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ABSTRACT

This document provides the definitions and procedures for the costing portion of the NCHEMS Information Exchange Procedures (IEP). Also included is an overview of the eight steps and more detailed activities to be performed by institutions using related computer software to conduct the IEP cost study. The IEP cost study implementation steps are: develop the IEP activity structure, develop the instructional workload matrix, cross over direct expenditures to the IEP activity structure, calculate discipline direct unit analysis, allocate support costs/calculate full costs, and calculate full unit costs. (MJM)

INFORMATION EXCHANGE PROCEDURES

COST STUDY PROCEDURES MANUAL

Technical Report 65

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P.O. Drawer P Boulder, Colorado 80302

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The Program of the National Center for Higher Education Management Systems at WICHE was proposed by state coordinating agencies and colleges and universities in the West to be under the aegis of the Western Interstate Commission for Higher Education. The National Center for Higher Education Management Systems at WICHE proposes in summary:

To design, develop, and encourage the implementation of management information systems and data bases including common data elements in institutions and agencies of higher education that will:

- provide improved information to higher education administration at all levels.
- facilitate exchange of comparable data among institutions.
- facilitate reporting of comparable information at the state and national levels.

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PREFACE

The Information Exchange Procedures (IEP) developed by the National Center for Higher Education Management Systems (NCHEMS) are a set of standard definitions and procedures for collecting information about disciplines and student degree programs, outcomes of instructional programs, and general institutional characteristics. These definitions and procedures have been developed to facilitate exchange of information among institutions of postsecondary education, providing institutions with some assurance that data they exchange are useful for purposes of comparison.

The procedures and definitions recommended in this manual and other manuals about IEP are "targets" for institutions. While it is anticipated that most institutions will be able to follow these recommendations, some institutions may not have available the required information and others may be able to provide it only at an unreasonable cost. Others may find that only after several years of using IEP can data be developed that accurately reflect the characteristics of the institutions. For some institutions the definitions and procedures may be too complex; others may find them too simplistic. Any effort at exchange of data among institutions involves some compromise in an attempt to accommodate the wide variation among institutions. Consequently, while comparable information for exchange is the goal of IEP, NCHEMS cannot guarantee absolute comparability of data as the final result of IEP. But, hopefully, implementation of IEP will represent reasonable progress toward that goal.

The Information Exchange Procedures initially were developed by the NCHEMS staff with guidance from a task force and steering committee, composed of institutional and state agency representatives. The cost procedures were tested during 1972-73 by a group of about 60 community colleges, private colleges, and state colleges and universities. The full set of exchange procedures was tested during 1973-74 in about the same number and kinds of institutions. Insights gained from these pilot tests served to refine the full range of procedures and definitions.

The Information Exchange Procedures described in this manual, and in others listed below, have been reviewed and approved by the IEP advisory groups and the NCHEMS Board of Directors, and are being released at this time for widescale implementation. While IEP is intended to be a final product, widescale implementation may point to additional information needs of institutions that can be addressed in updates to this manual if necessary. However, NCHEMS feels that IEP is sufficiently refined at this time that it can be released to the full NCHEMS general distribution mailing list and to other institutions interested in implementing IEP.

This publication is one of four implementation manuals for IEP:

Information Exchange Procedures Activity Structure, Technical Report No. 63, specifies the structure to be used in collecting institutional data, including detailed examples of an account crossover. This structure is based on the NCHEMS Program Classification Structure, Technical Report No. 27, as modified in late 1974.

Information Exchange Procedures Data Formats and Definitions, Technical Report No. 64, contains the formats recommended for collection and display of the IEP data set. This document also includes a complete glossary of IEP terminology and definitions.

Information Exchange Procedures Cost Study Procedures, Technical Report No. 65, contains the procedures for implementing the cost study portion of IEP with specific references to the NCHEMS Costing and Data Management System. The costing procedures specified in this document are based on those developed in the Cost Finding Principles project.

Information Exchange Procedures Outcomes Procedures, Technical Report No. 66, contains the procedures for implementing the outcomes portion of IEP. The outcomes measures and procedures specified in this document are based on those developed in the Outcomes project.

These documents replace the following documents:

Information Exchange Procedures Manual (Field Review Edition): A Synopsis, Technical Report No. 46

Information Exchange Procedures Manual (Field Review Edition), Technical Report No. 47

Information Exchange Procedures Cost Study Implementation Guide (Preliminary Edition), Technical Report No. 52

The software system designed to support the Information Exchange Procedures is documented separately. Readers concerned with the NCHEMS Costing and

Data Management System should refer to the following documents:

An Introduction to the NCHEMS Costing and Data Management System, Technical Report No. 55

NCHEMS Costing and Data Management System--Sample Reports, Technical Report No. 56

Account Crossover Module Reference Manual, Technical Report No. 57

Faculty Activity Module Reference Manual, Technical Report No. 58

Personnel Data Module Reference Manual, Technical Report No. 59

Student Data Module Reference Manual, Technical Report No. 50

Student Outcomes Module Reference Manual, Technical Report No. 61

Data Management Module Reference Manual, Technical Report No. 62

Other documents that will be useful in conjunction with the manual are:

Report of the Joint Accounting Group

Faculty Activity Analysis: Procedures Manual, Technical Report No. 44

Faculty Activity Analysis: Interpretation and Uses of Data, Technical Report No. 54

Cost Analysis Manual (Field Review Edition), Technical Report No. 45

Higher Education Facilities Planning and Management Manuals

ACKNOWLEDGMENTS

Many individuals and institutions have contributed to the development of the Information Exchange Procedures and related products. Contributing task forces and other groups have been mentioned in the Preface. Within NCHEMS, many individuals have contributed to this Cost Study Procedures Manual by sharing their implementation experience and providing reviews of drafts of the manual. Among these individuals are: William Collard, Gary Gamso, Michael Haight, Ivy Iwashita, Anahid Katchian, Ron Martin, Ed Myers, Nancy Renkiewicz, Leonard Romney, Allan Service, James Topping and Robert Wallhaus.

Special thanks are reserved for Mrs. Dee Blessing who patiently typed and coordinated the production of the many revisions of this manual.

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INTRODUCTION

This document provides the definitions and procedures for the costing portion of the NCHEMS Information Exchange Procedures (IEP). Also included is an overview of the eight steps and more detailed activities to be performed by institutions using related computer software - the NCHEMS Costing and Data Management System - to conduct the IEP cost study.

The IEP related publications described in the Preface are designed for several different types of individuals involved in the implementation process. This Cost Study Procedures Manual is designed for individuals responsible for the cost study portion of the IEP implementation effort and others with a need for understanding the Information Exchange Procedures and the general implementation process. Individuals responsible for the actual installation of the NCHEMS Costing and Data Management System computer software should read the technical documents relating to that system (Technical Reports 55, 56, 57, 58, 59, 60, 61 and 62). Individuals responsible for the actual collection of institutional data and the preparation of other input data to the NCHEMS Costing and Data Management System for an IEP implementation will need to refer to the more detailed publications Information Exchange Procedures Activity Structure, Technical Report 63, Information Exchange Procedures Data Formats and Definitions, Technical Report 64, and additional training and implementation material prepared to assist in the implementation process. Individuals responsible for implementing the

student outcomes study portion of the IEP will use the Information Exchange Procedures Outcomes Procedures Manual, Technical Report 66 as well as the appropriate technical documents.

As mentioned in the Preface, this cost study manual contains the recommended definitions and procedures to be used by institutions implementing the cost study portion of the Information Exchange Procedures. While institutions should attempt to develop cost data in adherence with these procedures and conventions, many users will also discover that the development of cost data that accurately represents an institution does not really occur until the second or even third implementation cycle. Effort in the first year or two may lead primarily to refining the institution's data systems so that future results will more accurately reflect the institution's operation and use of resources.

To facilitate the implementation of an IEP cost study, NCHEMS has developed the NCHEMS Costing and Data Management computer software. While all participating institutions should attempt to adhere to the recommended costing definitions and procedures, the use of the NCHEMS Costing and Data Management System - and the particular approach to the use of that system described in this manual - represent only one way of collecting and preparing the information included in the IEP data set. Other

implementation approaches using the NCHEMS Costing and Data Management System or implementations not using the NCHEMS computer software can also develop the IEP data set in full adherence to the Information Exchange Procedures.

Many institutions that conduct an IEP cost study may wish to extend their analysis by using the NCHEMS Resource Requirements Prediction Model 1.6 (RRPM 1.6). This model allows the user to take the IEP cost study one step further and analyze the impact of decisions on the cost of future resource requirements. To facilitate this further analysis, the NCHEMS Costing and Data Management System optionally provides input to RRPM 1.6. Users interested in extending their cost analysis should refer to the Introduction to the Resource Requirements Prediction Model 1.6, Technical Report 34A and Resource Requirements Prediction Model 1.6 System Documentation, Technical Report 34B.

Individuals in institutions implementing the Information Exchange Procedures should make special note that the implementation of these procedures is not an end in itself but rather only a means to the more important use of comparative data in the decision making process of the institution. Much effort will be devoted by NCHEMS in the coming months to discovering and documenting existing and new uses of the Information Exchange Procedures data and to improving the data set itself.

NCHEMS U

To facilitate the use of coordinated and meaningful examples throughout this manual, partial data for a hypothetical institution,

"NCHEMS U," are presented and referred to in a number of examples. The use of a single set of sample data is particularly helpful in understanding the relationship of information in the several computer software modules.

The user should first read the entire manual so as to place each task in its proper perspective. After this is done, the user will be better prepared to make specific plans for completing each task.

IEP OVERVIEW

The Information Exchange Procedures (IEP) are a set of recommendations and guidelines for collecting, reorganizing, and displaying:

(1) general descriptive and supporting institutional data

(2) direct cost for all IEP Activity Centers and direct cost by unit of instruction (for course levels within disciplines and student levels within student programs)

(3) full cost for IEP-defined "final cost objectives" and full cost by unit of instruction (for course levels within disciplines and student levels within student programs)

(4) outcomes of student programs

The data to be collected as part of an Information Exchange Procedures implementation are recorded on a set of "IEP Display Formats." These display formats are contained in IEP Data Formats and Definitions, Technical Report No. 64. In general, each display format contains data for one of the four data categories described above.

If an institution produces data in accordance with the Information Exchange Procedures, the results of the study should be compatible with studies for other time periods using the same procedures and with the results from other institutions where the same procedures have been used.

The remainder of this section provides a brief overview of the costing steps and their relationship to the NCHEMS Costing and Data Management System computer software. Following this brief overview, each major step in the implementation process is described in more detail in subsequent chapters. (Although the cost study process is conceptually quite simple, the details and calculations required may tend to make the entire process appear more difficult. The reader therefore should not attempt to achieve a full understanding of the implementation process from the brief overview but instead should use the following description to help place the several tasks in their proper perspective.)

MAJOR COST STUDY ACTIVITIES

This Cost Study Procedures Manual is designed to assist an institution in conducting an IEP cost study in an efficient manner with as few activities as necessary. Although there are many ways of approaching a cost study, knowing and understanding just one approach is all that is necessary for a successful implementation. One important element in a successful cost study is defining the implementation process as a series of identifiable steps. The implementation steps described in this manual are:

