio for other departments.

Interpretation of such comparisons should be made with care since the input/output ratio can mask other important aspects. For example, a department with a low ratio, i.e., a low unit cost in comparison with other departments, may have one or more of the following characteristics:

(1.) The department may have a high student credit hour production because the college's curriculum forces large numbers of students to take courses in this department.

(2.) The department may be very weak and underfunded which results in a low unit cost in comparison with other more adequately funded departments.

(3.) The department may offer instruction which is by nature less expensive than that offered by other departments.

All three of these "causes" are possible and do occur. It is clear that each will suggest a different interpretation of the data and will point toward different policy options.

d. Degree winner: A third unit is the degree winner. In this method the planner is seeking to price out a degree. Instead of asking how much does the English department cost or how much does an English student credit hour cost, he wants to know how much a degree in English costs. Since an English major (as does any major) takes the bulk of his academic work outside the department of his major, he cannot take the costs of the

English department and divide it by the number of degrees in English produced. Rather the program of the English major is viewed as consisting of student credit hours drawn from the English department and a wide assortment of other departments. (The discussion of the Induced Course Load Matrix in Volume I presents the rationale and methodology behind this.)

Once the student credit hour profile of an English major is established, the cost of the degree can be developed by multiplying the student credit hours by their appropriate costs and aggregating the results. This process is repeated for each major so that the planner ends with an estimate of the cost of producing all the degrees available at the college. This figure can be used to compare the cost of academic programs and is often more useful that the departmentally constrained student credit hour unit cost. The expense and effort involved in developing degree winner costs is appropriately higher than that of the student credit hour unit. The planner will have to determine whether the gain in precision is worth the increase in cost and effort.

e. Costs: Once the planner has selected the type of output unit he will use in his analysis, he must determine the categories of expense he will use to develop his unit cost statistic. A pragmatic approach to this problem is recommended. In general, the planner should use the expenditure information which is easily available to him. If all direct costs are specifically allocated to the departments, then this figure should be used.

In other cases where some "direct" costs are not charged to individual departments, it may not be worthwhile to determine a method for allocating these charges unless the planner feels they will be significantly large. Methods which allocate these charges on the basis of student credit hour will not affect the relative positions of unit measures all departments.

Indirect costs pose a similar problem. If the planner feels the inclusion of these costs will add value beyond the effort involved in obtaining a departmental allocation, he should implement such a procedure. Otherwise, he will be satisfied with the information he can easily and directly bring to bear on the problem.

D. Micro-Model

1. Historic analysis: The vehicle for depicting and computing historic information is the worksheet shown in Figure 9. The actual data elements consist of Lines 1, 2, 8, 10, 11, and 18. A description of these data elements and their probable sources follows:

HISTORIC ANALYSIS

INSTRUCTIONAL UNIT COST AND ITS DETERMINANTS

Program/Department ____________________

No.	Item	Source	Academic Year Beginning In: 65	66	67	68	69	70	71
* 1	Average Credits/Section	Input.							
* 2	Registrations	Input.							
3	Student Credit Hours	Line 1 x Line 2.							
4	Previous Period's Student Credit Hours	Shift Line 3 to the Right 1 Year.							
5	Change in Student Credit Hours	Line 3 - Line 4.							
6	Percent Change in Student Credit Hours	Line 5 ÷ Line 4 x 100.							
7	Accumulated Percent Change in Student	Accumulate the Values in Line 6.							
* 8	Time Periods	Input.							
9	Moving Average of Percent Change in Student Credit Hours	Line 7 ÷ Line 8.							
*10	FTE Faculty	Input.							
*11	Total Salaries	Input.							
12	Average Salary	Line 11 ÷ Line 10.							
13	Previous Period's Average Salary	Shift Line 12 to the Right 1 Year.							
14	Change in Average Salary	Line 12 - Line 13.							
15	Percent Change in Average Salary	Line 14 ÷ Line 13 x 100.							
16	Accumulated Percent Change in Average Salary	Accumulate the Values in Line 15.							

* These input items are defined and their possible sources are included in the test of this cost analysis material.

Figure 9

HISTORIC ANALYSIS (Continued)

Program/Department ____________________

No.	Item	Source	Academic Year Beginning In: 65	66	67	68	69	70	71
17	Moving Average of Percent Change in Average Salary	Line 16 ÷ Line 8.	___	___	___	___	___	___	___
*18	Support Budget	Input.	___	___	___	___	___	___	___
19	Total Expense	Line 11 + Line 18.	___	___	___	___	___	___	___
20	Support as Percent of Salaries	Line 18 ÷ Line 11 x 100.	___	___	___	___	___	___	___
21	Previous Period's Support as Percent of Salaries	Shift Line 20 To the Right 1 Year.	___	___	___	___	___	___	___
22	Change in Support as Percent of Salaries	Line 20 - Line 21.	___	___	___	___	___	___	___
23	Percent Change in Support as Percent of Salaries	Line 22 ÷ Line 21 x 100.	___	___	___	___	___	___	___
24	Accumulated Percent Change in Support as Percent of Salaries	Accumulate the Values in Line 23.	___	___	___	___	___	___	___
25	Moving Average of Percent Change in Support as Percent of Salaries	Line 24 ÷ Line 8.	___	___	___	___	___	___	___
26	Student Credit Hours per FTE Faculty	Line 3 ÷ Line 10.	___	___	___	___	___	___	___
27	Previous Period's Student Credit Hours per FTE Faculty	Shift Line 26 To the Right 1 Year.	___	___	___	___	___	___	___
28	Change in Student Credit Hours per FTE Faculty	Line 26 - Line 27.	___	___	___	___	___	___	___
29	Percent Change in Student Credit Hours per FTE Faculty	Line 28 ÷ Line 27 x 100.	___	___	___	___	___	___	___

Figure 9 (Continued)

Program/Department ____________________

No.	Item	Source	65	66	67	68	69	70	71
			Academic Year Beginning In:						
30	Accumulated Percent Change in Student Credit Hours per FTE Faculty	Accumulate the Values in Line 29.	___	___	___	___	___	___	___
31	Moving Average of Percent Change in Student Credit Hours per FTE Faculty	Line 30 ÷ Line 8.	___	___	___	___	___	___	___
32	Total Expense per Student Credit Hour	Line 19 ÷ Line 3.	___	___	___	___	___	___	___
33	Salaries per Student Credit Hour	Line 11 ÷ Line 3.	___	___	___	___	___	___	___

Figure 9 (Concluded)

Line 1--average credits/section: This item consists of the total number of credit hours offered divided by the number of credit sections. While this may vary from program/department to program/department, the number for a given program/department remains fairly constant. For a program/department which offers only 3-hr. courses, the average credits/section is three. These data will normally be available from the Registrar.

Line 2--registrations: This item consists of the total duplicated number of students enrolled in courses. For example, if a department offered four courses, the registrations would be equal to the total number of students enrolled.

Course A	50 Students
Course B	23 Students
Course C	30 Students
Course D	70 Students
Total	173 Registrations

These data are obtained from the Registrar.

Line 3--student credit hour: This item is a unit of instructional output which is calculated by multiplying the registrations by the average credits per section.

Line 4--time periods: These are used to compute the moving averages and will correspond to the extent of the time period being analyzed. For a 10-year analysis, these will be 0 through 9. For a 5-year analysis, they would be 0 through 4, etc.

Line 10--full time equivalent (FTE) faculty: This item consists of full-time plus part-time faculty expressed in equivalent terms. The traditional method for computing the full-time equivalents of part-time faculty is to divide the teaching load of a part-time faculty by the "individual" full-time load. For example, a faculty member teaching 6 credit hours at an institution where the normal full-time load is 12 credits is described as 0.5 FTE faculty member. This information will usually be available from the Registrar or the Academic Dean.

Line 11--total salaries: This item consists of the total amount paid to academic staff at the level of program/department being analyzed. This information will usually be available from the business office.

Line 18--support budget: This item is a category for all non-salary expenses. This will also be available from the business office. The various components of this category could be broken out and analyzed separately.

As we stated earlier, there are six input data elements: average credits/section, registrations, time periods, FTE faculty, total salaries, and support budget. The remaining entries are all computations. Developing the historic analysis would require obtaining and inserting the input data elements, and, following the instructions in the "source" column, making the indicated calculations.

2. Projection: The development of the educational plan for an institution begins with a review, on an individual program/department level, of the historic analysis and the evaluation team ranking.

We have suggested that the trends identified in the historic analysis phase be extended to provide a baseline for alternatives. That is often informative, and aids in developing meaningful alternatives. It is accomplished on an individual program/department level by using the historic analysis, the projection worksheet (Figure 10) and by computation as follows:

a. Take the last value in Line 3 of the historic analysis, change it by the percent reflected in the last value in Line 9, and insert the changed values into Line 3 of the projection worksheet.

b. Take the last value in Line 26 of the historic analysis, change it by the percent reflected in the last value in Line 31, and insert the changed values into Line 4 of the projection worksheet.

c. Take the last value in Line 12 of the historic analysis, change it by the percent reflected in the last value in Line 17, and insert the changed values in Line 6 of the projection worksheet.

d. Take the last value in Line 20 of the historic analysis, change it by the percent reflected in the last value in Line 25, and insert the changed values into Line 8 of the projection worksheet.

(If it is desirable to use average credits per section and registrations as a means to develop student credit hours, Lines 1 and 2 of the projection worksheet are input, and Line 3 is computed by multiplying Line 1 times Line 2.)

From this baseline data, alternatives may be developed by manipulating Lines 3, 4, 6, and 7 of the projection worksheet. Once a reasonable alternative is developed for each program/department, the most important individual program/department items, such as Line 3 (Student Credit Hours), Line 5 (FTE Faculty), Line 7 (Salaries), Line 9 (Support Budget), and Line 10 (Total Expense) may be summed for the entire institution.

PROJECTION

RESOURCE REQUIREMENTS

Program/Department ____________________

No.	Item	Sources	Base 71	72	73	74	75	76	77	78	79	80
*1	Average Credits/Section	(Change By ________.)	____	____	____	____	____	____	____	____	____	____
**2	Registrations	(Change By ________.)	____	____	____	____	____	____	____	____	____	____
*3	Student Credit Hours	Change By________.	____	____	____	____	____	____	____	____	____	____
*4	Student Credit Hours per FTE Faculty	Change By________.	____	____	____	____	____	____	____	____	____	____
5	FTE Faculty	Line 3 ÷ Line 4.	____	____	____	____	____	____	____	____	____	____
*6	Average Faculty Salary	Change By________.	____	____	____	____	____	____	____	____	____	____
7	Salaries	Line 5 x Line 6.	____	____	____	____	____	____	____	____	____	____
*8	Support Budget Ratio	Change By________.	____	____	____	____	____	____	____	____	____	____
9	Support Budget	Line 8 x Line 7.	____	____	____	____	____	____	____	____	____	____
10	Total Expense	Line 7 + Line 9.	____	____	____	____	____	____	____	____	____	____
11	Total Expense per Student Credit Hour	Line 10 ÷ Line 3.	____	____	____	____	____	____	____	____	____	____
12	Salaries per Student Credit Hour	Line 7 ÷ Line 3.	____	____	____	____	____	____	____	____	____	____

(Columns 72–80: Academic Year Beginning In:)

* If these items are to be projected, Line 3 is computed by multiplying Line 1 x Line 2.

** These item values, and their associated base value, may be derived from the historic analysis or from estimates of the planners.

Figure 10

A review of the impact of the selected alternatives will logically result in modifications to individual programs/departments. These changes are incorporated and the revised overall institution values computed.

The overall totaling will vary broadly from institution to institution. This is due to the broad range of programs/departments involved, and also, to what particular items the institution desires to use for developing totals. Since it is a straightforward procedure, we are not going into detail on that effort.