IEP COST STUDY IMPLEMENTATION STEPS

STEP 1--Develop the IEP Activity Structure

STEP 2--Develop the Instructional Work Load Matrix

STEP 3--Crossover Direct Expenditures to the IEP Activity Structure

A. Make adjustments to the general ledger to conform to IEP direct expenditures

B. Crossover these adjusted direct costs to the IEP Activity Structure

STEP 4--Calculate Discipline Direct Unit Costs

STEP 5--Calculate Student Program Direct Unit Costs

STEP 6--Prepare for Full Cost Analysis

STEP 7--Allocate Support Costs/Calculate Full Costs

STEP 8--Calculate Full Unit Costs

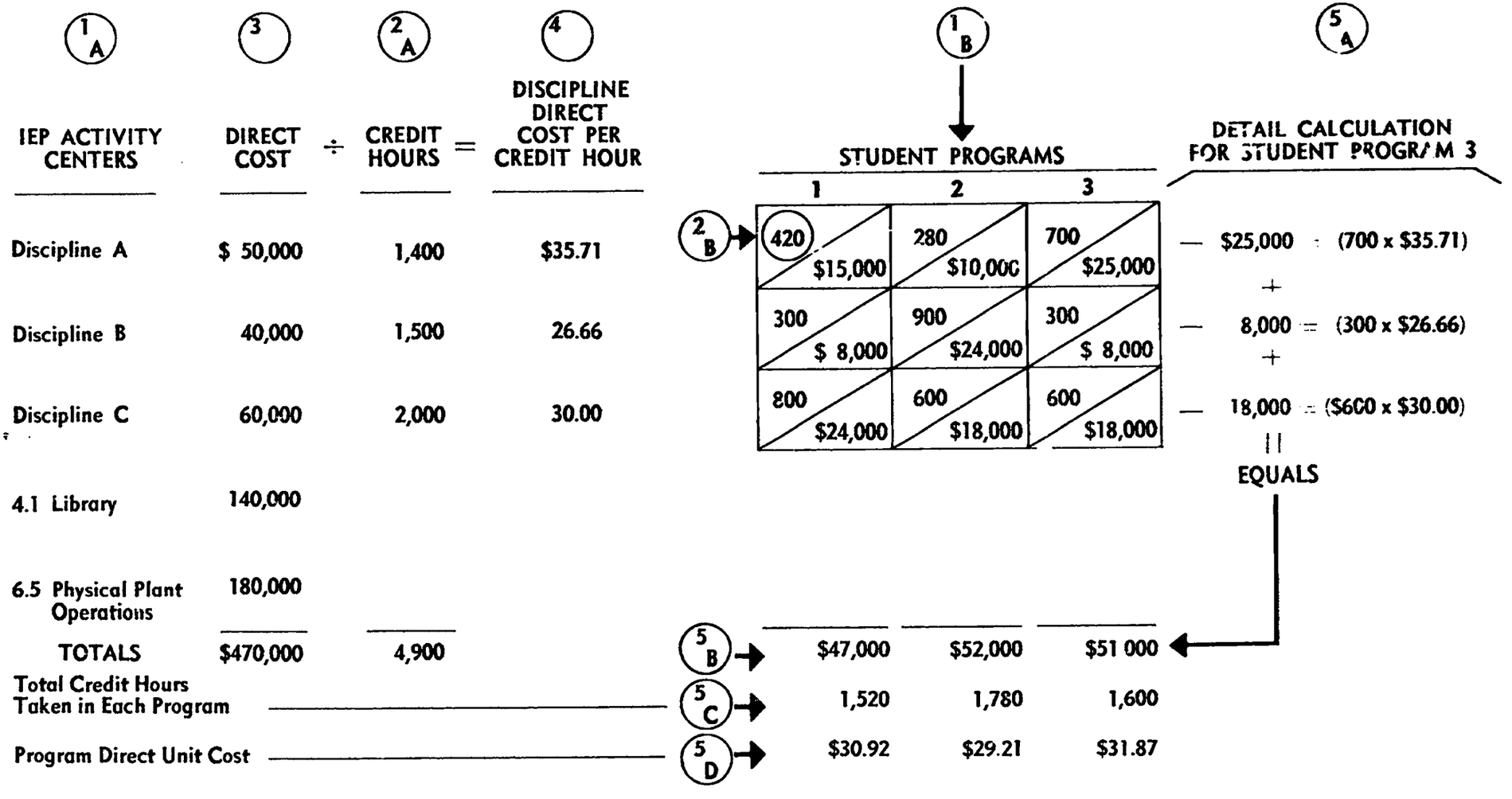
Conceptually, the data and the steps required to conduct a cost study are quite simple. Figure 1 provides an overview of the direct cost portion of the cost study process. (More exact definitions of the terms used in the figure are provided throughout this manual.)

The paragraphs below provide a brief description of this general process and of how the several computer software modules assist in the implementation process.

STEP 1--Develop the IEP Activity Structure

First the discipline and other organizational units with which costs are to be associated must be defined. The results of this are the IEP Activity Centers and Student Program descriptions indicated by (1A) and (1B).

FIGURE 1
IEP OVERVIEW OF DIRECT COST CALCULATIONS



This is done manually with the help of additional documentation in this and other IEP implementation manuals (such as Information Exchange Procedures Activity Structure, Technical Report No. 63).

STEP 2--Develop the Instructional Work Load Matrix

Next, the Student Data Module (SDM) uses student registration data and the institution's IEP Activity Structure to calculate the total number of credit hours taught (contributed) by each discipline and the total number of credit hours taken (consumed) by students in each student program. For example, this module may calculate that Lower Division History (Discipline A) provided a total of 1400 credit hours and that Upper Division Chemistry students took 420 credit hours from Lower Division History. The entire set of data describing the credit hours consumed by students in each student program from each discipline is referred to as the Instructional Work Load Matrix (or IWLM). The primary values calculated by the Student Data Module are indicated by (2A) and (2B).

STEP 3--Crossover Direct Expenditures to the IEP Activity Structure

The third implementation step is to adjust the institutional account balances to conform to the IEP definition of direct cost and then to crossover these adjusted account balances to the IEP Activity Structure to arrive at the direct cost of each activity center. The Account Crossover Module (ACM) is used first to adjust institutional accounts and then used again to crossover the adjusted accounts to the IEP Activity Centers. In crossing over adjusted institutional accounts, ACM uses data from the Personnel Data Module (PDM). The PDM analyzes compensation and costable activities for instructional faculty members (and in some cases, other staff members) and provides information as to how the adjusted institutional accounts from which faculty members were paid should be crossed to the activity centers in which the faculty members actually performed activities. Instructions for crossing over institutional accounts not treated by the Personnel Data Module (such as controllers office, library, dean of students) must be prepared manually. These manually prepared crossover instructions together with the crossover instructions prepared by the Personnel Data Module, are used by the Account Crossover Module to actually crossover institutional account balances to the IEP Activity Structure. The results of this crossover are direct cost figures for the IEP Activity Centers indicated by (3A).

In determining the crossover instructions for the faculty compensation accounts, some institutions may wish to obtain more detailed information on the activities of faculty members through the use of the NCHEMS Faculty Activity Analysis Survey Instrument. In this case, the Faculty Activity Module (FAM) is used to analyze the results of the survey instrument and prepare input for the Personnel Data Module. (Appendix B of this manual describes in more detail the use of Faculty Activity Analysis data.)

STEP 4--Calculate Discipline Direct Unit Costs

The Data Management Module (DMM) is used to calculate discipline and program direct unit costs. Discipline unit costs (indicated by column (4) are calculated by dividing the direct cost in a discipline by the credit hours offered by the discipline.

STEP 5--Calculate Student Program Direct Unit Costs

The Data Management Module is used again in this step to calculate total student program cost by "charging" each student program with its share of each discipline's direct cost. This is accomplished by multiplying the credit hours students take in a program by the discipline direct cost per credit hour calculated in Step 4, repeating this calculation for each discipline from which the program's students take credits, and then summing these calculations to derive a total program cost. These calculations for a single program are shown in column (5A) and the totals for all programs in row (5B). The Data Management Module also calculates the total number of credit hours taken by students in each program as shown in row (5C).

Program direct unit costs (5D) then are calculated by the Data Management Module by dividing total program cost (5B) by the total number of credit hours taken by students in the program (5C).

STEP 6--Prepare For Full Cost Analysis

The direct costs for all IEP Activity Centers have now been determined. In preparation for the calculation of full costs, additional cost data to reflect the use of capital assets and additicnal data to be used in the allocation process are supplied to the Data Manageme..t Module for use in the next step. (Figure 1 does not illustrate this step.)

STEP 7--Allocate Support Costs/Calculate Full Costs

To calculate full costs, the Data Management Module is used to allocate the direct costs of support cost centers (for example, 4.1 Libraries and 6.5 Physical Plant Operations)--plus the capital asset related cost data from Step 6--to IEP final cost objectives (cost centers that are not considered "support" cost centers) using recommended allocation parameters or actual usage data. The total costs allocated to each final cost objective then are added to the direct cost of the activity center to arrive at full costs. Again, Figure 1 does not illustrate this step.

STEP 8--Calculate Full Unit Costs

In the last implementation step, full unit costs are calculated in the same manner in which direct unit costs were calculated in 4 and 5, with the exception that full cost data are used rather than direct cost data.

ADDITIONAL COMPUTER SOFTWARE COMMENTS

In addition to the five modules mentioned above, one other computer software product may be of interest to institutions participating in an IEP implementation. The Student Outcomes Module, a sixth module in the NCHEMS Costing and Data Management System, can be used to analyze data from the NCHEMS Student Outcomes Survey Instrument and to provide data to the Data Management Module to enable limited examinations of student program costs and benefits. A separate procedures manual is available for institutions implementing the student outcomes portion of IEP.

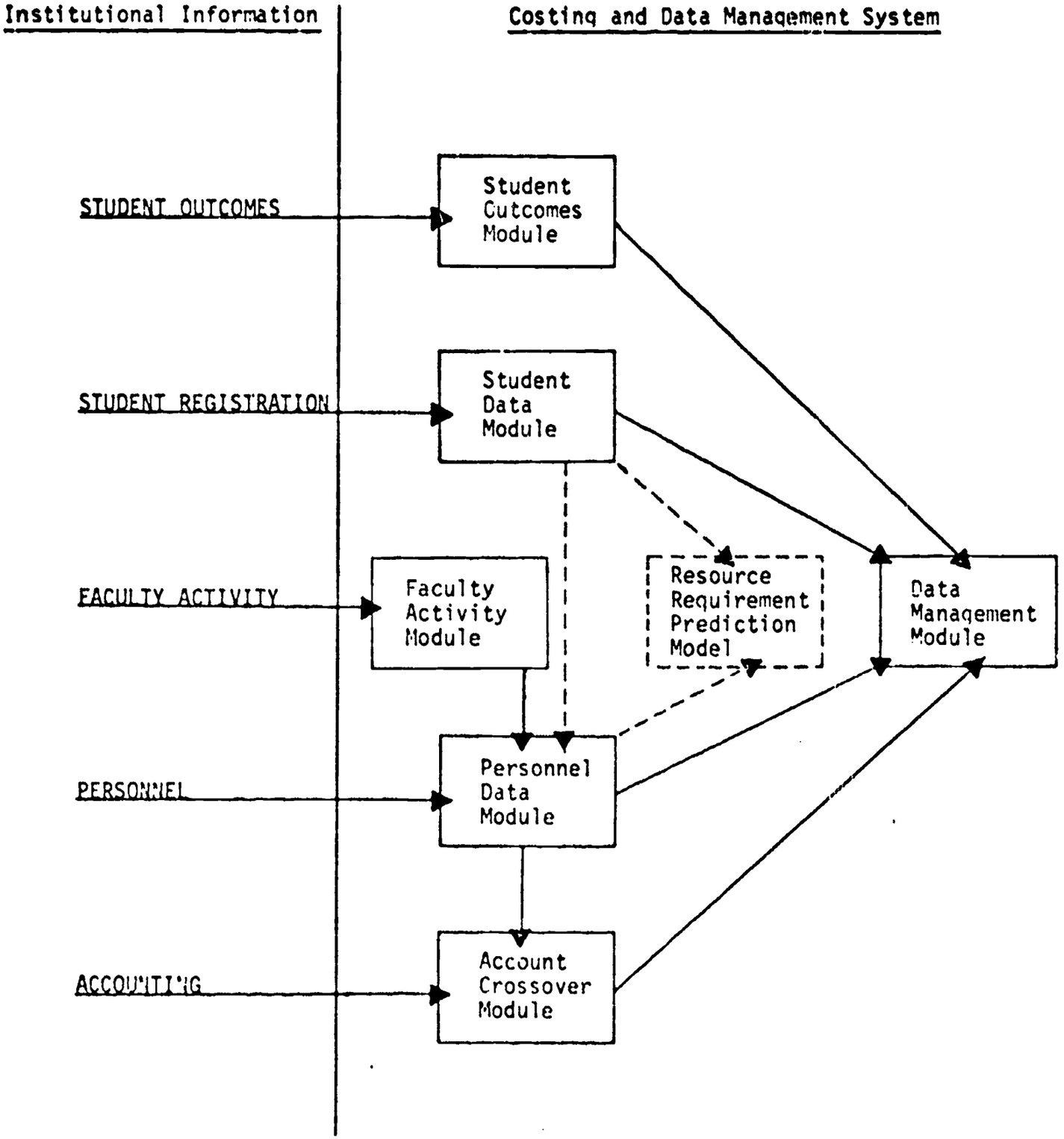
A more comprehensive overview of all of these computer software products is contained in An Introduction to the NCHEMS Costing and Data Management System, Technical Report No. 55 and the Introduction to the Resource Requirements Prediction Model 1.6, Technical Report No. 34A. More detailed documentation concerning each of these modules is contained in the reference manual for each module listed in the Preface.

The brief overview of the implementation steps given above implied several relationships between the software modules. A more complete description of the structure of the system and the interaction of the various modules is illustrated in Figure 2.

Figure 2

NCHEMS Costing and Data Management Systems

SYSTEM STRUCTURE



STEP 1--DEVELOP THE IEP ACTIVITY STRUCTURE

Institutions of higher education differ considerably in their organizational structures and in the ways their accounting systems represent expenses incurred with these structures. To overcome the incompatabilities resulting from these differences, the Information Exchange Procedures project uses a common structure, common definitions and procedures, and several coding conventions to help facilitate compatibility in the results. In the cost study portion of the IEP project, for example, an IEP Activitv Structure is used to help ensure that two cost figures representing the costs of similar activities at two institutions are, in fact, associated with the same activities. Using only institutional terminology, the account "executive management" at one institution, for example, might include the cost of the president, the comptroller, vice-presidents and certain other costs. At another institution a similarly titled account might include only the cost of the president's office. To compare the costs of "executive management" in these two institutions would be misleading. The IEP Activity Structure defines the kinds of expenditures to be included in the activity center "executive management." If both institutions use the same definition of "executive management" and compare their IEP "executive management" costs, they will be comparing like expenditures.

Table 1 shows the structure used for data exchange in the IEP project. This structure is taken from Information Exchange Procedures Activity Structure, Technical Report No. 63.

Table 1

IEP ACTIVITY STRUCTURE

CODE	TITLE
1.1.XXXX.XX	General Academic Instruction (delineated to discipline and course level)
1.2.XXXX.XX	Occupational and Vocational Instruction (delineated to discipline and course level)
1.3	Community Education
2.1	Institutes and Research Centers
2.2.XX00	Individual or Project Research (delineated to program category)
3.1	Patient Services
3.2	Community Services
3.3	Cooperative Extension Services
3.4	Public Broadcasting Services
4.1	Libraries
4.2	Museum and Galleries
4.3	Audiovisual Services
4.4	Computing Support
4.5.XX00	Ancillary Support (delineated to program category)
4.6.XX00	Academic Administration (delineated to program category)
4.7.XX00	Course and Curriculum Development (delineated to program category)
4.8.XX00	Academic Personnel Development (delineated to program category)
5.1	Student Service Administration
5.2	Social and Cultural Development
5.3	Counseling and Career Guidance
5.4	Financial Aid Administration
5.5	Student Auxiliary Services
5.6	Intercollegiate Athletics
6.1	Executive Management
6.2	Fiscal Operations
6.3	General Administrative Services
6.4	Logistical Services
6.5	Physical Plant Operations
6.6	Faculty and Staff Auxiliary Services
6.7	Public Relations and Development
6.8	Student Recruitment, Admissions and Records
7.1	Independent Operations/Institutional
7.2	Independent Operations/Outside Agencies
8.1	Scholarships
8.2	Fellowships
9.1	Cost of Purchases for Resale (*)
9.2	Capital Expenditures (*)
9.3	Capital Cost — Buildings and Land Improvements (*)
9.4	Capital Cost — Equipment (*)

*Additional activities not found in the Program Classification Structure but used in the IEP cost study.

The first digit of the IEP Activity Structure Code identifies the highest level of aggregation within the structure. The eight most aggregate activity centers (or programs) as indicated by the first digit of the structure's coding system are:

1.0 Instruction	5.0 Student Support
2.0 Research	6.0 Institutional Support
3.0 Public Service	7.0 Independent Operations
4.0 Academic Support	8.0 Scholarships and Fellowships

The second digit of the IEP Activity Structure coding scheme is used to disaggregate each of the eight aggregate activity centers in more detail. For example, under program 1.0 Instruction, 1.1 identifies General Academic Instruction, 1.2 identifies Occupational and Vocational Instruction and 1.4 identifies Preparatory and Adult Basic Education.

The next four digits of the code (digits 3 through 6) are used in most cases to identify a specific discipline within one of the activity centers. The seventh and eighth digits of the code define a course level within a discipline. The Information Exchange Procedures specify the use of the Higher Education General Information Survey (HEGIS) taxonomy code for use in digits 3 through 6 to identify disciplines and the use of the codes '20', '30', and '50' to represent Lower Division, Upper Division, and Graduate course levels respectively.* Upper Division General Physics taught during the academic year (that is, general academic instruction) therefore would be coded as 1.1.1902.30. The code

*If an appropriate HEGIS cost does not exist for a discipline in the institution, an unused number in the HEGIS coding sequence should be used.

for Graduate Level English courses would be 1.1.1501.50, and Auto Mechanics courses taught in a community college would be 1.2.5306.20 (assuming that all courses in a two-year community college are Lower Division). The term "activity center" normally refers to the lowest level of detail being used. For the IEP project, an activity center is usually a course level within a discipline (such as Lower Division History). Within the support areas, however, the lowest activity center typically used is at the two-digit level, such as 6.2 Fiscal Operations.

Most of the IEP activity centers shown in Table 1 are the centers for which costs actually are reported for information exchange purposes. However, in the process of conducting the cost study, it is necessary to use several additional activity centers as temporary "holding accounts." To describe the use of these holding accounts, it is convenient to assign them codes and names for use in this manual. These additional activity centers are:

9.1 Cost of Purchases for Resale
9.2 Capital Expenditures
9.3 Capital Cost - Buildings and Land Improvements
9.4 Capital Cost - Equipment

Much of the cost study involves reorganizing institutional data and attaching these data to the IEP Activity Structure. To avoid inconsistencies in the data collection process and to aid in understanding the implementation process it is important for an institution to examine explicitly the total IEP Activity Structure and determine the subset of activity centers that are relevant for

it and thus required for that institution's IEP implementation project. Activity Centers that are not relevant for a particular institution may be excluded immediately from that institution's analysis. Activity Centers not found in many institutions are summarized in Table 2.

Table 2

IEP Activity Centers Seldom Used in Many Institutions

Activity Center		Common Exceptions
1.2	Occupational & Vocational Instruction	Usually appear in community colleges only
1.3	Community Education (noncredit)	Seldom found in private colleges
2.1	Institutes & Research Centers	Mainly appear in public four-year institutions
3.1	Patient Services	Only in institutions with a hospital, medical school, speech clinic, etc.
3.3	Cooperative Extension	Mainly in public four-year institutions
3.4	Public Broadcasting Services	Seldom found in any type of institution
4.2	Museums and Galleries	Seldom found in community colleges
4.5	Ancillary Support	Seldom found in community colleges or private colleges
7.1	Independent Operations/ Institutional	Seldom found in any types of institutions
7.2	Independent Operations/Outside Agencies	Seldom found in any types of institutions
8.2	Fellowships	Appears only in schools with graduate programs

The IEP Activity Structure Manual contains an illustrative list of the types of expenditures to be included in each activity center. These examples should be helpful when performing the actual crossing over of institutional data to the IEP Activity Structure.

OTHER CONVENTIONS

Student Programs

In addition to the organizationally oriented activities shown in Table 1, the institution must develop an activity structure for student programs or majors. To help ensure compatibility in the results, the HEGIS taxonomy codes should be used to identify student programs as well as disciplines. To distinguish between disciplines and programs a prefix 'PRG.' is used for program identifiers rather than the 1.1 or 1.2 prefix for disciplines.

Student levels for program identifiers are:

Student Level	Code
Lower Division	.20
Upper Division	.30
First Professional	.40
Graduate I	.50
Graduate II	.60
Intern (Medical)	.70
Resident (Medical)	.80
Other--Specify	.90

Using these conventions, the students in the Upper Division English program would be coded as PRG.1501.30; Lower Division Welding students would be coded as PRG.5308.20, and so forth.

Period of Analysis

The IEP cost study is to include data for an entire fiscal year for the institution. The Instructional Work Load Matrix developed in Step 2 should, therefore, contain course enrollments for an entire twelve month-period and the related faculty compensation and activity data should be for the entire year.

Some institutions, however, maintain their academic year data and special session data (for example, summer school) in different formats, different levels of detail, or in other ways that essentially prohibit the combining of data for these different time periods. If either special session student credit hour data or special session cost data are maintained in these "incompatible" forms, the institution will have to conduct its cost study for just the academic year and report its special session data as footnotes to the cost study. Hopefully, the desire of institutions to prepare more compatible cost data, combined with the increasing importance of the "twelve month" school calendar, will encourage institutions to change their data systems to permit the more meaningful fiscal year analysis.

Source of Funds

An IEP cost study is to include all expenditures regarded as "current expenses" regardless of the source of funds.

DISTINCTION BETWEEN DISCIPLINES AND STUDENT PROGRAMS

Throughout the IEP implementation it is important to distinguish between discipline and student program activity centers. Disciplines are related to organizational units and have faculty members, secretaries, supply expenses, and so forth associated with them. Student program activity centers are student oriented and, for the most part, have student-related data associated with them (for example, number of headcount students, number of FTE students, and the total of all credit hours taken by students in the Lower Division History programs). Any data that may be developed through use of the student outcomes portion of IEP therefore are related to student programs. Disciplines offer or contribute credit hours, while students in programs take courses or consume the credit hours.

NCHEMS U SAMPLE DATA AND IEP ACTIVITY STRUCTURE

The advantage of using a single set of data for examples was described on page 3 of the Introduction. Information about NCHEMS U is shown in Tables 3 and 4. These data are referred to repeatedly in subsequent sections.

Table 3 contains selected accounts from NCHEMS U's general ledger. (Notice that the first two digits of the account structure identify an NCHEMS U organizational unit and the next three digits indicate an object of expense classification. A similar structure exists in most institutions' accounting systems and can be used to advantage in the cost study.)

In addition to the expenditures shown in the general ledger, NCHEMS U has $200,000 in fringe benefits paid directly by the central office of the state system to which NCHEMS U belongs. (This amount is calculated as ten percent of the total NCHEMS U salary and wages accounts.)

After understanding the needs of the entire project and reviewing the characteristics of a particular institution, the IEP Activity Centers required for NCHEMS U can be developed. The structure and related activity center names required by the general ledger accounts for NCHEMS U are shown in Table 4.

Table 3

NCHEMS U Partial General Ledger

Account		Balance
	English	
10-520	Instructional salaries	$ 43,000
10-580	Telephone chargeback	3,000
10-581	Travel	1,000
10-523	Secretarial	8,000
10-584	Supplies	5,000
		$ 60,000
	Mathematics	
21-520	Instructional salaries	$ 41,000
21-580	Telephone chargeback	4,000
21-581	Travel	500
21-560	Computer chargeback	12,000
21-584	Supplies	1,500
21-523	Secretarial	3,000
21-525	Student help	1,000
21-800	Capital expenditure	3,000
		$ 66,000
	Research Center	
31-525	Exempt salaries	$ 29,700
31-529	Nonexempt salaries	6,700
31-584	Supplies	11,800
31-523	Secretarial	4,100
		$ 52,300
	Community Education	
87-525	Exempt salaries	$ 7,200
87-529	Nonexempt salaries	1,700
87-584	Supplies	2,700
87-523	Secretarial	3,700
87-576	Building rental	4,000
		$ 19,300
	Library	
50-525	Exempt salaries	$ 30,000
50-529	Nonexempt salaries	55,000
50-584	Supplies	7,000
50-800	Capital expenditure	20,000
		$112,000
	Academic Computer Center	
52-525	Exempt salaries	$ 25,000
52-529	Nonexempt salaries	30,000
52-584	Supplies	40,000
52-570	Computer rental	70,000
52-300	Chargebacks	(12,000)
		$153,000
	Counseling Center	
44-520	Salaries	$ 47,000
44-523	Wages	14,000
44-581	Supplies	3,400
		$ 64,400
	Dormitories	
63-460	Utilities	$100,000
63-528	Clerical staff	20,000
63-455	Maintenance	30,000
63-302	Buildings and grounds chargeback	40,000
63-529	Food service--nonexempt salaries	60,000
63-584	Food service--supplies	20,000
63-465	Food service-food purchases	100,000
63-580	Telephone chargeback	5,000
		$375,000
	Buildings and Grounds	
54-525	Exempt salaries	$ 80,000
54-529	Nonexempt salaries	100,000
54-584	Supplies	100,000
54-800	Equipment purchases	50,000
54-300	Chargeback to dormitories	(40,000)
		$290,000
	Financial Aid Office	
68-525	Exempt salaries	$ 20,000
68-529	Secretarial salaries	5,000
68-421	Aid to students	300,000
		$325,000
	Central Services	
71-525	President's salary	$ 25,000
72-529	Telephone nonexempt salaries	53,000
72-415	Telephone company payments	140,000
72-301	Telephone chargebacks	(175,000)
74-525	Controllers office--salaries	40,000
		$ 83,000

Table 4

NCHEMS U IEP ACTIVITY STRUCTURE AND
DISCIPLINE/STUDENT PROGRAM CROSSOVER

Institutional Disciplines and Student Programs	NCHEMS U IEP Activity Structure	
General English, Freshman English	1.1.1501.20	Lower Division English
	1.1.1501.30	Upper Division English
General Mathematics, Service Mathematics	1.1.1701.20	Lower Division Mathematics
	1.1.1701.30	Upper Division Mathematics
	1.3	Community Education (noncredit)
	2.1	Research Center
	4.1	Libraries
	4.4	Computing Support
	4.7	Course and Curriculum Development
	5.3	Counseling and Career Guidance
	5.4	Financial Aid Administration
	5.5	Student Auxiliary Services
	6.1	Executive Management
	6.2	Fiscal Operations
	6.5	Physical Plant Operations
	8.1	Scholarships
	9.1	Cost of Purchases for Resale
	9.2	Capital Expenditures
	9.3	Capital Cost - Buildings and Land Improvements
	9.4	Capital Cost - Equipment
English	PRG.1501.20	Lower Division English
	PRG.1501.30	Upper Division English
General Studies, Liberal Arts	PRG.4901.20	Lower Division Liberal Arts
	PRG.4901.30	Upper Division Liberal Arts

STEP 2--DEVELOP THE INSTRUCTIONAL WORK LOAD MATRIX

The second step in the IEP implementation process is the development of the Instructional Work Load Matrix (IWLM) using the Student Data Module. The IWLM indicates the total number of student credit hours taken by all students in each student program and student level at each course level within each discipline. The IWLM might indicate for NCHEMS U, for example, that all Lower Division English students took 429 semester credit hours of Lower Division English, 137 semester credit hours of Upper Division English, 107 semester credit hours of Lower Division Mathematics, and so forth.

The Student Data Module requires input data from the student registration system. The basic input is a record for each student enrolled in each course section during the entire twelve month year. For example, if an institution has 2,000 students taking four courses per term for three terms, 24,000 of these records would be prepared for input to the Student Data Module.