The individual program/department projections can, as the historic analysis, be performed manually. The input items, and the means of computing the other items is shown in the source column of Figure 9.

E. Case Study

The HELP/PLANTRAN System could be logically applied to accomplish the analysis and projection. Figures 11 and 14 show the system input. Figures 12 and 15 show the "Analysis of Planning Matrix." and Figures 13 and 16 show the summary report output. Using HELP/PLANTRAN, the totaling to provide overall institution impact would be accomplished by having each program/department in an individual module, and incorporating these modules into a large model. The desired totals would be computed through use of the summary instruction.

The advantage in using a mechanical means for developing both the individual program/department modules and the overall model is the ease in making modifications. The educational plan must be flexible. Use of the planning system provides an on-going flexibility to accommodate change into the institution's operation. That change is certain to occur, and the responsiveness of the planning tool can aid in making accurate and timely decisions.

F. Data Collection

Figure 17 is a copy of a data collection document for the historic analysis of program costs. Figure 18 is a sample of a completed data collection document which conforms to the data used in the case study. The planner should review section D carefully before completing the document. One document should be completed for each program/department to be analyzed.

No single data collection document, just as no single model, will be appropriate for every institution. The planner should modify the data collection specifications rather than modify the data to fit the document or not collect data at all. To the greatest extent possible input and output from the model should resemble the operational data of the institution with which the decision makers are familiar.

NAME ____________

PLANTRAN II DATA SHEET

PAGE 1 OF 2 MRI

IDENTIFICATION

ORGANIZATION	MODEL DESCRIPTION	DATE	BASE PERIOD	T	H	R	RUN NO.
EXAMPLE	UNIT COST	CURRENT DATE	1965	T			

T - TIME PERIOD
H - HEADING
R - REPLACEMENT

COLUMNAR HEADINGS - OPTIONAL

PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	PERIOD 5	PERIOD 6	PERIOD 7	PERIOD 8	PERIOD 9	PERIOD 10	PERIOD 11	PERIOD 12

MODEL SPECIFICATION

LINE NO.	PLANNING ITEM	BASE LEVEL	FREEFORM METHOD OF COMPUTATION
1	AVE CREDITS/SECTION	3	CONSTANT
2	REGISTRATIONS	945	DATA 1026, 997, 1066, 958, 756, 753
3	STUDENT CREDIT HOURS-SCH	2835	EQUATION: L1*L2
4	PREVIOUS PERIODS SCH		SHIFT L3
5	CHANGE IN STUD CREDIT HR		EQUATION: L3-L4
6	PCT CHG IN SCH		EQUATION: L5/L4*100
7	AVE PCT CHG IN SCH		AVERAGE OF LINE 6
8	FTE FACULTY	5	DATA 5, 5, 5, 5, 4, 4
9	TOTAL SALARIES	51000	DATA 53750, 57250, 62300, 66570, 57300, C
			60000
10	AVERAGE SALARY	10200	EQUATION: L9/L8
11	PREVIOUS PERIOD AVE SAL		SHIFT L10
12	CHANGE IN AVE SALARY		EQUATION: L10-L11
13	PCT CHANGE IN AVE SAL		EQUATION: L12/L11*100
14	AVE PCT CHG IN AVE SAL		AVERAGE OF LINE 13
15	SUPPORT BUDGET	800	DATA 800, 950, 1030, 1000, 900, 900
16	TOTAL EXPENSE	51800	SUM OF 9, 15
17	SUP BUD/SALARIES X 100	1.58	EQUATION: L15/L9*100

SUMMARY REPORTS

REPORT TITLE	FREEFORM REPORT LINES

Figure 11

PLANTRAN II DATA SHEET

NAME ____________ PAGE 2 OF 2 MRI

IDENTIFICATION

ORGANIZATION (1–24)	MODEL DESCRIPTION (25–40)	DATE (41–56)	BASE PERIOD (57–60)	T (61)	H (63)	R (65)	T - TIME PERIOD, H - HEADING, R - REPLACEMENT	RUN NO. (78–80)

COLUMNAR HEADINGS - OPTIONAL

PERIOD 1 (1–6)	PERIOD 2 (7–12)	PERIOD 3 (13–18)	PERIOD 4 (19–24)	PERIOD 5 (25–30)	PERIOD 6 (31–36)	PERIOD 7 (37–42)	PERIOD 8 (43–48)	PERIOD 9 (49–54)	PERIOD 10 (55–60)	PERIOD 11 (61–66)	PERIOD 12 (67–72)

MODEL SPECIFICATION

LINE NO. (1–4)	PLANNING ITEM (5–28)	BASE LEVEL (29–40)	FREEFORM METHOD OF COMPUTATION (41–80)
18	PREVIOUS PERIODS RATIO		SHIFT L17
19	CHANGE IN RATIO		EQUATION: L17-L18
20	PCT CHANGE IN RATIO		EQUATION: L19 / L18 * 100
21	AVE PCT CHANGE IN RATIO		AVERAGE LINE 20
22	SCH PER FTE FACULTY	567	EQUATION: L3/L8
23	PREV PERIODS SCH/FTE FAC		SHIFT L22
24	CHG IN SCH/FTE FACULTY		EQUATION: L22-L23
25	PCT CHG IN SCH/FTE FAC		EQUATION: L24/L23 *100
26	AVE PCT CHG IN SCH/FTE		AVERAGE LINE 25
27	TOTAL EXPENSES PER SCH		EQUATION: L16/L3
28	SALARIES PER SCH		EQUATION: L9/L3
29			

SUMMARY REPORTS

REPORT TITLE (1–24)	FREEFORM REPORT LINES (25–80)
ENGLISH DEPARTMENT	1-3, 7, 29, 8, 10, 14, 29, 9, 15, 16, 29, 22, 26-28

Figure 12

EXAMPLE
UNIT COST
RUN

ANALYSIS OF MATRIX
FOR A
6 PERIOD FORECAST

CURRENT DATE

BASE YR. 1965

LINE	DESCRIPTION	BASE	METHOD OF COMPUTATION
1	AVE CREDITS/SECTION	3	CONSTANT
2	REGISTRATIONS	945	DATA1026,997,1066,958,756,753
3	STUDENT CREDIT HOURS-SCH	2835	EQUATION: L1 * L2
4	PREVIOUS PERIODS SCH		SHIFT L3
5	CHANGE IN STUD CREDIT HR		EQUATION: L3 - L4
6	PCT CHG IN SCH		EQUATION: L5 / L4 * 100
7	AVE PCT CHG IN SCH		AVERAGE OF LINE 6
8	FTE FACULTY	5	DATA 5,5,5,5,4,4
9	TOTAL SALARIES	51000	DATA53750,57250,62300,66570,57300,C 60000
10	AVERAGE SALARY	10200	EQUATION: L9 / L8
11	PREVIOUS PERIOD AVE SAL		SHIFT L10
12	CHANGE IN AVE SALARY		EQUATION: L10 - L11
13	PCT CHANGE IN AVE SALARY		EQUATION: L12 / L11 * 100
14	AVE PCT CHG IN AVE SAL		AVERAGE OF LINE 13
15	SUPPORT BUDGET	800	DATA800,950,1030,1000,900,900
16	TOTAL EXPENSE	51800	SUM OF 9,15
17	SUP BUD/SALARIES X 100	1.58	EQUATION: L15 / L9 * 100
18	PREVIOUS PERIODS RATIO		SHIFT L17
19	CHANGE IN RATIO		EQUATION: L17 - L18

Figure 12 (Continued)

EXAMPLE
UNIT COST
RUN

ANALYSIS OF MATRIX
FOR A
6 PERIOD FORECAST

CURRENT DATE

BASE YR. 1965

LINE	DESCRIPTION	BASE	METHOD OF COMPUTATION
20	PCT CHANGE IN RATIO		EQUATION: L19 / L18 * 100
21	AVE PCT CHANGE IN RATIO		AVERAGE LINE 20
22	SCH PER FTE FACULTY	567	EQUATION: L3 / L8
23	PREV PERIODS SCH/FTE FAC		SHIFT L22
24	CHG IN SCH/FTE FACULTY		EQUATION: L22 - L23
25	PCT CHG IN SCH/FTE FAC		EQUATION: L24 / L23 * 100
26	AVE PCT CHG IN SCH/FTE		AVERAGE LINE 25
27	TOTAL EXPENSES PER SCH		EQUATION: L16 / L3
28	SALARIES PER SCH		EQUATION: L9 / L3
29			

Figure 12 (Continued)

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THE FOLLOWING REPORTS ARE REQUESTED
ENGLISH DEPARTMENT          1-3,7,29,8,10,14,29,9,15,16,29,22,26-28
```

Figure 12 (Concluded)

EXAMPLE
UNIT COST

ENGLISH DEPARTMENT

CURRENT DATE
RUN

LINE NO.	PLANNING ITEM	1966	1967	1968	1969	1970	1971
1	AVE CREDITS/SECTION	3.00	3.00	3.00	3.00	3.00	3.00
2	REGISTRATIONS	1026.00	997.00	1066.00	958.00	756.00	753.00
3	STUDENT CREDIT HOURS-SCH	3078.00	2991.00	3198.00	2874.00	2268.00	2259.00
7	AVE PCT CHG IN SCH	8.57	2.87	4.22	0.63	-3.71	-3.16
29							
8	FTE FACULTY	5.00	5.00	5.00	5.00	4.00	4.00
10	AVERAGE SALARY	10750.00	11450.00	12460.00	13314.00	14325.00	15000.00
14	AVE PCT CHG IN AVE SAL	5.39	5.95	6.91	6.89	7.03	6.65
29							
9	TOTAL SALARIES	53750.00	57250.00	62300.00	66570.00	57300.00	60000.00
15	SUPPORT BUDGET	800.00	950.00	1030.00	1000.00	900.00	900.00
16	TOTAL EXPENSE	54550.00	58200.00	63330.00	67570.00	58200.00	60900.00
29							
22	SCH PER FTE FACULTY	615.60	598.20	639.60	574.80	567.00	564.75
26	AVE PCT CHG IN SCH/FTE	8.57	2.87	4.22	0.63	0.24	0.13
27	TOTAL EXPENSES PER SCH	17.72	19.46	19.80	23.51	25.66	26.96
28	SALARIES PER SCH	17.46	19.14	19.48	23.16	25.26	26.56

Figure 13

NAME ____________

PLANTRAN II DATA SHEET

PAGE 1 OF 1

MRI

IDENTIFICATION

ORGANIZATION (1–24)	MODEL DESCRIPTION (25–40)	DATE (41–56)	BASE PERIOD (57–60)	T (61–63)	H	R (65)	T - TIME PERIOD H - HEADING R - REPLACEMENT	RUN NO (78–80)
EXAMPLE	COST PROJECTION	CURRENT DATE	1971	T				

COLUMNAR HEADINGS-OPTIONAL

PERIOD 1 (1–6)	PERIOD 2 (7–12)	PERIOD 3 (13–18)	PERIOD 4 (19–24)	PERIOD 5 (25–30)	PERIOD 6 (31–36)	PERIOD 7 (37–42)	PERIOD 8 (43–48)	PERIOD 9 (49–54)	PERIOD 10 (55–60)	PERIOD 11 (61–66)	PERIOD 12 (67–72)

MODEL SPECIFICATION

LINE NO. (1–4)	PLANNING ITEM (5–28)	BASE LEVEL (29–40)	FREEFORM METHOD OF COMPUTATION (41–80)
1	STUDENT CREDIT HOURS	2257	PERCENT INCREASE OF 9
2	STUDENT CR HRS/FTE FAC	564.75	PERCENT INCREASE OF 5
3	FTE FACULTY	4	EQUATION: L1/L2
4	AVE SALARY	15000	PERCENT INCREASE OF 6
5	SALARIES	60000	EQUATION: L3*L4
6	SUPPORT BUDGET RATIO	1.6	PERCENT DECREASE OF 1
7	SUPPORT BUDGET	900	EQUATION: .01L6*L5
8	TOTAL EXPENSE	60900	SUM OF 5,7
9	TOTAL EXPENSE/STUD CR HR	26.96	EQUATION: L8/L1
10	SALARIES/STUD CR HR	26.56	EQUATION: L5/L1
11			

SUMMARY REPORTS

REPORT TITLE (1–24)	FREEFORM REPORT LINES (25–80)
ENGLISH DEPARTMENT	1,3,4,11,5,7,8,11,9,10

Figure 14

EXAMPLE
COST PROJECTION
RUN

ANALYSIS OF MATRIX
FOR A
6 PERIOD FORECAST

CURRENT DATE

BASE YR. 1971

LINE	DESCRIPTION	BASE	METHOD OF COMPUTATION
1	STUDENT CREDIT HOURS	2259	PERCENT INCREASE OF 9
2	STUDENT CR HRS/FTE FAC	564.75	PERCENT INCREASE 5
3	FTE FACULTY	4	EQUATION: L1 / L2
4	AVE SALARY	15000	PERCENT INCREASE OF 6
5	SALARIES	60000	EQUATION: L3 * L4
6	SUPPORT BUDGET RATIO	1.6	PERCENT DECREASE OF 1
7	SUPPORT BUDGET	900	EQUATION: .01L6 * L5
8	TOTAL EXPENSE	60900	SUM OF 5,7
9	TOTAL EXPENSE/STUD CR HR	26.96	EQUATION: L8 / L1
10	SALARIES/STUD CR HR	26.56	EQUATION: L5 / L1
11			

Figure 15

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THE FOLLOWING REPORTS ARE REQUESTED
ENGLISH DEPARTMENT              1,3,4,11,5,7,8,11,9,10
```

Figure 15 (Concluded)

EXAMPLE
COST PROJECTION

ENGLISH DEPARTMENT

CURRENT DATE
RUN

LINE NO.	PLANNING ITEM	1972	1973	1974	1975	1976	1977
1	STUDENT CREDIT HOURS	2462.31	2683.92	2925.47	3188.76	3475.75	3788.57
3	FTE FACULTY	4.15	4.31	4.47	4.65	4.82	5.01
4	AVE SALARY	15900.00	16854.00	17865.24	18937.15	20073.38	21277.79
11							
5	SALARIES	66022.81	72650.25	79942.94	87967.69	96798.00	106514.69
7	SUPPORT BUDGET	1045.80	1139.27	1241.10	1352.02	1472.86	1604.50
8	TOTAL EXPENSE	67068.61	73789.52	81184.03	89319.71	98270.86	108119.19
11							
9	TOTAL EXPENSE/STUD CR HR	27.24	27.49	27.75	28.01	28.27	28.54
10	SALARIES/STUD CR HR	26.81	27.07	27.33	27.59	27.85	28.11

Figure 16

DATA COLLECTION DOCUMENT
PROGRAM COST ANALYSIS
HISTORIC ANALYSIS

Department: ________________________

No.	Item	65	66	67	68	69	70	71
1	Average Credits per Section	____	____	____	____	____	____	____
2	Registrations	____	____	____	____	____	____	____
3	Full-Time Equivalent Faculty	____	____	____	____	____	____	____
4	Total Salaries	____	____	____	____	____	____	____
5	Support Budget	____	____	____	____	____	____	____

Figure 17

DATA COLLECTION DOCUMENT
PROGRAM COST ANALYSIS
HISTORIC ANALYSIS

SAMPLE

Department: ENGLISH

No.	Item	65	66	67	68	69	70	71
1	Average Credits per Section	3	3	3	3	3	3	3
2	Registrations	945	1026	997	1066	958	756	753
3	Full-Time Equivalent Faculty	5	5	6	5	5	4	4
4	Total Salaries	51000	53750	57250	62300	66570	57300	60000
5	Support Budget	800	800	950	1030	1000	900	900

Figure 18

G. Model Adaptation

No matter how good the data and no matter how sophisticated and precise the methodology, as planners and decision makers review the projection results, they will begin to suggest changes. Some will be changes that reflect a distrust of the projected values; others will simply be expressions of interest in what would happen if? Obviously both of these concerns are important to the model builder.

He is particularly interested in the second response. The decision maker who wants to investigate a number of alternatives just to see what would happen, is the decision maker who realizes how to use simulation. The chart in Figure 19 graphically represents this plan refining cycle which is the hallmark of a successful simulation effort.

PLAN REFINING CYCLE

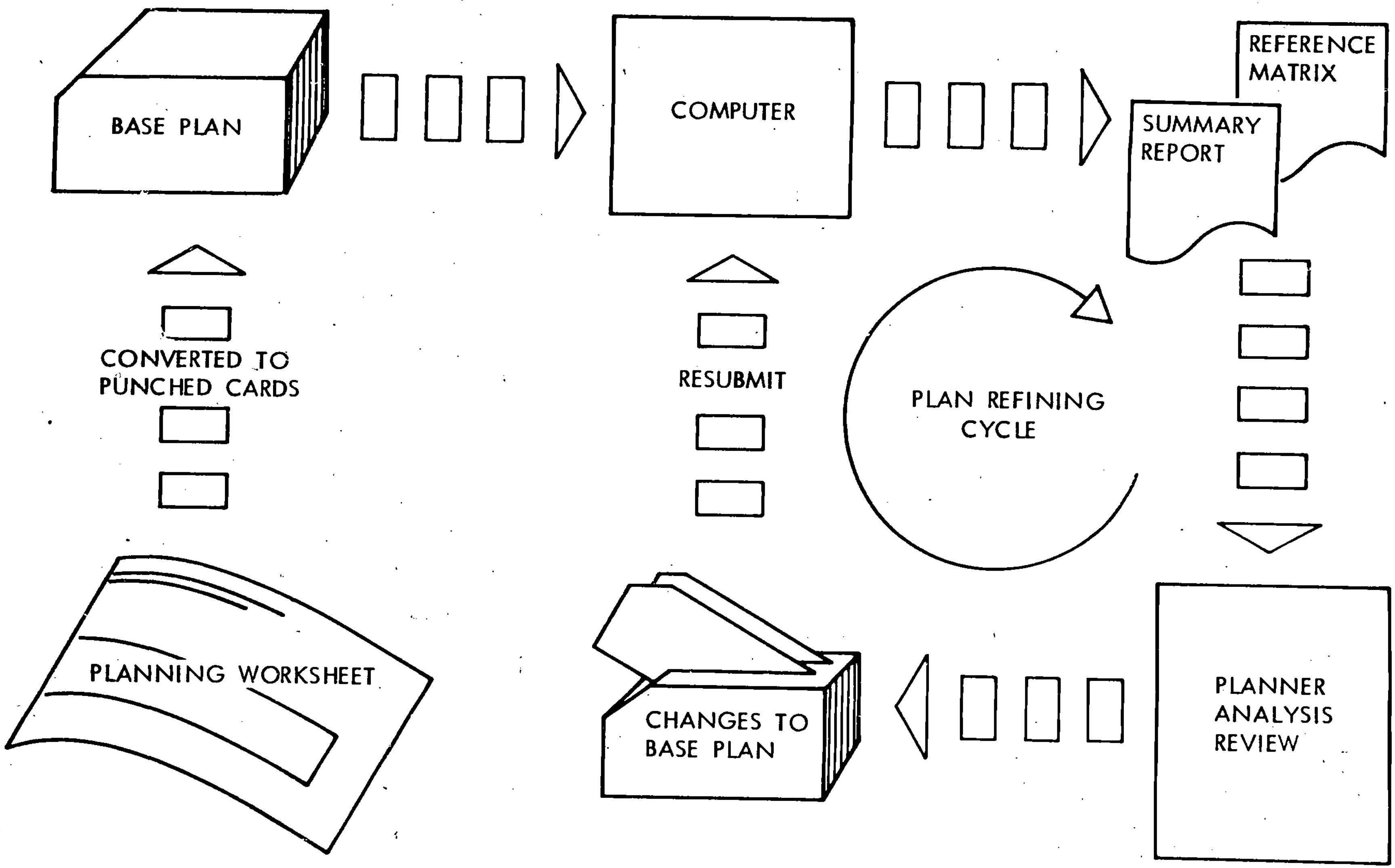

Figure 19

APPENDIX

I. Criteria for Evaluation and Planning

The application of subjective judgement inherently includes individual bias and emotion. To aid in making the judgements of individuals as objective as possible, some outline of criteria must be utilized. These criteria insure that the same considerations are given to all programs/departments being evaluated, and that individual bias and emotion is minimized.

Institutional philosophy might be utilized to develop criteria for determining the effectiveness of a given program/department. However, effectiveness cannot alone dictate a decision. The realistic impact of resources must also be considered.

The approach we are proposing provides an institution the means of making full use of their existing knowledge about emphasis to be given a program/department. It offers a means of collecting the knowledge, organizing it, and applying it into policy decisions.

The basis of the evaluation is a technique which enables sound "bite-sized" judgements about individual factors which make up the numerous and complex relationships of a program/department. Every program/department has several facets which require evaluation: the program/department itself, the institution, the environment, and the effect upon resources. These facets are broken into general aspects, and these may be even further divided.

It might be expected that a technique so broadly viable would produce results providing little basis for comparison between programs/departments. Quite the opposite is true. Intercomparability of evaluations is the very essence of the technique.

This intercomparability is achieved by providing a stated frame of reference for each required judgement. In the individual judgement there is always the most unfavorable, the norm, and the best, or most desirable. In addition, the evaluator chooses a factor which best measures his ability to judge the particular aspect.

The final evaluation ratings for a specific program/department are directly comparable with other programs/deparcments and, with the judgements of other evaluators as well. This enables an objective judgement of the merits of all programs/departments on an accurate and meaningful basis. The averaged ratings of the programs/departments provided by all evaluators show the relationships compared with similar standards.

There are several advantages to this analysis technique:

1. It enables an institution to make maximum use of one of its most valuable assets--its present knowledge--and to apply it effectively to the tough problem of evaluation.

2. It compels thoughtful attention to several aspects of a program/department, thereby eliminating blind spots. At the same time, it prevents over-valuing a few dominant considerations which tend to distort decision judgement.

3. It identifies and qualifies strengths and weaknesses in present operations, thus offering the opportunity to tailor future emphasis for specific strategic purposes.

4. It shows precisely where the institution's information is too weak for reliable evaluation. This enables further research effort to be directed to specific needs.

5. It provides an accurate, sophisticated, and orderly evaluation capability.

6. It provides a sound and consistent basis for comparing the merits of various programs/departments with each other.

This technique provides a means for an institution to gauge the emphasis to be provided its operation. By combining the collective thoughts of various administrators in a quantified manner, the decision-making task is both assisted and expedited.

II. Application of Criteria

The evaluation phase begins with the establishing of an evaluation team. The size of this team would vary from institution to institution. The team members should be those individuals within the institution who have the responsibility and the authority to alter program emphasis.

The team establishment is followed by a group orientation session which aims at providing all participants with identical understanding of the evaluation technique and the ground rules. The session would cover an explanation of what programs/departments were to be evaluated, use of the criteria worksheet, and how the ratings for each program/department would be developed.

The next step is for each evaluation team member to express his judgement on the various aspects of the evaluation. Once the individual program/department worksheets have been completed by the individual team member, they are returned for the ranking computations. Three ranking totals are obtained--for effectiveness, for nonfinancial resources, and for financial resources.

The rankings would be displayed in two ways: First by the actual program/department scores for each of the three rankings, along with the rankings of all other evaluators, and an average score; second in actual rank order of the three rankings along with other evaluator's rankings and the average.