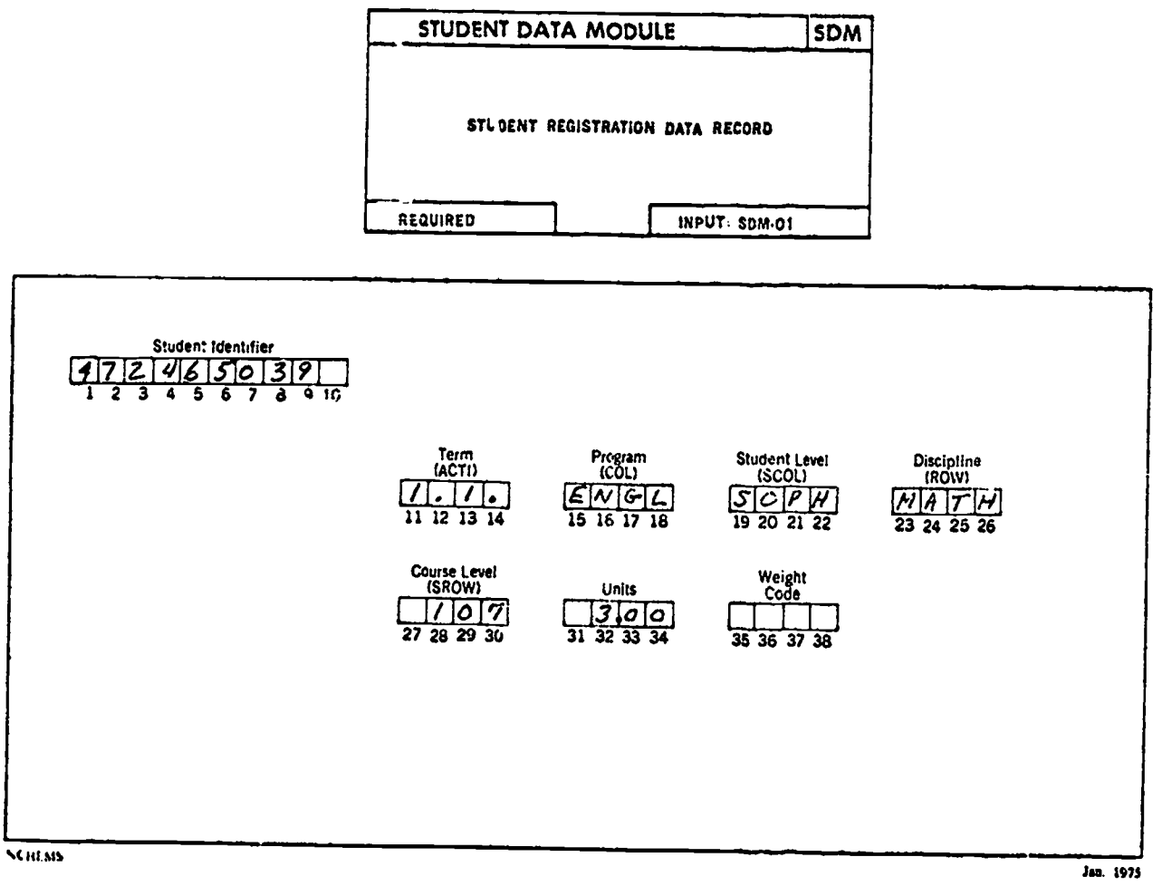
The seven data elements typically provided for each course enrollment are:

- IEP Activity (usually a term such as Fall or Spring)
- Student Identifier (for example, social security number)
- Student Program (for example, Biology, Auto Mechanics)
- Student Level (for example, Lower Division)
- Course Discipline (for example, Mathematics, Drafting)
- Course Level (for example, Lower Division)
- Semester Credit Hours (or equivalents)

This information is recorded on the SDM Student Registration Data Record shown in Figure 3. (Note that the title of the input record--Student Registration Data Record--appears in the box in the upper middle portion of the input form. All input records for the NCHEMS Costing and Data Management System have this same basic format.)

Figure 3

Student Registration Data Record



As indicated in Step 1, the HEGIS taxonomy codes should be used to identify student programs as well as disciplines. The student registration data should reflect course enrollments as of the cut-off period normally used to determine enrollment for reporting purposes. Credit hour figures for other than a semester should be converted to semester credit hours (for example, multiplying quarter credit hours by 0.667). The weight code field on the Student Registration Data Record can be used in adjusting to semester credit hour units. Other typical uses for this field are described in the reference manual for the Student Data Module.

THE DATA MANAGEMENT MODULE

As described in the introduction, the Data Management Module (DMM) accepts IEP Activity Center data from the Student Data Module, the Faculty Activity Module, the Personnel Data Module, the Account Crossover Module, and the Student Outcomes Module, and then, according to instructions supplied by the user, performs many of the calculations required to arrive at the IEP cost study data. Because this is the first detailed use of the Data Management Module, a brief description of it may be useful.

The primary purpose of the Data Management Module is to calculate and display most of the data included in the cost study portion of the IEP. To accomplish this, the Data Management Module accepts data from other modules, performs calculations on these data according to instructions supplied by the user, and displays results as requested by the user.

In performing these tasks, the Data Management Module makes use of a matrix for storing data and performing calculations. As each prior module (such as the Student Data Module) is run, its results can be added to the matrix. The rows of the matrix represent the IEP Activity Centers. The columns of the matrix represent "parameters," such as direct costs or student credit hours. An element or cell of the matrix is the value of a particular parameter for a particular activity center, such as semester credit hours in Lower Division History, direct cost in 6.1 Executive Management, or direct cost per semester credit hour in Upper Division Physics.

After the Student Data Module has been run and its results provided to the Data Management Module, a portion of the DMM matrix might appear as illustrated in Figure 4.

Notice the explanations given for several of the elements in the DMM matrix.

FIGURE 4

DMM DATA (from the Student Data Module)

PARAMETER

ACTIVITY CENTER	NAME		CREDIT. HOURS	IWL. 1501.20	IWL. 1501.30	IWL. 4901.20	IWL. 4901.30
1.1.1501.20	LD English		1,698	429	75	176	54
1.1.1501.30	UD English		1,009	137	382	29	142
1.1.1701.20	LD Math		1,584	107	31	102	25
1.1.1701.30	UD Math		438	10	63	18	93
PRG. 1501 20	LD English		1,724				
PRG. 1501.30	UD English		1,950				
PRG. 4901.20	LD Liberal Arts		1,914				
PRG. 4901.30	UD Liberal Arts		1,879				

The Lower Division English Discipline taught a total of 1,698 credit hours.

Students in the Lower Division English program consumed a total of 1,724 credit hours.

Students in the Upper Division English program took 63 credit hours from the Upper Division Math discipline.

Figure 6

Crossover of Direct Expenditures

STEP 3.1 Develop the Institutional General Ledger File.

STEP 3.2 Make adjustments to institutional accounts for:

- Pooled expenses
- Central office expenses
- Reverse certain chargebacks
- Cost of purchases
- Capital expenditures
- Rental and lease expenditures

STEP 3.3 Develop distribution percentages for academic area accounts--using the Personnel Data Module.

a. Instructional Compensation Accounts

(1) For each individual teaching a course, collect for each account from which the individual is paid:

- fund (account) identifier
- compensation from this account
- data concerning each task (usually course taught) performed by the individual that is paid for by this account:
  - activity units (contact hours) associated with the task (course).

(2) Consider faculty activity analysis versus assignment analysis

(3) Adjust for donated or contributed services of teaching personnel.

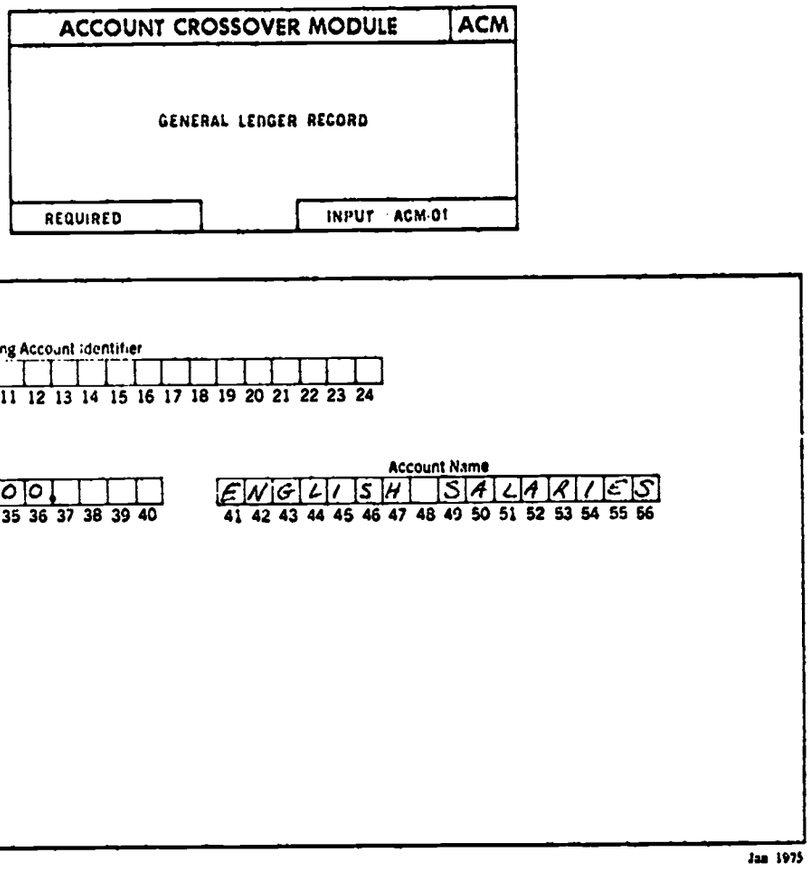
b. For academic area direct cost noncompensation accounts use the Duplicate Record feature of the Personnel Data Module.

STEP 3.4 Develop crossover instructions for accounts not covered by the Personnel Data Module.

- Use the ACM Crossover Record to crossover a single account
- Use the ACM Selective Crossover Record to crossover sets of accounts

Figure 7

General Ledger Record



The sending account identifier field should contain an institutional general ledger account identifier and must match exactly the identifier used for this account in manually prepared crossover instructions and in any use of this account identifier in the Personnel Data Module. The account name field is optional but improves the readability of reports produced by the system.

STEP 3.2--MAKE ADJUSTMENTS TO INSTITUTIONAL ACCOUNTS

An institution's internal management needs and the fiduciary responsibility of the accounting system usually result in an institutional account structure that does not permit an immediate crossover of institutional accounts to the IEP Activity Structure. In most institutions, some adjustments are necessary to conform

to the IEP definition of direct costs as shown in Figure 5. It may be necessary also to identify certain other expenditures and combine them with (or extract them from) the institution's general ledger. These adjustments are summarized in Figure 8 and described below.

Figure 8

Crossover of Direct Expenditures

STEP 3.2 Make adjustments to institutional accounts for:
.Pooled expenses .Central office expenses .Reverse certain chargebacks .Cost of purchases .Capital expenditures .Rental and Lease Expenditures

Pooled Expenses

The sum of the institutional expenditures for items defined as direct cost in the academic area (according to Figure 5) should be located in the "using department" (academic department) account balances. Institutions with accounting systems that do not charge out all of these expenses must distribute these costs to the "using departments" as part of the determination of direct cost. Examples of expenses that are frequently pooled are secretaries employed at the division or college level, and supplies and services that are not charged back to the using department. Another frequently encountered example involves fringe benefits. A number of institutions do detailed accounting for faculty (and other personnel) salaries but record fringe benefits in a pooled account. Because direct cost includes compensation (salary plus fringe benefits) the pooled fringe benefit account must be distributed also.

The Information Exchange Procedures Activity Structure manual indicates other categories of expenses that frequently require adjustment under the intent of this section.

Central Office Expenses

Institutions that are part of a multicampus system may have some of their expenses paid directly from central office accounts. Typical expenses of this nature are fringe benefit payments, utilities, computer center services, and equipment purchases. These expenses should be identified and included in the cost study just as if they had been paid by the institution. (This is not an attempt to distribute the costs of the central office itself. The expenses of the Chancellor's office of a system, for example, would not be distributed to institutions under the intent of this adjustment.)

Reversing Certain Chargebacks

Sometimes certain types of expenses are "charged back" to using departments within an institution. Many of these expenses are defined by IEP as a direct cost within the activity center performing the service (or supplying a product) rather than as a direct cost within the activity center using the service (or product). These chargebacks must be reversed for direct cost analysis. Examples of these expenses are:

- .Library services
- .Audiovisual services
- .Academic computing services
- .Administrative data processing
- .Transportation services (provided by the institution)
- .Utilities
- .Building and grounds maintenance
- .Building and equipment rental
- .Food service

As with the pooled expense adjustments, the Information Exchange Procedures Activity Structure manual provides additional help in determining the types of chargebacks that should be reversed.

Cost of Purchases

Several activity centers (typically associated with institutional auxiliary enterprises) often have large expenditures for materials intended for resale. Examples are purchases of books and resaleable supplies by the bookstore, purchase of food by food service, student union, or dormitories, and expenditures for student insurance and student telephones in dormitory rooms that are paid for by the institution and then charged directly to the student. These expenses are not to be included in the final results of the cost study but should be crossed over to the reconciling activity center 9.1, Cost of Purchases for Resale, to permit reconciliation with other institutional expense summaries.

Capital Expenditures

The IEP cost study uses a "capital cost" concept to recognize the utilization of capital assets acquired over a number of years. Therefore, the current year's capital expenditures for the new buildings, additions, and improvements to existing buildings and expenditures for capital equipment (costing more than $500 and having an estimated life of more than two years) should not be included directly in the final results of the cost study. As was done with cost of purchases, these expenditures should be identified and crossed over to activity center 9.2, Capital Expenditures, to permit reconciliation with other institutional expense summaries.