This display leads to the next step, which is a team discussion of the variance between an individual evaluator's "high" or "low" ranking as compared to the average. The purpose of this review is <u>not</u> to challenge the validity of the individual ranking, but rather to inform the entire evaluation team of the reason why the individual ranked a given program/department in a specific way. In this manner the entire team is provided with information which might alter an overall individual program/department ranking. The technique is designed to make inconsistencies obvious. The goal is to collect the evaluation team's best judgement, and the comparative ranking display tends to insure that each rating represents the evaluator's best thinking as accurately as practicable.

Figure 20 shows the proposed criteria worksheet. Keep in mind that this is just a proposed set of criteria, and might be logically altered to accommodate an individual institution's needs. These criteria <u>have</u> been used by other educational institutions, primarily in the decision-making process involved in establishing new programs/departments. We feel that the same criteria might be reasonable to use in the decision-making process for determining future program/department emphasis.

The "total", which eventually provides ranking, is developed from two factors. The first, which is used as a multiplier, involves the "evaluator's factor."

For each evaluation rating the rater is asked to indicate how certain he is of the accuracy of reliability of the evaluation factor--"0" indicating that the rating is a wild guess, "5" indicating that the rating is a fair estimate, and "10" indicating that the rating is a known fact.

These three points may be adequate in defining the range of evaluating values, but if a more specific delineation is desired, the following might be utilized:

PROPOSED CRITERIA WORKSHEET

Program ______________

Department ______________

I. Effectiveness

Question	Evaluator's Factor	Scale				
1. What is the intrinsic value of the program/department?	[ ]	Very Low		Average		Very High
2. Is the program/department essential to any institution?	[ ]	Definitely Not		Probably		Absolutely
3. Is the program/department essential to this institution?	[ ]	Definitely Not		Probably		Absolutely
4. Are the program/department objectives related to the philosophy of this institution?	[ ]	Definitely Not		Probably		Absolutely
5. Is the program/department appropriate to this institution?	[ ]	Definitely Not		Probably		Absolutely
6. Is the program/department particularily important to the leadership role of this institution?	[ ]	Definitely Not		Probably		Absolutely
7. How important is the program/department for the public service function of this institution?	[ ]	Unimportant		Important		Very Important
8. Does the program/department make possible a unique public service?	[ ]	Definitely Not		Probably		Absolutely
9. Does the program/department provide public service to a unique segment of the area?	[ ]	Definitely Not		Probably		Absolutely
10. Does the program/department serve the needs of many students in a way that other local or regional institutions do not serve?	[ ]	Definitely Not		Probably		Absolutely

Figure 20

	Evaluator's Factor					
11. How important is the program/department for service to other parts of this institution?		Unimportant		Important		Very Important
12. Does the program/department provide services essential to the operation of other parts of this institution?		Definitely Not		Probably		Absolutely
13. Does the program/department make a notable contribution to students or faculty in other segments of this institution?		Definitely Not		Probably		Absolutely
14. Is the program/department important to the research function of this institution?		Definitely Not		Probably		Absolutely
Total for effectiveness aspects						

II. Required Resources

A. Nonfinancial Resources

	Evaluator's Factor					
1. Does the program/department now exist in a developed and quality manner?		Definitely Not		Probably		Absolutely
2. Does the program/department use only supporting services and disciplines which must be maintained with or without the program/department?		Definitely Not		Probably		Absolutely
3. Is adequate space provided for the program/department?		Definitely Not		Probably		Absolutely
4. Are the library holdings supporting the program/department adequate?		Definitely Not		Probably		Absolutely
5. Is this institution in a unique position to achieve with the program/department?		Definitely Not		Probably		Absolutely

Figure 20 (Continued)

		Evaluator's Factor					
6.	Is the existing staff such as to insure continuing program/department growth?	____	Definitely Not		Probably		Absolutely
7.	Are there local resources which are of great value to the program/department?	____	Definitely Not		Probably		Absolutely
8.	Is there significant mutual reinforcement between the program/department and other programs/departments?	____	Definitely Not		Probably		Absolutely
	Total for nonfinancial resources aspects			____			

B. Financial Resources

		Evaluator's Factor					
1.	Is the program/department self-supporting?	____	Definitely Not		Probably		Absolutely
2.	Can a portion of the program/department provided by other means?	____	Definitely Not		Probably		Absolutely
3.	What would be the net fiscal effect on the institution by continuing of the program/department?	____	Loss		Break Even		Gain
4.	What is the potential for obtaining outside support for the program/department?	____	Very Low		Average		Very High
5.	Does the program/department attract outside donors and so bring additional financial support to the institution?	____	Definitely Not		Probably		Absolutely
6.	What is the programs/departments competitive position in the local student market?	____	Very Low		Average		Very High
7.	What is the program/s/department's competitive position in the regional student market?	____	Very Low		Average		Very High
	Total for financial resources aspects			____			

Figure 20 (Concluded)

How would you best describe this evaluation rating?

0 - A wild guess
1 - A weak guess
2 - A fair guess
3 - A good guess
4 - An educated guess
5 - A fair estimate
6 - A good estimate
7 - A reliable estimate
8 - An accurate estimate
9 - A very accurate estimate
10 - A known fact

The second value involved in developing the "total" is the frame of reference for each judgement. The value associated with the worst, or most unfavorable rating is a "0". The stated norm, or average, is represented by a "5". A "10" is always the best, or most desirable rating. There are also two intermediate values--corresponding to values of 2.5 and 7.5. These intermediate ratings provide the evaluator a means of further dividing the judgement frame.

The individual evaluator does <u>not</u> assign a numeric value to the judgment frame. He merely inserts an "X" or a check mark in one of the the judgment frame column value. For example, if the evaluator assigned

Once the criteria worksheets have been completed by each evaluator for each program/department, the scoring must be accomplished. This is computed by a simple multiplication of the evaluator's factor times the judgement frame column value. For example, if the evaluator assigned a factor of "5" (a fair estimate) and checked the area between the norm, or middle column, and the best, or far-right column, with a value of 7.5, the score for that individual aspect would be 37.5. After each multiplication has been made, the scores are summed into the appropriate total.

The display of the scoring is as in Figure 21. An examination of the scores, converting the highest to rank 1, the next highest to 2, etc., in each of the three areas for the individual evaluator's results in a display as shown in Figure 22.

These displays are the basis of the review by the entire evaluation team. Once again, this review is to clarify any rating which is exceptionally "high" or "low". Any adjustment of the rankings would be a product of the entire evaluation team decision.

Once the ranking of the programs/departments has been completed, the evaluation team has, along with the historic analyses, the information to begin the projection of further program emphasis.

EVALUATION TEAM SCORES

	Evaluator 1 Scores			Evaluator 2 Scores				Evaluator Team Average Scores		
		Resources			Resources				Resources	
	Effectiveness	Non-Financial	Financial	Effectiveness	Non-Financial	Financial	. . . . .	Effectiveness	Non-Financial	Financial
Program/Department A							. . . . .			
Program/Department B							. . . . .			
Program/Department C							. . . . .			
Program/Department N							. . . . .			

Figure 21

EVALUATION TEAM RANKING

	Evaluator 1 Rankings			Evaluator 2 Rankings				Evaluator Team Average Rankings		
		Resources			Resources				Resources	
	Effectiveness	Non-Financial	Financial	Effectiveness	Non-Financial	Financial	. . . . .	Effectiveness	Non-Financial	Financial
Program/Department A							. . . . .			
Program/Department B							. . . . .			
Program/Department C							. . . . .			
Program/Department Z							. . . . .			

Figure 22

III. Specifying Future Program Emphasis--A Discussion

The purpose of the last phase is to arrive at a base plan and alternatives for future educational development. In future program/department emphasis planning, one alternative, simply to continue current practice should be included as a baseline. This task would be accomplished by simply extending the data derived from the historic analysis phase. Although this alternative will usually not be acceptable for the allocation of resources, it is beneficial to know those projected future costs.

Based on the rankings developed for individual programs/departments in Phase 3, alternative plans are generated. Once these plans are acceptable on the individual program/department level, they are combined to construct a basic educational plan for the entire institution. This plan then is subjected to review, and further changes and alternatives incorporated until the plan appears feasible for the apparent future conditions within the institution.

The plan indicates what actions are necessary, why they must be taken, who is responsible for the actions, the conditions under which they will be taken, and how the change will be accomplished. This requires that the planners, using the plan as a base, generate policy and make decisions to incorporate the plan into the operation of the institution.

The effect of an educational plan is enhanced by using a framework, since an explicitly stated means of achieving goals will facilitate coordination of the plan implementation. This planning document does not set an irrevocable course of action, but provides a working instrument that embodies certain basic decisions about program emphasis within the institution, for selected points in time, and establishes a guide for designing more detailed courses of action whenever influencing conditions become clear.

The educational plan suggests future strategy by pointing up needs related to fiscal matters. As the financial component is developed, the program/department budgets are reflected for several years in the future. Thus the allocation of financial resources is clarified.

This process, providing comprehensive planning, and involving all elements of the institution, is proposed to aid the institution fulfill its role. Complicated though the process may seem to some, it is no more so than any other all-pervasive administrative process. The basis of this approach is the educational component, reflected in program/department emphasis. It is that component which is the real purpose of the institution. Thus that component should be the basis for the planning activity.

IV. Budgeting and Finance

A. Relation to Overall Planning

Up to this point the planner has been developing estimates for the various components of his planning system. He first projected enrollments. He translated these into student credit hours by department using an induced course load matrix. Using this output he projected the faculty needs by department and the salary expense required. He then projected and costed the physical space demanded by the instructional load. On the basis of a unit cost analysis, he assisted institutional decision makers in achieving a consensus on future program emphasis.

The final planning task is to gather all these previous activities together and present a comprehensive and systematic picture of the college's future under the assumptions made in previous analyses.

B. Theory

1. Objective. The objective of this final budgeting component is to bring together the expense projections and the income projections so that

--the total impact on the institution may be measured

--alternatives can be rationally examined.

The financial impact on the college is most directly measured by the surplus/deficit resulting from the expense and income assumptions being used. For example if a certain student-faculty ratio is associated with an increase in the operating deficit, the planner can say that this student-faculty ratio has a negative financial impact on the college. If a change in the average class size is associated with a reduction of the operating deficit (or an increase in the operating surplus), the planner can say that the change in average class size has a beneficial financial impact on the college.

By bringing all the previous projections together and adding estimates of revenue and other expenses, the planner can present an overall projection of the income and expense of the institution. If the previous analyses and projections were valid, the coordinating effort will yield the best single projection of these variables through time.

The second objective is to provide a framework for simulation, i.e. experimentation with a number of alternatives for future action. The overall impact of the alternatives on the bottom line will be the criterion for evaluating each alternative. For example, a planner may want to assess the impact of several student-faculty ratios throughout the planning horizon. He wants to experiment with the future by changing only the student-faculty ratio. The comprehensive framework he has developed allows him to accomplish this task in an organized manner.

2. Format. In order to accomplish the two objectives discussed above, two slightly different formats will generally be required. To accomplish the first objective of bringing together the previous projections, the planner will need a detailed format in a modular pattern which will receive the output of the individual planning modules. The exact dimensions of this format will depend upon the individual college and the level of detail of the previous planning. Typically this will be a large system with several modules.

The second objective, simulation, can be accomplished with a somewhat different format. Generally the structure required for this type of activity, at least initially, is less detailed than that required for the first objective. While this format will include all the major variables, it will tend to operate at an aggregate level so that alternative policy decisions can be examined in light of their impact on the overall income-expense figure.

C. Techniques

There are a growing number of budgeting systems and techniques available for use in higher education. As with so many other decisions, the system used by a specific college will depend on a number of institutional variables including size, organization, staff expertise, and available resources. External agencies often impose budgeting systems or require reports in such a format that certain budgeting approaches are mandatory.