Rental and Lease Expenditures

Rental and lease expenditures for the current period are included in the IEP definition of capital cost and therefore are included in the capital cost calculations described in Step 6. To facilitate these calculations and reconciling to other expense summaries, rental and lease expenditures for buildings and land improvements should be crossed over to activity center 9.3, Capital Cost - Buildings and Land Improvements, and rental and lease expenditures for capital equipment items should be crossed over to activity center 9.4, Capital Cost - Equipment.

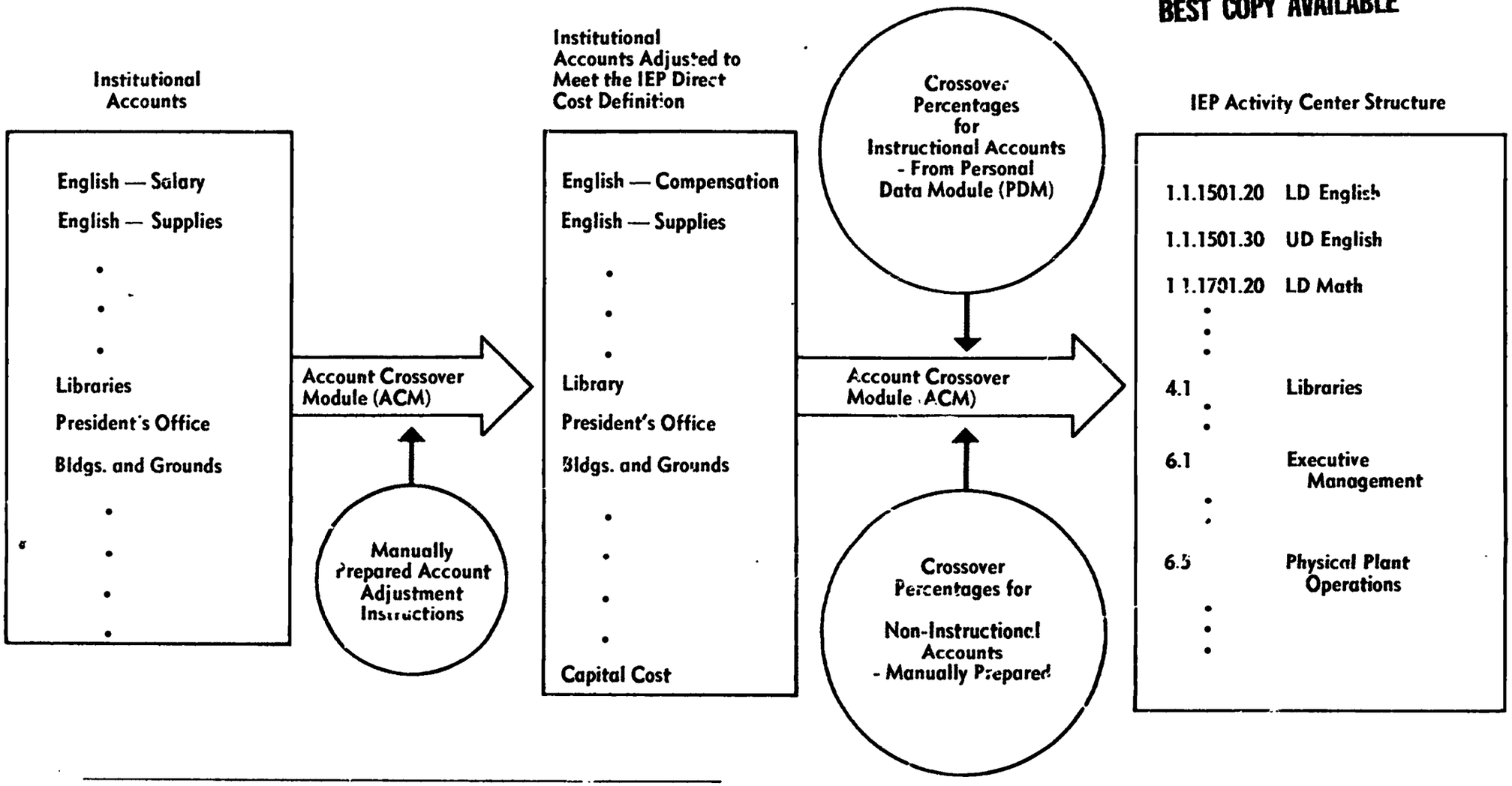
MAKING ADJUSTMENTS

For most institutions, making the adjustments described above is a relatively simple task. Because of the need to make adjustments such as these, the Account Crossover Module usually is run at least two times, as illustrated in Figure 9. In the first run of the ACM, adjustments (and in some cases the combining of accounts) are performed. In the second run, crossover instructions prepared in Steps 3.3 and 3.4 are used to complete the crossover process.

The Account Crossover Module accepts two basic types of crossover instructions. The Crossover Record shown in Figure 10 is used to crossover a single specified account. (Through another ACM option, the use of this record can be extended, but this feature will not be described here.) The Selective Crossover Record is illustrated

Figure 9

Overview of IEP Crossover Steps



- Distribute Pooled Expenses
- Reverse Certain Chargebacks
- Distribute Central Office Expenses
- Adjust Cost of Purchases
- Adjust Capital Expenditures

Figure 10

Crossover Record

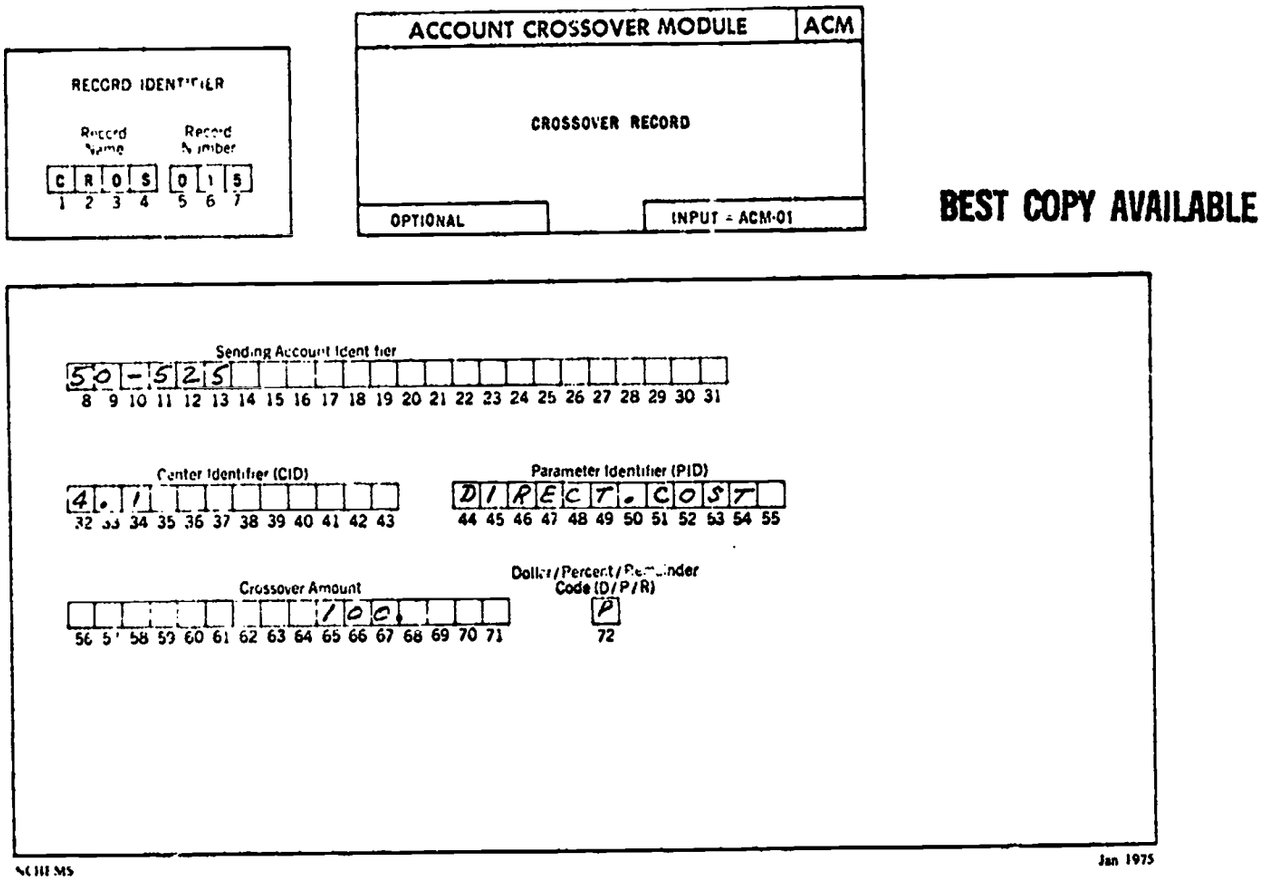


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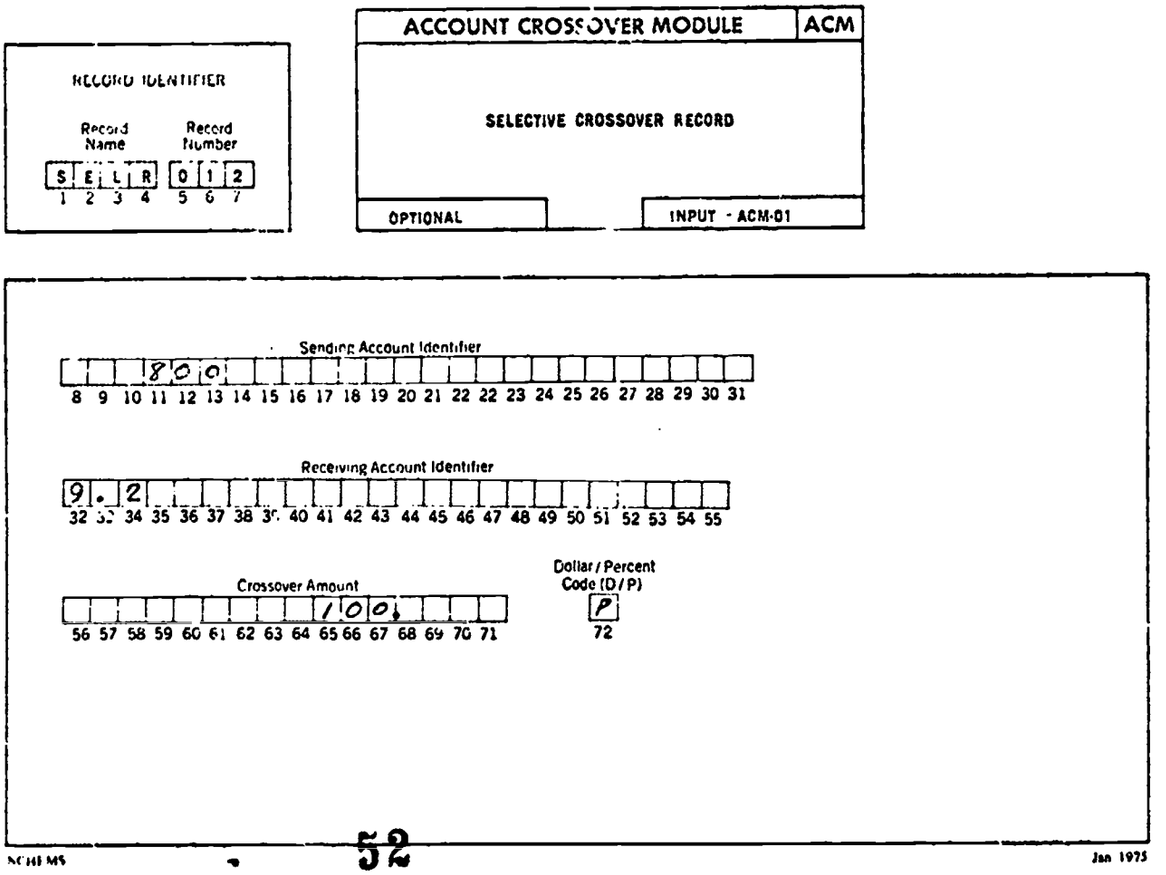
Figure 11

Selective Crossover Record



in Figure 11 and can be used (with most accounting systems) to crossover all accounts within an organizational unit, such as the library or the business office, to the appropriate IEP Activity Center or to crossover all accounts of a particular object of expenditure classification to a given activity center. Both types of crossover instructions permit crossing over either a specified dollar amount or a percentage of the account balance. In most cases one hundred percent of the account will be specified.

For most implementations, the Selective Crossover Record will be used primarily in the account adjustment run (first run) of the ACM and the Crossover Record will be used in the actual crossover run (second run) of the ACM.

(The use of the Selective Crossover Record in Figure 11 shows all institutional capital expenditure accounts--an object code of 800--being reorganized and grouped together in activity center 9.2, Capital Expenditures.)

NCHEMS U

The data presented for NCHEMS U in Table 3 and elsewhere in this manual indicate that the following adjustments should be made for NCHEMS U to adhere to the Information Exchange Procedures described above:

1. Adjust all capital expenditure accounts (those with an object code of '800') by crossing them to activity center 9.2, Capital Expenditures.