The topics presented earlier in this manual can be used with almost any budgeting system. A discussion of several systems will not be especially helpful here because of the lack of options in this area. Several different methods of enrollment projection, faculty planning, and cost analysis were presented because the planner has wide latitude in the specific technique he will use. In the area of an over view budget model, however, he must use the format and design currently in use in his institution if his efforts are to be effective.

The output of the several possible enrollment projection methods will be the same in format. They will be equally understood by users and could all be used in subsequent projections. Different budgeting systems, however, have different formats and produce different types of reports. The report of a program budgeting system is radically different from the report of a line item system even when both are describing the same organization.

The planner should make sure that his overview budget model conforms as closely as possible to the budgeting used at his institution. The same income and expense categories should be used and similar reports should be produced.

D. Micro-Model

Figure 23 presents the worksheets for projecting income and expenditures over a ten-year period. By inserting the input data items, specifying relationships, and carrying out the calculations, a planner can project an operating budget over a planning horizon. A "bottom line" is included to produce a surplus/deficit.

1. Input: Lines 1 through 15 are data input lines. In addition the planner must specify the method of projection for the following items: 19, 20, 23, 26, 27, 28, 29, 31, 32, 34, 36, 38, 40, 42, 44, 45, 51, 52, 56, 57, 58, 59, 60, 61, 63, 64, 66.

Line 1--Full-Time Students (semester): These are the number of full-time students projected for future time periods. This projection will usually come from an enrollment projection routine such as the one described in Section II of Volume I.

Line 2--Part-Time Students (Full-Time Equivalent): This is a projection of the number of part-time students stated in full-time equivalent terms.

Line 3--Fees per Full-Time Student: This is a projection of the fees to be paid by full-time students. Since this is one of the key income variables, the planner may not begin with firm values for this line. Usually however, there are expectations within the institution about the amount and frequency of changes in this item. These expectations should be used initially. The planner should count on making several models with different fee structures to assist decision makers in arriving at a conclusion.

Line 4--Fees per Credit Hour: This is similar to and generally a function of line 3. The same general process can be used to generate "first try" values.

Line 5--State Appropriation per FTE Student: This is a projection of the amount of state appropriation which will be available for each full-time equivalent student. This input item will not be applicable to all institutions.

Line 6--Endowment Principle: This is a projection of the corpus of the endowment. This can probably best be obtained from the development office. Estimates in this area should tend toward the conservative.

Line 7--Endowment Yield: This is the projected yield from the endowment principle. This can be obtained from the development office or the financial management office.

Line 8--Non-Student Aid Share of Endowment Income: This is the projection of the proportion of the endowment earnings which does not accrue to the student financial aid account.

Line 9--Percent of Full-Time Students Living on Campus: This is a projected portion of the full-time students who reside on campus and thus pay room and board charges to the institution.

Line 10--Room Fee: This is the projected room fee to be paid by students living on campus.

Line 11--Board Fee: This is the projected board fee to be paid by students living on campus.

Line 12--Average Class Size: This is the average size of a credit section. This can be projected from some historic base value or can be set as a management parameter to assess the financial impact of different levels of class size.

Line 13--Average Teaching Load: This can also be projected from some current base value or can be treated as a management parameter to assess the overall financial impact of varying teaching loads.

Line 14--Average Faculty Salary: This can be most easily treated as a parameter value which the planner can set at various levels to measure the overall financial impact of faculty salary decisions. Historical data can be used to project future values but these are probably less useful in planning than setting alternative levels.

Line 15--Average Financial Aid per Student: This is the projected amount of financial aid per student. While this can be developed from historical information, typically a planner will want to set various levels and assess the overall financial impact.

In addition to these input items, there are several planning items which require the planner to specify the method of computation. The in worksheets are all set up in terms of independent projections. The typical working is "Change a base of ____ 6 by ______." Historical analysis will

OVERVIEW BUDGET PROJECTION

	Item	Source	Academic Year Beginning In											
			72	73	74	75	[illegible]	[illegible]	78	79	80	81	82	83
* 1	Full-time Students (Semester)	Input												
* 2	Part-time Students (FTE)	Input												
* 3	Fees/Full-time Student	Input												
* 4	Fees/Credit Hour	Input												
* 5	State Appropriation/FTE Student	Input												
* 6	Endowment Principle	Input												
* 7	Endowment	Input												
* 8	Non-student Aid Share of Endowment Income	Input												
* 9	Percent Full-time Students Living On Campus	Input												
* 10	Room Fee	Input												
* 11	Board Fee	Input												
* 12	Average Class Size	Input												
* 13	Average Teaching Load	Input												
* 14	Average Faculty Salary	Input												
* 15	Average Financial Aid/Student	Input												
16	Student Credit Hours	(15 x Line 1) + (15 x Line 2)												
17	Number of FTE Faculty	Line 16 (Line 12 x Line 13)												

* Input item.

Figure 23

Income

	Item	Source	Academic Year Beginning In: 72	73	74	75	76	77	78	79	80	81	82	83
18	Tuition Income	(2 x Line 1 x Line 3) + (2 x Line 2 x 15 x Line 4)	___	___	___	___	___	___	___	___	___	___	___	___
19	Laboratory Fee Income	Change a Base of ___ By ___	___	___	___	___	___	___	___	___	___	___	___	___
20	Incidental Income	Change a Base of ___ By ___	___	___	___	___	___	___	___	___	___	___	___	___
21	Tuition and Fee Income	Line 18 + Line 19 + Line 20	___	___	___	___	___	___	___	___	___	___	___	___
22	State Government	Line 5 x (Line 1 + Line 2)	___	___	___	___	___	___	___	___	___	___	___	___
23	Federal Government	Change a Base of ___ By ___	___	___	___	___	___	___	___	___	___	___	___	___
24	Government Appropriations	Line 22 + Line 23	___	___	___	___	___	___	___	___	___	___	___	___
25	Endowment Income	Line 7 x Line 8 x Line 6	___	___	___	___	___	___	___	___	___	___	___	___
26	Alumni Gifts	Change a Base of ___ By ___	___	___	___	___	___	___	___	___	___	___	___	___
27	Foundation Gifts	Change a Base of ___ By ___	___	___	___	___	___	___	___	___	___	___	___	___
28	Corporate Gifts	Change a Base of ___ By ___	___	___	___	___	___	___	___	___	___	___	___	___
29	Other Gifts	Change a Base of ___ By ___	___	___	___	___	___	___	___	___	___	___	___	___
30	Gift Income	Line 26 + Line 27 + Line 28 + Line 29	___	___	___	___	___	___	___	___	___	___	___	___
31	Sponsored Research	Change a Base of ___ By ___	___	___	___	___	___	___	___	___	___	___	___	___
32	Other Sponsored Program	Change a Base of ___ By ___	___	___	___	___	___	___	___	___	___	___	___	___

Figure 23 (Continued)

OVERVIEW BUDGET PROJECTION (CONT'D)

Income

	Item	Source	Academic Year Beginning In											
			72	73	74	75	76	77	78	79	80	81	82	83
33	Recovery of Indirect Costs	30% x Line 31 + 15% x Line 32												
34	Other Income	Change a Base of ______ By ______												
35	Total Educational and General	Sum of Lines 21, 24, 25, 30, 31, 32, 33, 34												
36	Student Aid Gifts	Change a Base of ______ By ______												
37	Student Aid Endowment Income	Line 7 x Line 6 - Line 25												
38	Other Student Aid Income	a Base of ______ By ______												
39	Student Aid Income	Line 36 + Line 37 + Line 38												
40	Intercollegiate Athletics	Change a Base of ______ By ______												
41	Residence Halls	Line 9 x Line 1 x Line 10												
42	Faculty Housing	Change a Base of ______ By ______												
43	Food Services	Line 9 x Line 1 x Line 11												
44	College Union	Change a Base of ______ By ______												
45	Student Store	Change a Base of ______ By ______												
46	Auxiliary Enterprise Income	Sum of Lines 40, 41, 42, 43, 44, 45												
47	Total Revenue	Line 35 + Line 39 + Line 46												

Figure 23 (Continued)

OVERVIEW BUDGET PROJECTION

Expenditures

	Item	Source	Academic Year Beginning In											
			72	73	74	75	76	77	78	79	80	81	82	83
50	Faculty Salaries	Line 17 x Line 14												
51	Non-Faculty Salaries	____% x Line 50												
52	Support Costs	____% x Line 50												
53	Instruction and Departmental Research	Line 50 + Line 51 + Line 52												
54	Sponsored Research	Set Equal to Line 29												
55	Other Sponsored Programs	Set Equal to Line 30												
56	Public Service	Change a Base of ________ By __________												
57	Libraries	Change a Base of ________ By __________												
58	Registrar's Office	Change a Base of ________ By __________												
59	Dean of Students	Change a Base of ________ By __________												
60	Health Service	Change a Base of ________ By __________												
61	Testing and Counseling	Change a Base of ________ By __________												
62	Student Services	Line 58 + Line 59 + Line 60 + Line 61												
63	Physical Plant and Maintenance	Change a Base of ________ By __________												
64	General Administration	Change a Base of ________ By __________												
65	Staff Benefits	10% x Line 50												

Figure 23 (Continued)

OVERVIEW BUDGET PROJECTION (CONT'D)

Expenditures

	Item	Source	Academic Year Beginning In											
			72	73	74	75	76	77	78	79	80	81	82	83
66	General Institutional Expenses	Change a Base of _______ By ___________	___	___	___	___	___	___	___	___	___	___	___	___
67	Educational and General	Sum of Lines 53, 54, 55, 56, 57, 62, 63, 64, 65, 66	___	___	___	___	___	___	___	___	___	___	___	___
68	Student Aid	Line 15 x Line 1	___	___	___	___	___	___	___	___	___	___	___	___
69	Intercollegiate Athletics	115% x Line 38	___	___	___	___	___	___	___	___	___	___	___	___
70	Residence Halls	95% x Line 39	___	___	___	___	___	___	___	___	___	___	___	___
71	Faculty Housing	80% x Line 40	___	___	___	___	___	___	___	___	___	___	___	___
72	Food Service	90% x Line 41	___	___	___	___	___	___	___	___	___	___	___	___
73	College Union	85% x Line 42	___	___	___	___	___	___	___	___	___	___	___	___
74	Student Store	93% x Line 43	___	___	___	___	___	___	___	___	___	___	___	___
75	Auxiliary Enterprises	Sum of Lines 69, 70, 71, 72, 73, 74	___	___	___	___	___	___	___	___	___	___	___	___
76	Total Expenditures	Line 67 + Line 68 + Line 75	___	___	___	___	___	___	___	___	___	___	___	___
77	Surplus/Deficit	Line 45 - Line 76	___	___	___	___	___	___	___	___	___	___	___	___
78	Accumulated Surplus/Deficit	Accumulate Values In Line 77	___	___	___	___	___	___	___	___	___	___	___	___

Figure 23 (Concluded)

be of some assistance in determining the method of projection, but in most situations planners will find themselves constrained by resource availability or management constraints. The final selection of projection technique will depend upon the planner and his particular situation.

2. Output: The output of the budget projection routine in Figure 24 is a statement of income and expenditures over a ten-year period. The micro-model uses budget categories which conform to those in College and University Business Administration.

E. Case Study

The micro-model described has been applied to a set of insitutional data. Figure 24 shows the PLANTRAN system input required to conduct the projection. Figure 25 presents the "Analysis of Planning Matrix." Figure 26 shows the summary report output.

F. Data Collection

Figure 27 is a copy of the data collection document for the budget projection. Figure 28 is a sample of a completed data collection document which conforms to the data used in the case study. The planner should review section D carefully before completing the document.

In addition to the data required by the document, the planner will need to decide on the method of projecting several income and expense items. These projection methods may reflect historical analysis or management constraints. These elements are identified in section D.

G. Model Adaptation

No matter how good the data and no matter how sophisticated and precise the methodology, as planners and decision makers review the projection results, they will begin to suggest changes. Some will be changes that reflect a distrust of the projected values; others will simply be expressions of interest in what would happen if? Obviously both of these concerns are important to the model builder.

He is particularly interested in the second response. The decision maker who wants to investigate a number of alternatives, just to see what would happen, is the decision maker who realizes how to use simulation. The chart in Figure 29 graphically represents this plan refining cycle which is the hallmark of a successful simulation effort.

PLANTRAN II DATA SHEET

NAME ______________ PAGE 1 OF 5 MRI

IDENTIFICATION

ORGANIZATION	MODEL DESCRIPTION	DATE	BASE PERIOD	T	H	R	RUN NO.
EXAMPLE	OVERVIEW BUDGET	CURRENT DATE	1971	T			

T - TIME PERIOD
H - HEADING
R - REPLACEMENT

COLUMNAR HEADINGS - OPTIONAL

PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	PERIOD 5	PERIOD 6	PERIOD 7	PERIOD 8	PERIOD 9	PERIOD 10	PERIOD 11	PERIOD 12

MODEL SPECIFICATION

LINE NO.	PLANNING ITEM	BASE LEVEL	FREEFORM METHOD OF COMPUTATION
1	FULL-TIME STUDENTS/SEM	11450	DATA 12371, 13330, 14258, 14949, 15493, 16011
2	PART-TIME STUDENTS (FTE)	1000	CONSTANT
3	FEES/FULL-TIME STUDENT	2000	INCREASE 75 PER YEAR
4	FEES/CREDIT HOUR	67	EQUATION: L3/30
5	STATE APPROP/FTE STUDENT	20	CONSTANT
6	ENDOWMENT PRINCIPLE	10000000	INCREASE 1000000 PER YEAR
7	ENDOWMENT YIELD (PCT)	5	CONSTANT
8	NON-STUDENT AID PERCENT	40	CONSTANT
9	PCT FULL-TIME ON-CAMPUS	45	INCREASE 1.5 PER YEAR
10	ROOM FEE	600	PERCENT INCREASE OF 4
11	BOARD FEE	400	PERCENT INCREASE OF 5
12	AVERAGE CLASS SIZE	30	CONSTANT
13	AVERAGE TEACHING LOAD	9.5	CONSTANT
14	AVERAGE FACULTY SALARY	12300	PERCENT INCREASE OF 4
15	FINANCIAL AID/STUDENT	300	PERCENT INCREASE OF 3
16	STUDENT CREDIT HOURS	186750	EQUATION: 15 * (L1+L2)
17	NUMBER OF FTE FACULTY	655	EQUATION: L16/(L12 * L13)
18	TUITION INCOME	24910000	EQUATION: L1 * L3 + 30 L2 * L4

SUMMARY REPORTS

REPORT TITLE	FREEFORM REPORT LINES
PLANNING FACTORS	1-17
INCOME	S1, 18-21, 79, 22-24, 79, 25, 79, 26-30, 79, 31, 79, 32, 79, C
	33, 79, 34, 79, 35, 79, 36-39, 79, 40-46, 79, 47, 79, 77

Figure 24

PLANTRAN II DATA SHEET

MRI

IDENTIFICATION

ORGANIZATION (1–24)	MODEL DESCRIPTION (25–40)	DATE (41–56)	BASE PERIOD (57–60)	T (61)	H (63)	R (65)		RUN NO. (78–80)
							T - TIME PERIOD H - HEADING R - REPLACEMENT	

COLUMNAR HEADINGS - OPTIONAL

PERIOD 1 (1–6)	PERIOD 2 (7–12)	PERIOD 3 (13–18)	PERIOD 4 (19–24)	PERIOD 5 (25–30)	PERIOD 6 (31–36)	PERIOD 7 (37–42)	PERIOD 8 (43–48)	PERIOD 9 (49–54)	PERIOD 10 (55–60)	PERIOD 11 (61–66)	PERIOD 12 (67–72)

MODEL SPECIFICATION

LINE NO. (1–4)	PLANNING ITEM (5–28)	BASE LEVEL (29–40)	FREEFORM METHOD OF COMPUTATION (41–80)
19	LABORATORY INCOME	100000	PERCENT INCREASE OF 3
20	INCIDENTAL INCOME	100000	CONSTANT
21	TUITION + FEE INCOME	25110000	SUM OF 18, 19, 20
22	STATE GOVERNMENT	249000	EQUATION: L5 * (L1+L2)
23	FEDERAL GOVERNMENT	0	CONSTANT
24	GOVERNMENT APPROPRIATION	249000	SUM OF 22, 23
25	ENDOWMENT INCOME	200000	EQUATION: .01L7 * .01L8 * L6
26	ALUMNI GIFTS	100000	PERCENT INCREASE OF 2
27	FOUNDATION GIFTS	300000	CONSTANT
28	CORPORATE GIFTS	600000	PERCENT INCREASE OF 3
29	OTHER GIFTS	50000	CONSTANT
30	GIFT INCOME	1250000	SUM OF 26, 27, 28, 29
31	SPONSORED RESEARCH	300000	CONSTANT
32	OTHER SPONORED PROGRAMS	100000	PERCENT INCREASE OF 2
33	RECOVERY OF INDIR COSTS	105000	EQUATION: .30L31 + .15L32
34	OTHER INCOME	100000	CONSTANT
35	EDUCATIONAL + GEN INCOME	27414000	SUM OF 21, 24, 25, 30, 31, 32, 33, 34
36	STUDENT AID GIFTS	400000	PERCENT INCREASE OF 3

SUMMARY REPORTS

REPORT TITLE (1–24)	FREEFORM REPORT LINES (25–80)
EXPENSE	51, 50-53, 79, 54, 79, 55, 79, 56, 79, 57, 79, 58-62, 79, 63, 79, C
	64, 79, 65, 79, 66, 79, 67, 79, 79, 68, 79, 69-75, 79, 76, 79, 77

Figure 24 (Continued)

NAME ______

PLANTRAN II DATA SHEET

PAGE 3 OF 5 **MRI**

IDENTIFICATION

ORGANIZATION (1–24)	MODEL DESCRIPTION (25–40)	DATE (41–56)	BASE PERIOD (57–60)	T (61)	H (63)	R (65)	T- TIME PERIOD H- HEADING R- REPLACEMENT	RUN NO. (78–80)

COLUMNAR HEADINGS - OPTIONAL

PERIOD 1 (1–6)	PERIOD 2 (7–12)	PERIOD 3 (13–18)	PERIOD 4 (19–24)	PERIOD 5 (25–30)	PERIOD 6 (31–36)	PERIOD 7 (37–42)	PERIOD 8 (43–48)	PERIOD 9 (49–54)	PERIOD 10 (55–60)	PERIOD 11 (61–66)	PERIOD 12 (67–72)

MODEL SPECIFICATION

LINE NO. (1–4)	PLANNING ITEM (5–28)	BASE LEVEL (29–40)	FREEFORM METHOD OF COMPUTATION (41–80)
37	STUDENT AID ENDOW INCOME	300000	EQUATION: .01L7*L6-L25
38	OTHER STUDENT AID INCOME	100000	CONSTANT
39	STUDENT AID INCOME	800000	SUM OF 36, 37, 38
40	INTERCOLLEGIATE ATHLETIC	100000	CONSTANT
41	RESIDENCE HALLS	3090000	EQUATION: .01L9*L1*L10
42	FACULTY HOUSING	100000	CONSTANT
43	FOOD SERVICES	2060000	EQUATION: .01L9*L1*L11
44	COLLEGE UNION	300000	PERCENT INCREASE OF 3
45	STUDENT STORE	250000	CONSTANT
46	AUXIL ENTERPRISE INCOME	5900000	SUM OF 40, 41, 42, 43, 44, 45
47	TOTAL REVENUE	34114000	SUM OF 35, 39, 46
50	FACULTY SALARIES	8056000	EQUATION: L7*L14
51	NON-FACULTY SALARIES	2416000	EQUATION: .30L50
52	SUPPORT COSTS	2014000	EQUATION: .25L50
53	INSTRUCT + DEPT RESEARCH	12486000	SUM OF 50, 51, 52
54	SPONSORED RESEARCH	300000	EQUATION: L31
55	OTHER SPONSORED PROGRAMS	100000	EQUATION: L32
56	PUBLIC SERVICE	400000	CONSTANT

SUMMARY REPORTS

REPORT TITLE (1–24)	FREEFORM REPORT LINES (25–80)

Figure 24 (Continued)

NAME ____________

PLANTRAN II DATA SHEET

PAGE 4 OF 5

MRI

IDENTIFICATION

ORGANIZATION	MODEL DESCRIPTION	DATE	BASE PERIOD T	H	R		RUN NO.
1–24	25–40	41–56	57–60	61–63	63–65	T - TIME PERIOD H - HEADING R - REPLACEMENT	78–80

COLUMNAR HEADINGS - OPTIONAL

PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	PERIOD 5	PERIOD 6	PERIOD 7	PERIOD 8	PERIOD 9	PERIOD 10	PERIOD 11	PERIOD 12
1–6	7–12	13–18	19–24	25–30	31–36	37–42	43–48	49–54	55–60	61–66	67–72

MODEL SPECIFICATION

LINE NO. (1–4)	PLANNING ITEM (5–28)	BASE LEVEL (29–40)	FREEFORM METHOD OF COMPUTATION (41–80)
57	LIBRARIES	1370000	EQUATION: .05L35
58	REGISTRARS OFFICE	200000	PERCENT INCREASE OF 3
59	DEAN OF STUDENTS	700000	PERCENT INCREASE OF 5
60	HEALTH SERVICE	225000	PERCENT INCREASE OF 2
61	TESTING + COUNSELLING	200000	CONSTANT
62	STUDENT SERVICES	1325000	SUM OF 58, 59, 60, 61
63	PHYSICAL PLANT + MAINT	4300000	PERCENT INCREASE OF 2
64	GENERAL ADMINISTRATION	4300000	PERCENT INCREASE OF 4
65	STAFF BENEFITS	982000	EQUATION: .10L50
66	GENERAL INSTITUTIONAL	500000	PERCENT INCREASE OF 4
67	EDUCATION + GENERAL	24393000	SUM OF 53, 54, 55, 56, 57, 62, 63, 64, 65, 66
68	STUDENT AID	3435000	EQUATION: L15*L1
69	INTERCOLLEGIATE ATHLETIC	115000	EQUATION: 1.15L40
70	RESIDENCE HALLS	2935000	EQUATION: .95L41
71	FACULTY HOUSING	80000	EQUATION: .80L42
72	FOOD SERVICE	1854000	EQUATION: .90L43
73	COLLEGE UNION	255000	EQUATION: .85L44
74	STUDENT STORE	232000	EQUATION: .93L45

SUMMARY REPORTS

REPORT TITLE (1–24)	FREEFORM REPORT LINES (25–80)

Figure 24 (Continued)

PLANTRAN II DATA SHEET

NAME ______ PAGE 5 OF 5 MRI

IDENTIFICATION

ORGANIZATION (1–24)	MODEL DESCRIPTION (25–40)	DATE (41–56)	BASE PERIOD (57–60)	T (61)	H (63)	R (65)	T - TIME PERIOD H - HEADING R - REPLACEMENT	RUN NO. (78–80)

COLUMNAR HEADINGS - OPTIONAL

PERIOD 1 (1–6)	PERIOD 2 (7–12)	PERIOD 3 (13–18)	PERIOD 4 (19–24)	PERIOD 5 (25–30)	PERIOD 6 (31–36)	PERIOD 7 (37–42)	PERIOD 8 (43–48)	PERIOD 9 (49–54)	PERIOD 10 (55–60)	PERIOD 11 (61–66)	PERIOD 12 (67–72)