2. Adjust account 52-570 Computer Rental by crossing it to activity center 9.4, Capital Cost - Equipment.

3. Adjust account 87-576 Building Rental by crossing it to activity center 9.3, Capital Cost - Buildings and Land Improvements.

4. Adjust the computer chargeback account 21-560 Mathematics by reversing it to the academic computer center (departmental account 52).

5. Distribute the remainder of the institution's telephone expense to using departments. The total telephone expense is $193,000 (the sum of account 72-729 telephone nonexempt salaries and account 72-415 telephone company payments). Already charged back is $175,000, so the remaining $18,000 ($193,000 minus $175,000) must be distributed.

6. Distribute the $200,000 in fringe benefits that have been paid directly by the state.

7. Adjust account 63-465 food service purchases by crossing it over to activity center 9.1, Cost of Purchases for Resale.

8. Adjust the 63-302 buildings and grounds chargeback by reversing it from dormitories to buildings and grounds.

While one run of the ACM has been described for making account adjustments, some institutions will find that more than one run is necessary to complete all adjustments. If an institution has a large number of adjustments to make (and particularly distribution of pooled expenses), features of the Data Management Module may also be used to make these adjustments. As the user becomes familiar with the entire Costing and Data Management System, the advantages and disadvantages of using the DMM in making these adjustments will be better understood.

Step 3.3--DEVELOP DISTRIBUTION PERCENTAGES FOR ACADEMIC AREA ACCOUNTS

At this point an adjusted general ledger has been produced that conforms to the IEP definition of direct costs. A few accounts are represented in the IEP Activity Structure (such as 9.1, 9.2, 9.3, and 9.4) but the majority of institutional accounts have retained their original form. Individual account balances, in many instances, have changed but the total institutional expenditure has not been modified. Steps 3.3 and 3.4 describe the "crossing over" of these accounts to the IEP Activity Structure. Figure 12 provides an overview of Step 3.3.

Figure 12

Crossover of Direct Expenditures

STEP 3.3 Develop distribution percentages for academic area accounts--using the Personnel Data Module.

a. Instructional Compensation Accounts

(1) For each individual teaching a course, collect for each account from which the individual is paid:

- fund (account) identifier
- compensation from this account
- data concerning each task (usually course taught) performed by the individual that is paid for by this account:
  - activity units (contact hours) associated with the task (course).

(2) Consider faculty activity analysis versus assignment analysis

(3) Adjust for donated or contributed services of teaching personnel.

b. For academic area direct cost noncompensation accounts use the Duplicate Record feature of the Personnel Data Module.

The actual "crossing over" of account balances is performed by the Account Crossover Module, using crossover instructions that have been prepared by the Personnel Data Module or manually by the user. In preparing the crossover instructions, most of the accounts in an institution's general ledger can be processed in one of three ways. These three general account types and the manner in which they are typically processed are shown below.

(1) Academic Area Direct Cost Accounts--Instructional Compensation Accounts

Through analysis of faculty compensation and tasks, crossover instructions are prepared by the Personnel Data Module.

(2) Academic Area Direct Cost Accounts--Other than Instructional Compensation

In the absence of more accurate usage data, the Information Exchange Procedures recommend that these expenses be crossed over in the same manner as the related instructional salary account. Features of the Personnel Data Module can be used to prepare crossover instructions for these accounts.

(3) Nonacademic Area Accounts

Typically crossover instructions for these accounts are prepared manually.

Steo 3.4 describes the "crossing over" of these accounts to the IEP Activity Structure.

STEP 3.3.a--DEVELOP DISTRIBUTION PERCENTAGES (COMPENSATION ACCOUNTS)

The Personnel Data Module assists in the cost study by providing crossover instructions to the ACM for all salary and compensation accounts used to pay faculty members. For each individual analyzed by the Personnel Data Module, the PDM calculates the percent of the individual's effort devoted to each task described for the individual (such as teaching a Lower Division History course, conducting sponsored research in Physics, or engaging in course and curriculum development for an Upper Division English course). This effort distribution pattern then is related to the compensation accounts from which the individual is paid, combined with effort patterns for other individuals paid from the same fund, and used to produce crossover commands for each compensation account described to the PDM.

The Personnel Data Module has three primary input forms on which data for each faculty member are recorded. These input forms are shown in Figures 13, 14, and 15 and are described below.

Figure 13

Person Identifier Record

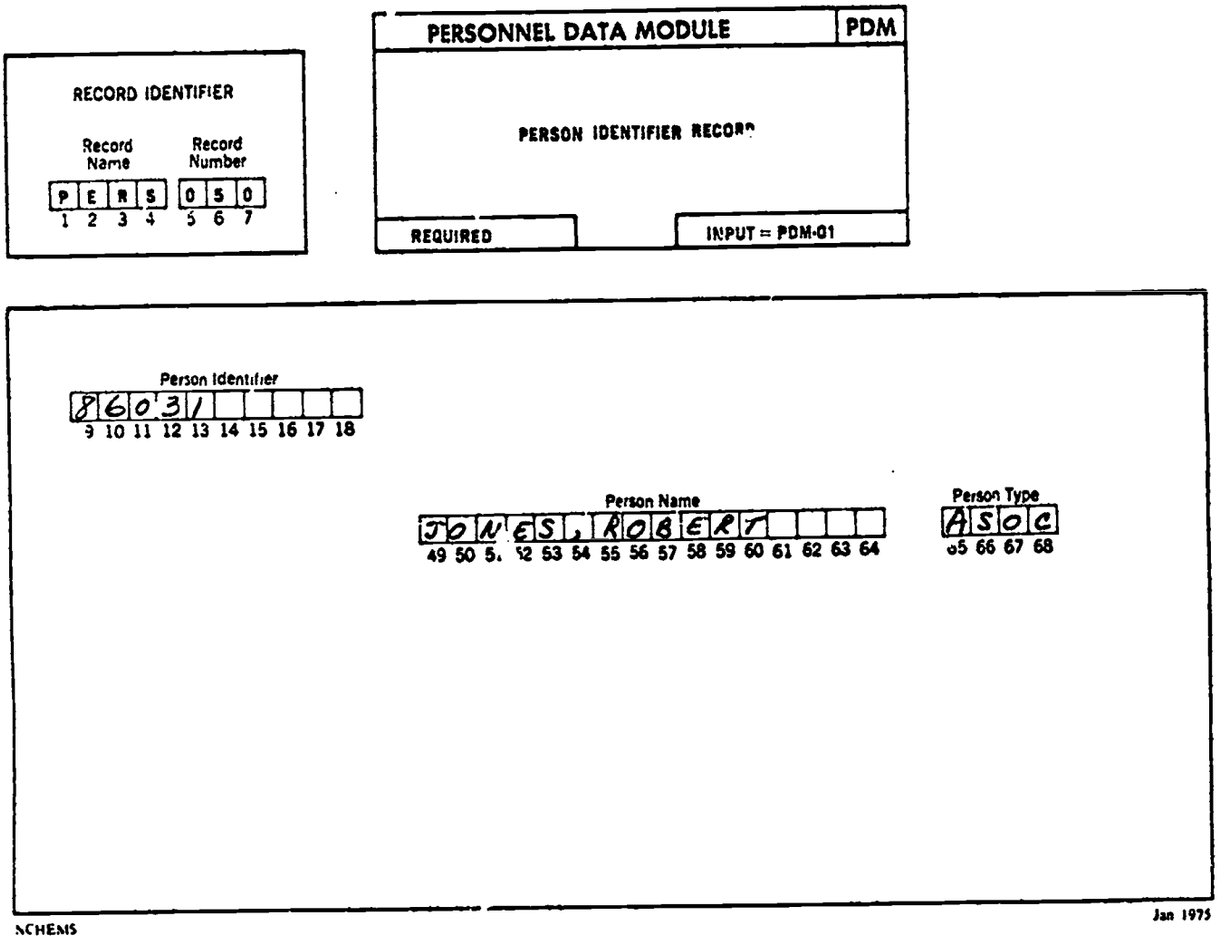


Figure 14

Funding Account Record

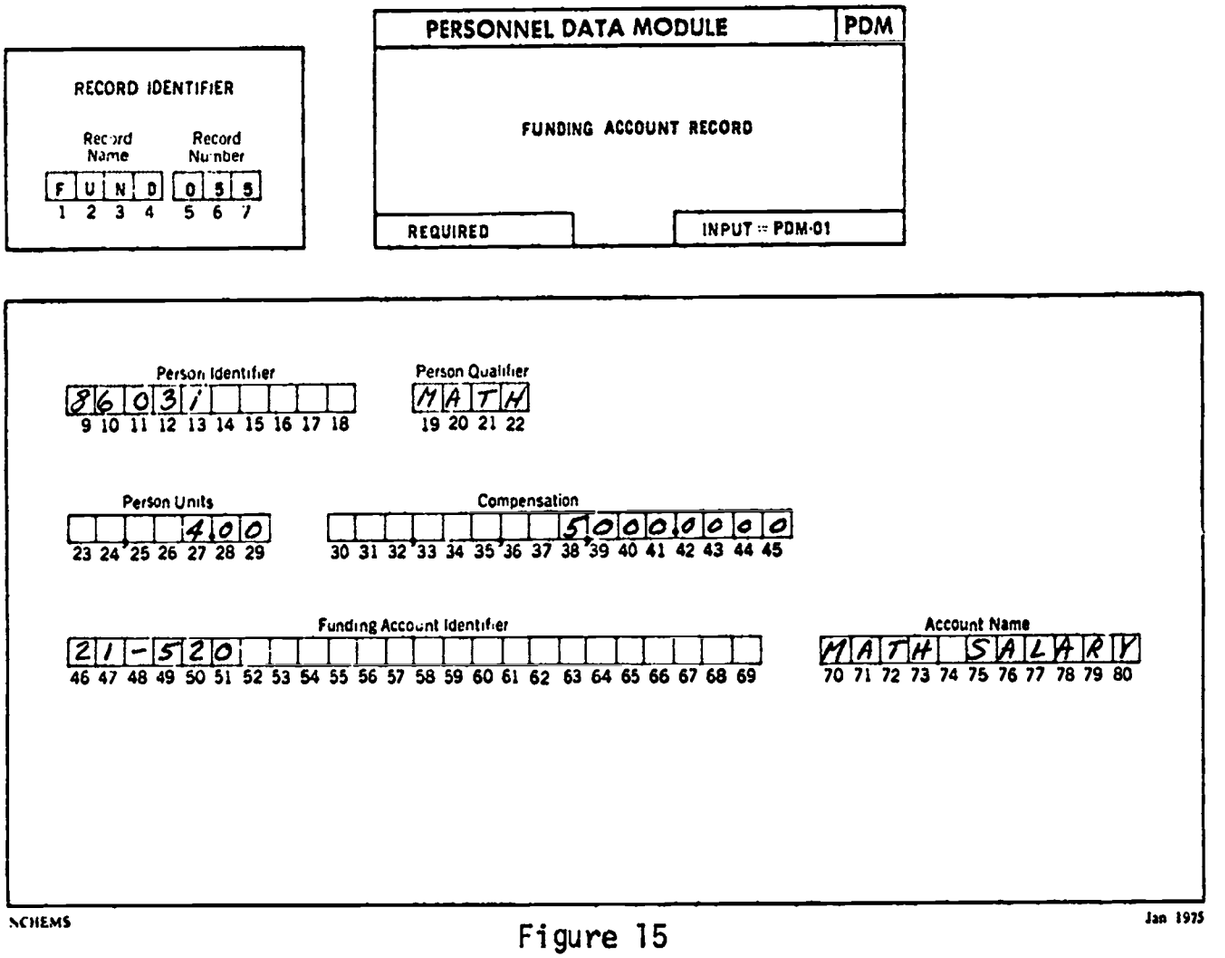
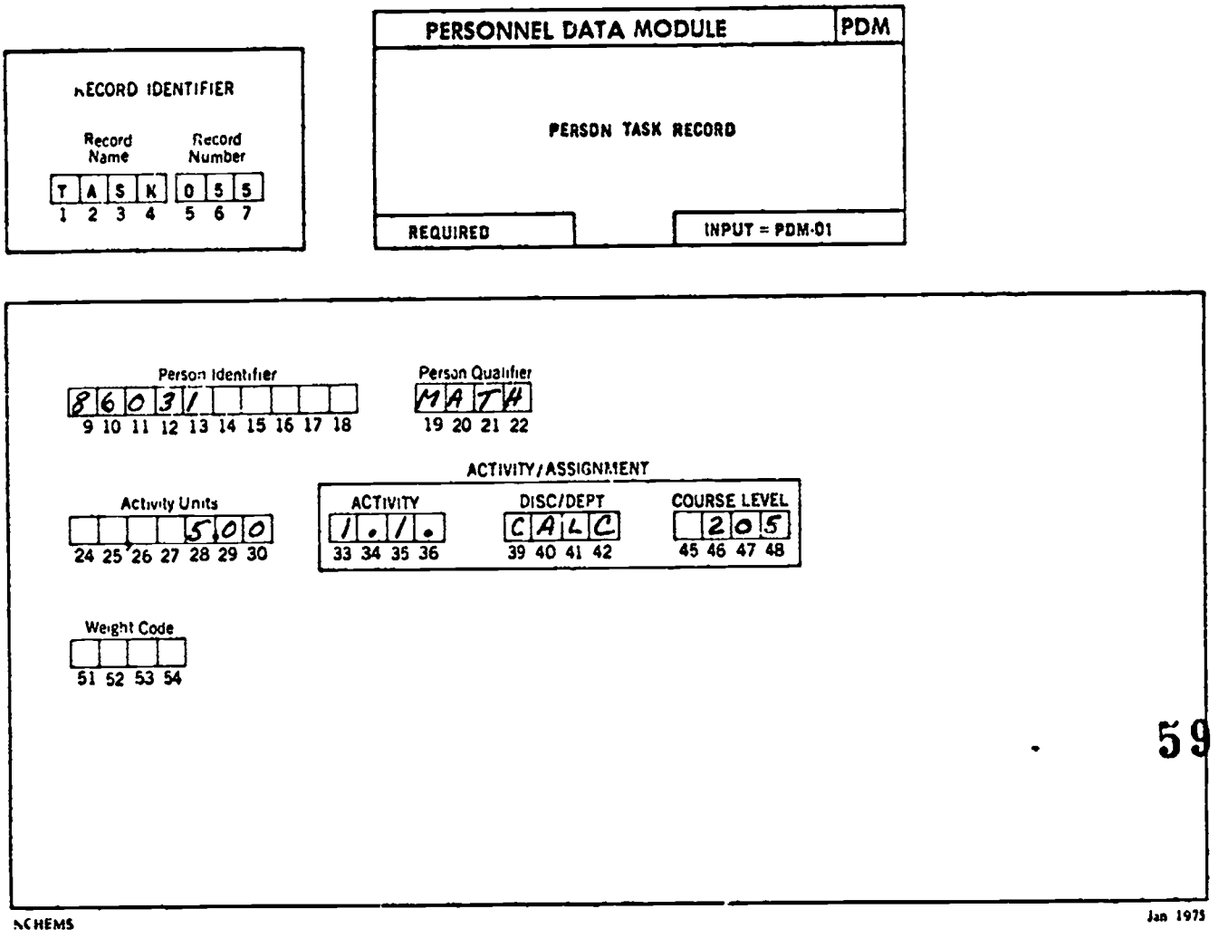


Figure 15

Person Task Record



For each individual to be included in this analysis, the PDM must be supplied with certain data relating to the individual, the accounts from which he is paid, and the activities for which he is paid. These three types of information, and the way they relate to the three basic input forms, are described below.

(1) Personal Data/PERSON IDENTIFIER RECORD

a. Person Identifier--individual's Social Security number, employee number, or some other unique identifier for the individual. This same number must appear in the Person Identifier field for all PDM input data related to this individual.

b. Person Name--optional entry to improve the readability of reports.

c. Person Type--may be used optionally to record data such as faculty member's rank or sex. Various reports produced by the Personnel Data Module then can provide summary data for these "Person Type" categories.

(2) Payroll Data/FUNDING ACCOUNT RECORD

For each account from which an individual is paid the following additional data should be recorded:

a. Person Qualifier--a code to link compensation with the activities being paid for a certain account. (The same code should appear on this individual's Person Task Records related to this compensation). Typically, this code is used when funds are to be restricted to specific activities (see page 53).

b. Person Units--this field should indicate the number of service months associated with the compensation from this account. (For IEP purposes, a service month is the equivalent of one person working "full time" for the period of one month.)

c. Person Compensation--the compensation received from the account specified in the Funding Account Identifier.

d. Funding Account Identifier--this field must match exactly with an account on the adjusted general ledger. (See page 36.)

e. Account Name--optional field that improves the readability of reports.

(3) Activity Data/PERSON TASK RECORD

a. Person Activity Units--the number of activity units (usually contact hours) associated with the activity (usually a course).

b. ACTI--the IEP Activity Structure subprogram in which the activity was performed (usually 1.1. for General Academic Instruction, 1.2. for Occupational and Vocational Instruction and so forth).

c. ROW--usually the course code for a course which will be converted by the PDM to a HEGIS code.

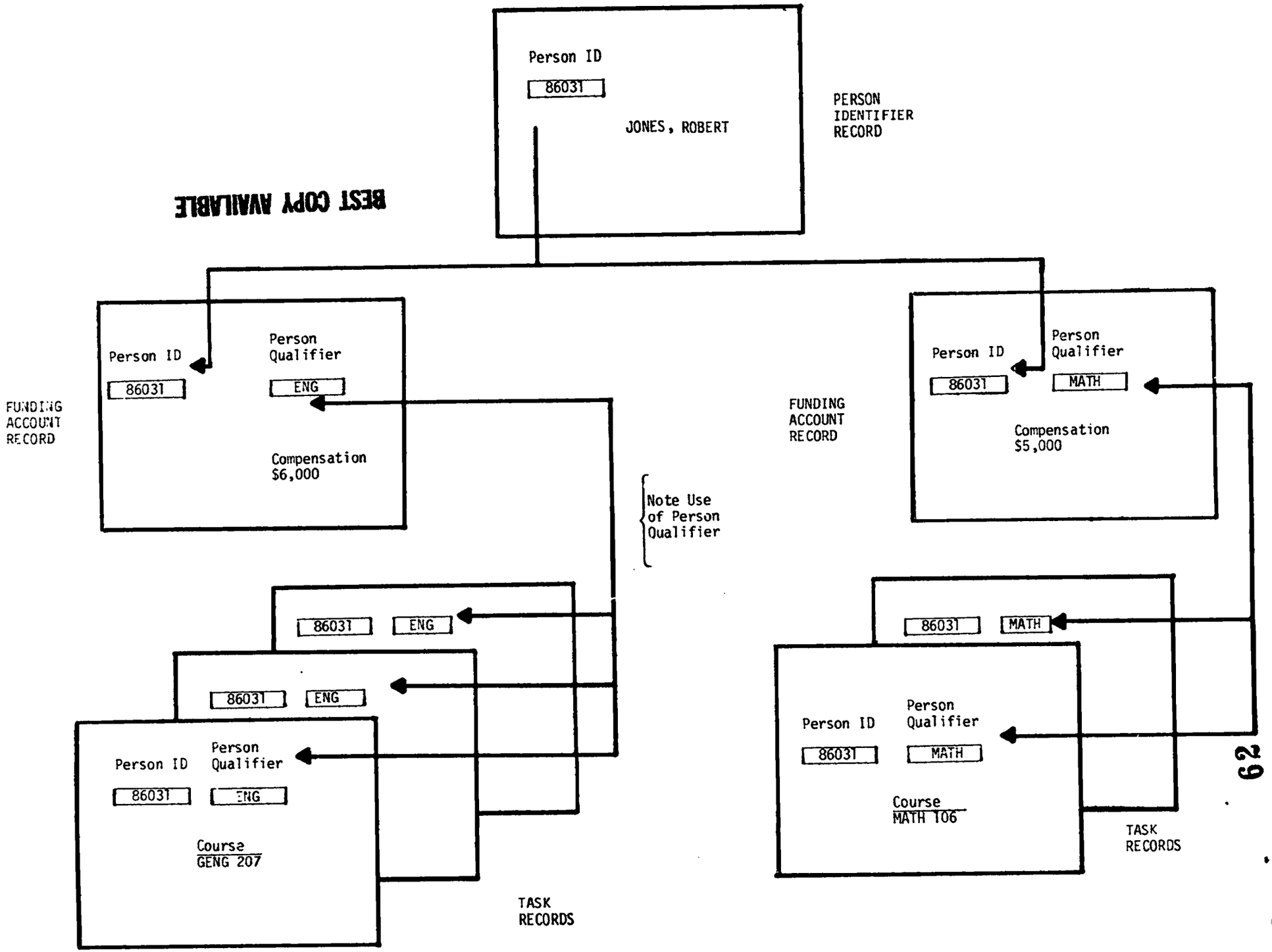
d. SROW--the course level or course number of the course taught which will be converted by the PDM to the IEP course level coding structure.

Figure 16 illustrates the use of these input forms and should provide additional understanding in their use. In this example, Jones is paid $6,000 from the English instructional salary account and $5,000 from the Mathematics instructional salary account. Jones teaches two courses for his English department compensation and is involved in course and curriculum development in the English discipline. Jones also teaches two courses for his Mathematics department compensation. Note the use of the Person Qualifier field to link tasks to their funding account. (Codes "ENG" and "MATH" are used in this example, but any characters may be used.)

Funding Account Records normally are produced using data from the institution's accounting and/or personnel systems. The Person Task Records may be prepared either directly from institutional course registration, accounting and assignment files or by the Faculty Activity Module computer software. The use of the Faculty Activity Module software to produce this information requires the use of a Faculty Activity Analysis Survey Instrument

Figure 16

SAMPLE USE OF PDM INPUT FORMS



to record faculty activity data. While the collection of faculty activity data through a faculty activity analysis requires additional effort, it will help in assigning faculty costs to areas in which faculty members typically perform activities but often do not have formal assignments. A more detailed description of the NCHEMS Faculty Activity Analysis Survey Instrument and its use in an IEP cost study is contained in Chapter IV of the Cost Analysis Manual. The verification of faculty data by a department chairman or other administrator is recommended regardless of whether assignment data or a faculty activity analysis survey instrument is used.

ADDITIONAL IEP CONVENTIONS

The Information Exchange Procedures have three additional conventions that relate to costs of institutional personnel.

Restricted Funds

There are essentially two ways in which an individual's compensation can be distributed to the activities he performs. In one approach, all compensation received by an individual is totaled and then this single amount is distributed to all activities that the individual performed. In Figure 16, for example, a total of $11,000 would be calculated for Jones and then this amount would be distributed to Jones's five activities based on the activity units for each activity.

The alternative costing philosophy is to restrict the activities to which a compensation amount will be distributed. Using this approach and the data in Figure 16, Jones's $6,000 from the

English account would be distributed only to the three activities related to the English discipline and the $5,000 from the Mathematics discipline would be distributed only to the two Mathematics discipline related activities.

The Information Exchange Procedures recommend the use of the first appraoch; that is, combining all compensation and distributing the total to all activities. If personnel data initially are recorded as described above, an option in the Person Data Module permits the institution to calculate personnel data costs using both approaches to determine differences for the institution's particular situation.

Donated Services

A special cost study problem exists for some institutions that have personnel who donate their services to the institution (or whose services are not recorded as an expense in the institution's accounting system). For example, many institutions have military science disciplines where faculty members are reimbursed by a military unit rather then the institution. Other institutions (and particularly those affiliated with religious groups) may have a much larger portion of faculty either donating their services or working for substantially reduced remuneration. In general:

> "An imputed value for donated services should be recorded as expenditures by department or division, following the same classification as other expenditures. The value of such services should be determined by relating such

services to equivalent salaries and wages (including the normal staff benefits such as group insurance and retirement benefits) for a similarly ranked personnel in the same institution or similar institutions. An imputed value for donated services should be recorded only if the following circumstances exist:

1. The amount of such donated services is significant when compared to the total expenditures of the reporting entity.
2. The services performed are a normal part of the institution's programs or supporting services and would otherwise be performed by salaried personnel.
3. The organization exercises control over the employment and duties of the donors of the services.
4. The organization has a clearly measurable basis for determining the value of such services."*

Work Study

The total cost (institutional contribution plus state and/or federal contribution) of work study students should be included as a direct cost in the activity center in which these students work.

STEP 3.3.b--DEVELOP DISTRIBUTION PERCENTAGES (NONCOMPENSATION ACCOUNTS)

The Information Exchange Procedures specify that academic area noncompensation accounts (included in the definition of direct cost) be crossed over in the same manner as related compensation accounts. The English department Supplies and Services account should, therefore, "follow" English department compensation; the Mathematics department travel account should "follow" the Mathematics department compensation account, and so forth. If, more specifically, four percent of the English Compensation general ledger balance is to

*Report of the Joint Accounting Group, WICHE, Boulder, Colorado, March 1974, P31-32.

be crossed over to Lower Division Mathematics, then four percent of the English department's Supplies and Services expenses should be crossed over to Lower Division Mathematics also.