MODEL SPECIFICATION

LINE NO. (1–4)	PLANNING ITEM (5–28)	BASE LEVEL (29–40)	FREEFORM METHOD OF COMPUTATION (41–44)	(45–80)
75	AUXILIARY ENTERPRISES	5471000	SUM	OF 69, 70, 71, 72, 73, 74
76	TOTAL EXPENDITURES	33299000	EQUA	TION: L67+L68+L75
77	SURPLUS/DEFICIT	815000	EQUA	TION: L47-L76
78	ACCUM SURPLUS/DEFICIT	815000	ACCS	77
79				

SUMMARY REPORTS

REPORT TITLE (1–24)	FREEFORM REPORT LINES (25–80)

Figure 24 (Concluded)

EXAMPLE
OVERVIEW BUDGET
RUN

ANALYSIS OF MATRIX
FOR A
6 PERIOD FORECAST

CURRENT DATE

BASE YR. 1971

LINE	DESCRIPTION	BASE	METHOD OF COMPUTATION
1	FULL-TIME STUDENTS/SEM	11450	DATA12371,13330,14258,14949,15493,16011
2	PART-TIME STUDENTS(FTE)	1000	CONSTANT
3	FEES/FULL-TIME STUDENT	2000	INCREASE 75 PER YEAR
4	FEES/CREDIT HOUR	67	EQUATION: L3 / 30
5	STATE APPROP/FTE STUDENT	20	CONSTANT
6	ENDOWMENT PRINCIPLE	10000000	INCREASE 1000000 PER YEAR
7	ENDOWMENT YIELD(PCT)	5	CONSTANT
8	NON-STUDENT AID PERCENT	40	CONSTANT
9	PCT FULL-TIME ON-CAMPUS	45	INCREASE 1.5 PER YEAR
10	ROOM FEE	600	PERCENT INCREASE OF 4
11	BOARD FEE	400	PERCENT INCREASE OF 5
12	AVERAGE CLASS SIZE	30	CONSTANT
13	AVERAGE TEACHING LOAD	9.5	CONSTANT
14	AVERAGE FACULTY SALARY	12300	PERCENT INCREASE OF 4
15	FINANCIAL AID/STUDENT	300	PERCENT INCREASE OF 3
16	STUDENT CREDIT HOURS	186750	EQUATION: 15 * (L1 + L2)
17	NUMBER OF FTE FACULTY	655	EQUATION: L16 / (L12 * L13)
18	TUITION INCOME	24910000	EQUATION: L1 * L3 + 30L2 * L4
19	LABORATORY INCOME	100000	PERCENT INCREASE OF 3

Figure 25

EXAMPLE
OVERVIEW BUDGET
RUN

ANALYSIS OF MATRIX
FOR A
6 PERIOD FORECAST

CURRENT DATE

BASE YR. 1971

LINE	DESCRIPTION	BASE	METHOD OF COMPUTATION
20	INCIDENTAL INCOME	100000	CONSTANT
21	TUITION + FEE INCOME	25110000	SUM OF 18,19,20
22	STATE GOVERNMENT	249000	EQUATION: L5 * (L1 + L2)
23	FEDERAL GOVERNMENT	0	CONSTANT
24	GOVERNMENT APPROPRIATION	249000	SUM OF 22,23
25	ENDOWMENT INCOME	200000	EQUATION: .01L7 * .01L8 * L6
26	ALUMNI GIFTS	100000	PERCENT INCREASE OF 2
27	FOUNDATION GIFTS	300000	CONSTANT
28	CORPORATE GIFTS	600000	PERCENT INCREASE OF 3
29	OTHER GIFTS	50000	CONSTANT
30	GIFT INCOME	1250000	SUM OF 26,27,28,29
31	SPONSORED RESEARCH	300000	CONSTANT
32	OTHER SPONSORED PROGRAMS	100000	PERCENT INCREASE OF 2
33	RECOVERY OF INDIR COSTS	105000	EQUATION: .30L31 + .15L32
34	OTHER INCOME	100000	CONSTANT
35	EDUCATIONAL + GEN INCOME	27414000	SUM OF 21,24,25,30,31,32,33,34
36	STUDENT AID GIFTS	400000	PERCENT INCREASE OF 3
37	STUDENT AID ENDOW INCOME	300000	EQUATION: .01L7 * L6 - L25
38	OTHER STUDENT AID INCOME	100000	CONSTANT

Figure 25 (Continued)

EXAMPLE
OVERVIEW BUDGET
RUN

ANALYSIS OF MATRIX
FOR A
6 PERIOD FORECAST

CURRENT DATE
BASE YR. 1971

LINE	DESCRIPTION	BASE	METHOD OF COMPUTATION
39	STUDENT AID INCOME	800000	SUM OF 36,37,38
40	INTERCOLLEGIATE ATHLETIC	100000	CONSTANT
41	RESIDENCE HALLS	3090000	EQUATION: .01L9 * L1 * L10
42	FACULTY HOUSING	100000	CONSTANT
43	FOOD SERVICES	2060000	EQUATION: .01L9 * L1 * L11
44	COLLEGE UNION	300000	PERCENT INCREASE OF 3
45	STUDENT STORE	250000	CONSTANT
46	AUXIL ENTERPRISE INCOME	5900000	SUM OF 40,41,42,43,44,45
47	TOTAL REVENUE	34114000	SUM OF 35,39,46
50	FACULTY SALARIES	8056000	EQUATION: L17 * L14
51	NON-FACULTY SALARIES	2416000	EQUATION: .30L50
52	SUPPORT COSTS	2014000	EQUATION: .25L50
53	INSTRUCT + DEPT RESEARCH	12486000	SUM OF 50,51,52
54	SPONSORED RESEARCH	300000	EQUATION: L31
55	OTHER SPONSORED PROGRAMS	100000	EQUATION: L32
56	PUBLIC SERVICE	400000	CONSTANT
57	LIBRARIES	1370000	EQUATION: .05L35
58	REGISTRARS OFFICE	200000	PERCENT INCREASE OF 3
59	DEAN OF STUDENTS	700000	PERCENT INCREASE OF 5

Figure 25 (Continued)

EXAMPLE
OVERVIEW BUDGET
RUN

ANALYSIS OF MATRIX
FOR A
6 PERIOD FORECAST

CURRENT DATE

BASE YR. 1971

LINE	DESCRIPTION	BASE	METHOD OF COMPUTATION
60	HEALTH SERVICE	225000	PERCENT INCREASE OF 2
61	TESTING + COUNSELLING	200000	CONSTANT
62	STUDENT SERVICES	1325000	SUM OF 58,59,60,61
63	PHYSICAL PLANT + MAINT	4000000	PERCENT INCREASE OF 2
64	GENERAL ADMINISTRATION	4300000	PERCENT INCREASE OF 6
65	STAFF BENEFITS	982000	EQUATION: .10L50
66	GENERAL INSTITUTIONAL	500000	PERCENT INCREASE OF 4
67	EDUCATION+ GENERAL	24393000	SUM OF 53,54,55,56,57,62,63,64,65,66
68	STUDENT AID	3435000	EQUATION: L15 * L1
69	INTERCOLLEGIATE ATHLETIC	115000	EQUATION: 1.15L40
70	RESIDENCE HALLS	2935000	EQUATION: .95L41
71	FACULTY HOUSING	80000	EQUATION:.80L42
72	FOOD SERVICE	1854000	EQUATION: .90L43
73	COLLEGE UNION	255000	EQUATION: .85L44
74	STUDENT STORE	232000	EQUATION: .93L45
75	AUXILIARY ENTERPRISES	5471000	SUM OF 69,70,71,72,73,74
76	TOTAL EXPENDITURES	33299000	EQUATION: L67 + L68 + L75
77	SURPLUS/DEFICIT	815000	EQUATION: L47 - L76
78	ACCUM SURPLUS/DEFICIT	815000	ACCS 77

Figure 25 (Continued)

EXAMPLE OVERVIEW BUDGET RUN	ANALYSIS OF MATRIX FOR A 6 PERIOD FORECAST	CURRENT DATE BASE YR. 1971

LINE	DESCRIPTION	BASE	METHOD OF COMPUTATION
79			

Figure 25 (Continued)

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THE FOLLOWING REPORTS ARE REQUESTED
PLANNING FACTORS           1-17
INCOME                     S1,18-21,79,22-24,79,25,79,26-30,79,31,79,32,79,C
                           33,79,34,79,35,79,36-39,79,40-46,79,47,79,77
EXPENSE                    S1,50-53,79,54,79,55,79,56,79,57,79,58-62,79,63,79,C
                           64,79,65,79,66,79,67,79,79,68,79,69-75,79,76,79,77
```

Figure 25 (Concluded)

EXAMPLE
OVERVIEW BUDGET

PLANNING FACTORS

CURRENT DATE
RUN

LINE NO.	PLANNING ITEM	1972	1973	1974	1975	1976	1977
1	FULL-TIME STUDENTS/SEM	12371.00	13330.00	14258.00	14949.00	15493.00	16011.00
2	PART-TIME STUDENTS(FTE)	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
3	FEES/FULL-TIME STUDENT	2075.00	2150.00	2225.00	2300.00	2375.00	2450.00
4	FEES/CREDIT HOUR	69.17	71.67	74.17	76.67	79.17	81.67
5	STATE APPROP/FTE STUDENT	20.00	20.00	20.00	20.00	20.00	20.00
6	ENDOWMENT PRINCIPLE	11000000	12000000	13000000	14000000	15000000	16000000
7	ENDOWMENT YIELD(PCT)	5.00	5.00	5.00	5.00	5.00	5.00
8	NON-STUDENT AID PERCENT	40.00	40.00	40.00	40.00	40.00	40.00
9	PCT FULL-TIME ON-CAMPUS	46.50	48.00	49.50	51.00	52.50	54.00
10	ROOM FEE	624.00	648.96	674.92	701.92	729.99	759.19
11	BOARD FEE	420.00	441.00	463.05	486.20	510.51	536.04
12	AVERAGE CLASS SIZE	30.00	30.00	30.00	30.00	30.00	30.00
13	AVERAGE TEACHING LOAD	9.50	9.50	9.50	9.50	9.50	9.50
14	AVERAGE FACULTY SALARY	12792.00	13303.68	13835.83	14389.26	14964.83	15563.42
15	FINANCIAL AID/STUDENT	309.00	318.27	327.82	337.65	347.78	358.22
16	STUDENT CREDIT HOURS	200565.00	214950.00	228870.00	239235.00	247395.00	255165.00
17	NUMBER OF FTE FACULTY	703.74	754.21	803.05	839.42	868.05	895.32

Figure 26

EXAMPLE
OVERVIEW BUDGET

INCOME

CURRENT DATE
RUN

LINE NO.	PLANNING ITEM	1972	1973	1974	1975	1976	1977
18	TUITION INCOME	27744816	30809472	33949040	36682672	39170864	41676928
19	LABORATORY INCOME	103000	106090	109273	112551	115927	119405
20	INCIDENTAL INCOME	100000	100000	100000	100000	100000	100000
21	TUITION + FEE INCOME	27947816	31015562	34158313	36895223	39386791	41896333
79							
22	STATE GOVERNMENT	267420	286600	305160	318980	329860	340220
23	FEDERAL GOVERNMENT	0	0	0	0	0	0
24	GOVERNMENT APPROPRIATION	267420	286600	305160	318980	329860	340220
79							
25	ENDOWMENT INCOME	220000	240000	260000	280000	300000	320000
79							
26	ALUMNI GIFTS	102000	104040	106121	108243	110408	112616
27	FOUNDATION GIFTS	300000	300000	300000	300000	300000	300000
28	CORPORATE GIFTS	618000	636540	655636	675305	695564	716431
29	OTHER GIFTS	50000	50000	50000	50000	50000	50000
30	GIFT INCOME	1070000	1090580	1111757	1133548	1155973	1179048
79							
31	SPONSORED RESEARCH	300000	300000	300000	300000	300000	300000
79							
32	OTHER SPONSORED PROGRAMS	102000	104040	106121	108243	110408	112616
79							

Figure 26 (Continued)

EXAMPLE
OVERVIEW BUDGET

INCOME

CURRENT DATE
RUN

LINE NO.	PLANNING ITEM	1972	1973	1974	1975	1976	1977
33	RECOVERY OF INDIR COSTS	105300	105606	105918	106236	106561	106892
79							
34	OTHER INCOME	100000	100000	100000	100000	100000	100000
79							
35	EDUCATIONAL + GEN INCOME	30112536	33242388	36447268	39242231	41789593	44355109
79							
36	STUDENT AID GIFTS	412000	424360	437091	450204	463710	477621
37	STUDENT AID ENDOW INCOME	330000	360000	390000	420000	450000	480000
38	OTHER STUDENT AID INCOME	100000	100000	100000	100000	100000	100000
39	STUDENT AID INCOME	842000	884360	927091	970204	1013710	1057621
79							
40	INTERCOLLEGIATE ATHLETIC	100000	100000	100000	100000	100000	100000
41	RESIDENCE HALLS	3589565	4152304	4763375	5351389	5937621	6563918
42	FACULTY HOUSING	100000	100000	100000	100000	100000	100000
43	FOOD SERVICES	2416053	2821692	3268069	3706799	4152416	4634549
44	COLLEGE UNION	309000	318270	327818	337653	347782	358216
45	STUDENT STORE	250000	250000	250000	250000	250000	250000
46	AUXIL ENTERPRISE INCOME	6764618	7742266	8809262	9845841	10887819	12006683
79							
47	TOTAL REVENUE	37719154	41869014	46183621	50058275	53691122	57419413
79							

Figure 26 (Continued)

EXAMPLE
OVERVIEW BUDGET

INCOME

CURRENT DATE
RUN

LINE NO.	PLANNING ITEM	1972	1973	1974	1975	1976	1977
77	SURPLUS/DEFICIT	-67888	470480	979264	1313360	1515424	1656288

Figure 26 (Continued)

EXAMPLE
OVERVIEW BUDGET

EXPENSE

CURRENT DATE
RU

LINE NO.	PLANNING ITEM	1972	1973	1974	1975	1976	1977
50	FACULTY SALARIES	9002198	10033774	11110893	12078643	12990256	13934175
51	NON-FACULTY SALARIES	2700658	3010131	3333267	3623592	3897076	4180251
52	SUPPORT COSTS	2250549	2508443	2777723	3019660	3247564	3483543
53	INSTRUCT + DEPT RESEARCH	13953405	15552348	17221883	18721895	20134896	21597969
79							
54	SPONSORED RESEARCH	300000	300000	300000	300000	300000	300000
79							
55	OTHER SPONSORED PROGRAMS	102000	104040	106121	108243	110408	112616
79							
56	PUBLIC SERVICE	400000	400000	400000	400000	400000	400000
79							
57	LIBRARIES	1505626	1662119	1822363	1962111	2089479	2217755
79							
58	REGISTRARS OFFICE	206000	212180	218545	225102	231855	238810
59	DEAN OF STUDENTS	735000	771750	810337	850854	893397	938067
60	HEALTH SERVICE	229500	234090	238772	243547	248418	253387
61	TESTING + COUNSELLING	200000	200000	200000	200000	200000	200000
62	STUDENT SERVICES	1370500	1418020	1467655	1519503	1573670	1630264
79							
63	PHYSICAL PLANT + MAINT	4080000	4161600	4244832	4329729	4416323	4504650

Figure 26 (Continued)

EXAMPLE
OVERVIEW BUDGET

EXPENSE

CURRENT DATE
RUN

LINE NO.	PLANNING ITEM	1972	1973	1974	1975	1976	1977
79							
64	GENERAL ADMINISTRATION	4559000	4631480	5121369	5428651	5754370	6099632
79							
65	STAFF BENEFITS	900219	1003377	1111088	1207863	1299025	1393417
79							
66	GENERAL INSTITUTIONAL	520000	540800	562432	584929	608326	632660
79							
67	EDUCATION+ GENERAL	27689750	29973784	32357742	34562924	36686498	38888962
79							
79							
68	STUDENT AID	3822635	4242536	4674027	5047568	5388186	5735389
79							
69	INTERCOLLEGIATE ATHLETIC	115000	115000	115000	115000	115000	115000
70	RESIDENCE HALLS	3410086	3944688	4525206	5083819	5640739	6235722
71	FACULTY HOUSING	80000	80000	80000	80000	80000	80000
72	FOOD SERVICE	2174447	2539522	2941262	3336119	3737174	4171093
73	COLLEGE UNION	262650	270529	278645	287005	295615	304483
74	STUDENT STORE	232500	232500	232500	232500	232500	232500
75	AUXILIARY ENTERPRISES	6274683	7182239	8172613	9134443	10101028	11138798
79							

Figure 26 (Continued)

PLE
VIEW BUDGET

EXPENSE

CURRENT DATE
RUN

LINE NO.	PLANNING ITEM	1972	1973	1974	1975	1976	1977
76	TOTAL EXPENDITURES	37787040	41398528	45204352	48744912	52175696	55763120
79							
77	SURPLUS/DEFICIT	-67888	470480	979264	1313360	1515424	1656288

Figure 26 (Concluded)

BUDGET PROJECTION
DATA COLLECTION DOCUMENT

Item	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
1. Full-Time Students												
2. Part-Time Students (FTE)												
3. Fees/Full-Time Student												
4. Fees/Credit Hour												
5. State Appropriation/FTE Student												
6. Endowment Principle (thou)												
7. Endowment Yield												
8. Non-Student Aid Share of Endowment Income												
9. Percent Full-Time Students Living on Campus												
10. Room Fee												
11. Board Fee												
12. Average Class Size												
13. Average Teaching Load												
14. Average Faculty Salary												
15. Average Financial Aid/Student												

Figure 27

BUDGET PROJECTION
DATA COLLECTION DOCUMENT

SAMPLE

Item	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
1. Full-Time Students	12371	13330	14258	14949	15493	16011	16516	16992	17497	18001	18300	18258
2. Part-Time Students (FTE)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
3. Fees/Full-Time Student	2025	2150	2225	2300	2325	2450	2525	2600	2625	2750	2825	2900
4. Fees/Credit Hour	69.2	11.7	74.2	76.7	79.2	81.7	84.2	86.7	89.2	91.7	94.2	96.7
5. State Appropriation/FTE Student	20	20	20	20	20	20	20	20	20	20	20	20
6. Endowment Principle (thou.)	11000	12000	13000	14000	15000	16000	17000	18000	19000	20000	21000	22000
7. Endowment Yield	5	5	5	5	5	5	5	5	5	5	5	5
8. Non-Student Aid Share of Endowment Income	40	40	40	40	40	40	40	40	40	40	40	40
9. Percent Full-Time Students Living on Campus	46.5	48.0	49.5	51.0	52.5	54.0	55.5	57.0	58.5	60.0	61.5	63.0
10. Room Fee	624	649	674	701	730	759	789	821	854	888	921	954
11. Board Fee	420	441	463	486	510	536	562	591	620	651	672	690
12. Average Class Size	30	30	30	30	30	30	30	30	30	30	30	30
13. Average Teaching Load	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
14. Average Faculty Salary	12791	13303	13835	14389	14964	15563	16185	16833	17506	18207	19300	20100
15. Average Financial Aid/Student	309	318	327	337	347	358	369	380	391	403	414	430

Figure 28

PLAN REFINING CYCLE

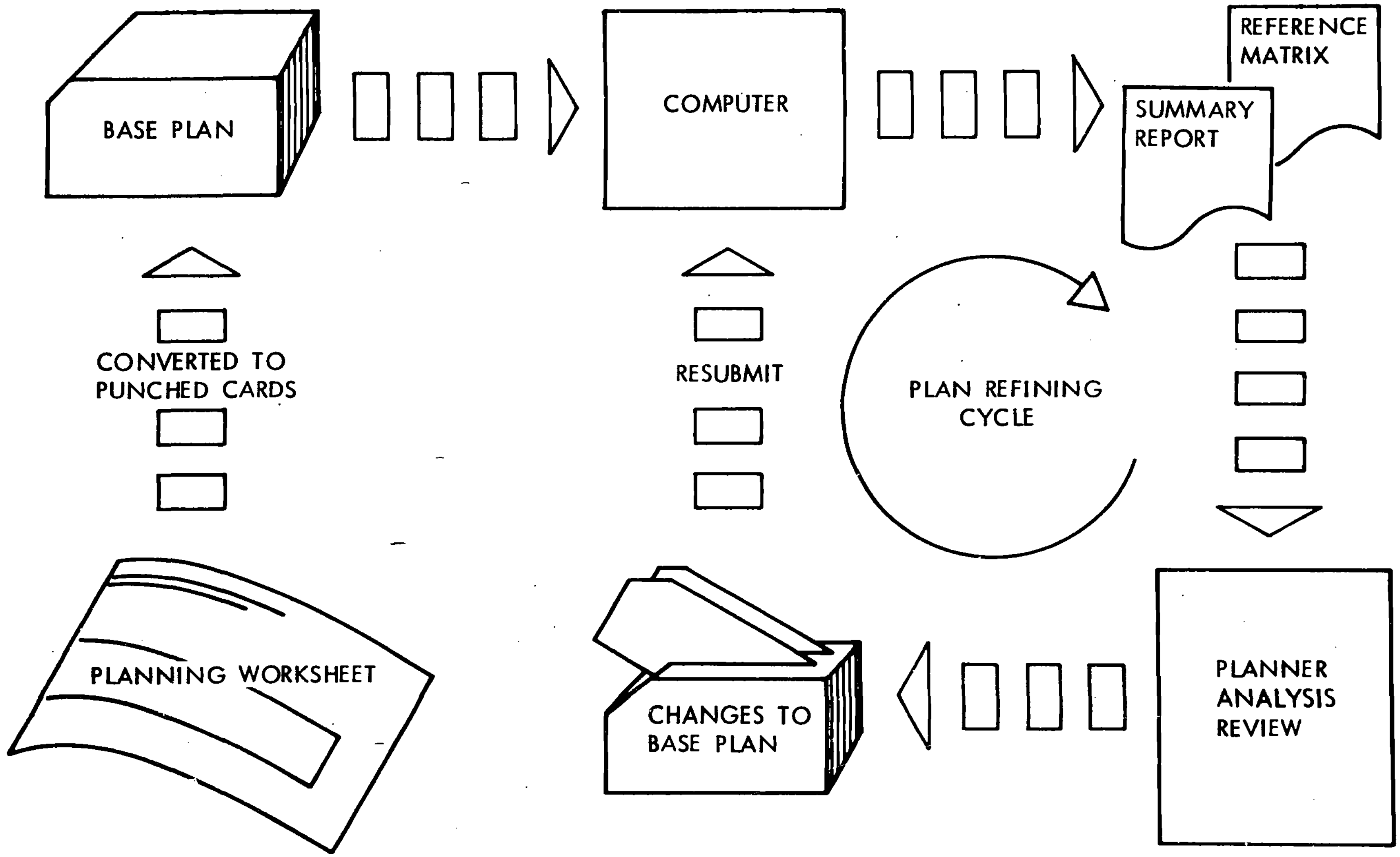

Figure 29

Changes in the model can be of two types. The structure of the model itself can be changed in order to more closely approximate the real world situation. For example, the income and expense reporting format for a college may differ significantly from the one used in the micro-model. In such an event the structure of the micro-model should be changed to conform to the format and titles which institutional decision makers are familiar with.

A second type of change is the result of the application of informed judgment. A projection that increased certain income items at too fast a rate will be changed in the light of the judgment and knowledge of decision makers. This type of input to the modeling effort is important and should not be overlooked.