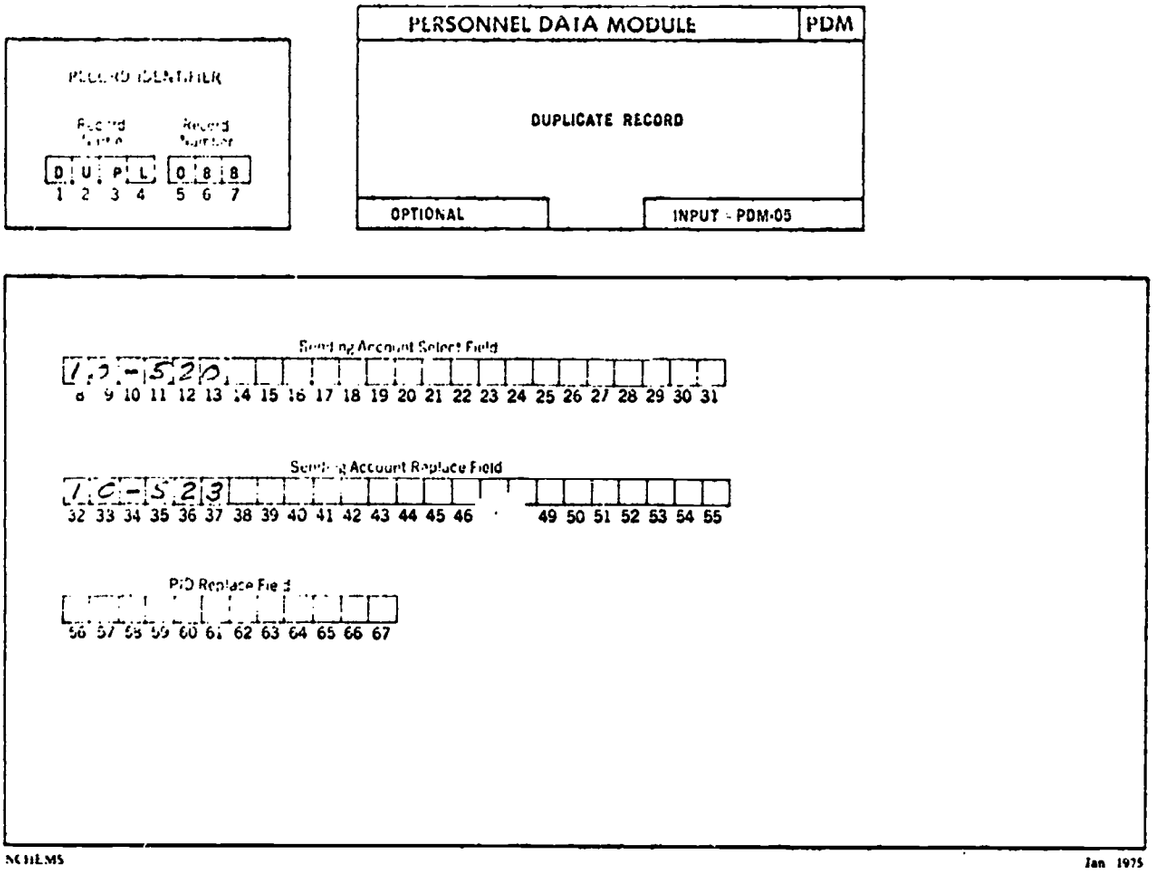
The preceding section described the use of the PDM to prepare crossover instructions for the instructional compensation accounts. The PDM can be used also to prepare crossover instructions for other academic area accounts that are to be included in direct cost of instruction as defined above.

The PDM Duplicate Record input form is used to instruct the PDM to prepare the same crossover instructions for one account (the "sending account select field") as it did for another account (the "sending account replace field").

The example shown in Figure 17 illustrates this command. In this example using NCHEMS U data, the PDM will prepare crossover instructions that will result in the English Department secretarial account being crossed over to the IEP Activity Structure in the same manner as the English department instructional salary account.

Figure 17

Duplicate Record



The use of the Duplicate Record feature facilitates crossing over the noncompensation academic direct cost accounts in accordance with the Information Exchange Procedure recommendation. An important assumption behind this recommendation should be noted, however, and the institution should determine whether the assumption is valid for it and the recommended procedure followed.

The assumption incorporated in this recommendation relates to the manner in which the institution's accounting system records expenses included in the IEP definition of direct cost. In general, the recommended procedure assumes that the institution's accounting system charges direct cost expenses incurred by a faculty member

to organizational units from which the faculty member is paid rather than to organizational units in which the faculty member performs activities. This assumes, for example, that a faculty member paid by the English department, but teaching a course in the Mathematics discipline, uses English department secretaries to prepare course materials, uses English department teaching assistants, and charges photocopy costs for the Mathematics course to the English department.

The example probably does not accurately reflect the actual use of resources. Because Supplies and Services expenses follow compensation expenses, strict adherence to this recommended procedure will result in total direct costs being perfectly related to compensation. Hopefully, an institution will have some actual usage data available. If an institution's accounting system already charges noncompensation direct costs to the activity center related to the activity, (the Mathematics discipline in this case) rather than to the faculty member's funding activity center, the procedure is not appropriate for that institution. A participating institution should review its accounting practices to decide on a general approach--that is, letting all or none of the other direct costs automatically follow PDM-produced crossover percentages--and then look for individual situations that may suggest deviations from the general approach.

PDM's Role in the Crossover

It should be noted that the Personnel Data Module does not actually perform any crossing over of account balances. Based on the personnel funding account and activity data furnished it, the PDM simply produces data in the same format as the crossover instructions prepared manually by the user (as illustrated in Figure 10). These PDM-prepared and the manually prepared crossover instructions then are used by the Account Crossover Module, which applies the percentages or dollar amounts to the institution's general ledger account balances and crosses the calculated amounts over to the IEP Activity Structure.

STEP 3.4--DEVELOP CROSSOVER INSTRUCTIONS FOR ACCOUNTS NOT COVERED BY THE PERSONNEL DATA MODULE

Figure 18

Crossover of Direct Expenditures

STEP 3.4 Develop crossover instructions for accounts not covered by the Personnel Data Module.

- Use the ACM Crossover Record to crossover a single account
- Use the ACM Selective Crossover Record to crossover sets of accounts.

For most institutions the Personnel Data Module can be used to prepare crossover instructions for all academic area accounts that are considered direct costs. Crossover instructions for accounts in the third general account category--nonacademic area accounts--usually are prepared manually by the user. These crossover instructions typically are prepared and coded on the Crossover Record (illustrated in Figure 10). Normally included in this category are crossover instructions for libraries, buildings and grounds, the president's office, the business office, and so forth. If an organizational unit's activities are in more than one IEP activity center, this should be reflected in the crossover instructions.

FINAL CROSSOVER/INPUT TO THE DMM

Once all of the crossover instructions have been prepared, the final run (or runs) of the Account Crossover Module can be made and the results provided to the Data Management Module. For NCHEMS U, the relevant portions of the DMM would appear as in Figure 19.

FIGURE 19

DMM DATA AFTER ACM CROSSOVER

ACTIVITY CENTER / PARAMETER	NAME	CREDIT HOURS	IWL. 1501.20	IWL. 1501.30	IWL. 4901.20	IWL. 4901.30	DIRECT COST
1.1.1501.20	LD English	1,698	429	75	176	54	40,260
1.1.1501.30	UD English	1,009	137	382	29	142	30,626
1.1.1701.20	LD Math	1,584	107	31	102	25	36,934
1.1.1701.30	UD Math	438	10	63	18	93	21,880
1.3	Comm. Educ.						16,660
2.1	Research Center						56,750
4.1	Libraries						100,800
4.4	Computing Support						101,600
4.7.1501	CC Development						2,500
5.3	Counseling/Career						70,600
5.4	Fin. Aid-Admin.						27,700
5.5	St. Aux. Services						113,500
6.1	Exec. Mgmt.						27,700
6.2	Fiscal Operations						44,300
6.5	Phy. Plant Oper.						428,700
8.1	Scholarships						300,000
9.1	Cost of Purchases						100,000
9.2	Cap. Expenditures						73,000
9.3	Cap. Cost-Bldgs.						4,000
9.4	Cap. Cost-Equip.						70,000

To assist the reader in understanding the interaction of the adjustments and crossovers, the supporting detail for the direct cost balance of three activity centers is shown below, illustrating the types of calculations involved in determining these values.

(1) Activity Center 5.5, Student Auxilary Service

Total dormitory account	$375,000
Less	
63-460 Utilities (crossed over to 6.5)	(100,000)
63-455 Maintenance (to 6.5)	(30,000)
63-302 Buildings and Grounds Chargeback (to 6.5)	(40,000)
63-465 Food Service - Food Purchases (to 9.1)	(100,000)
Plus	
Fringe benefits (10% of $80,000 salary expense)	8,000
Portion of $18,000 telephone distribution	500
Total direct cost	$113,500

(2) Activity Center 6.5, Physical Plant Operations

Total Buildings and Grounds Account	$290,000
Less	
54-800 Equipment Purchases (to 9.2)	(50,000)
Plus	
Reversal of dormitory chargeback (account 63-302)	40,000
63-460 Utilities (from dormitories)	100,000
63-455 Maintenance (from dormitories)	30,000
Fringe benefits (10% of $180,000 salary expense)	18,000
Portion of $18,000 telephone distribution	700
	$428,700

(3) Activity Center 4.4, Computing Support

Total Academic Computer Center	153,000
Less	
52-570 Computer Rental (to 9.4)	(70,000)
Plus	
21-560 Mathematics Computer Chargeback	12,000
Fringe benefits (10% of $55,000 salary expense)	5,500
Portion of $18,000 telephone distribution	1,100
	$101,600

STEP 4--CALCULATE DISCIPLINE DIRECT UNIT COSTS

At this point the Data Management Module contains the total number of credit hours taught in each course level in each discipline and the total direct cost of producing these credit hours. The discipline direct unit cost can be calculated by dividing each total direct cost value by its corresponding credit hour value.

The Data Management Module has a number of commands that permit operations to be performed on the data maintained by the DMM. One of these commands--the Discipline Unit Cost Definition Record--requests the necessary calculations to derive discipline unit costs. An example of the use of this command is shown in Figure 20. Executing this command for NCHEMS U results in the parameter 'DIR.COST/CR' being added to the DMM data file. Figure 21 illustrates portions of the DMM data with these new values included. (DIR.COST/CR' values have been rounded to the nearest dollar in the figure to simplify subsequent calculations.)

Figure 20

Discipline Unit Cost Record

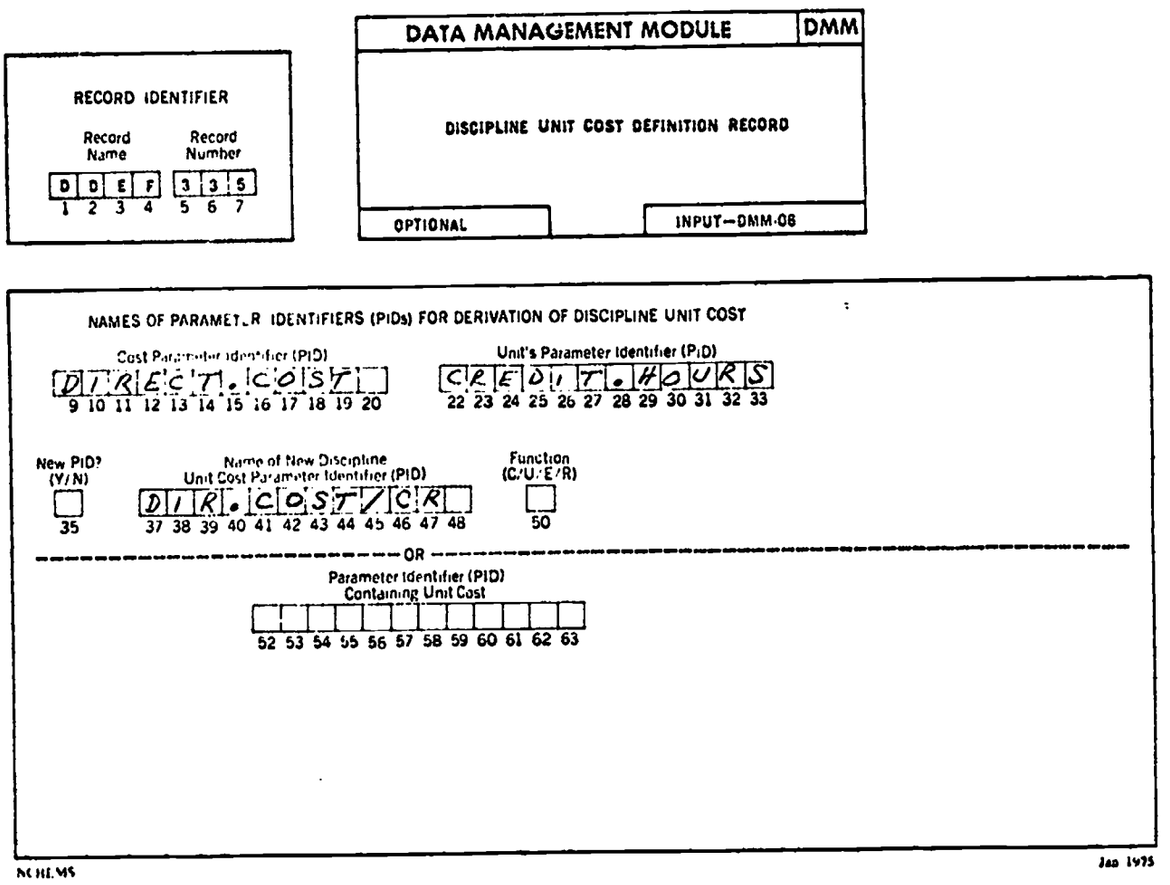


FIGURE 21

DMM DISCIPLINE DIRECT UNIT COST

ACTIVITY CENTER	PARAMETER NAME		CREDIT HOURS	DIRECT COST	DIR. COST/CR.
1.1.1501.20	LD English		1,698	40,226	24.00
1.1.1501.30	UD English		1,009	30,626	30.00
1.1.1701.20	LD Math		1,584	36,934	23.00
1.1.1701.30	UD Math		438	21,880	50.00

STEP 5--CALCULATE STUDENT PROGRAM DIRECT UNIT COSTS

After completing the first four implementation steps, both the direct cost of a credit hour in each discipline and course level and the IWLM data are available in the Data Management Module. To calculate the direct cost by unit of instruction for a program and student level requires calculating the total cost of all credit hours taken by students in the program and student level and then dividing this total cost by the total number of credit hours taken in that program and student level.

Using the NCHEMS U data in Figures 19 and 21, for example, the direct unit program cost for Upper Division General Liberal Arts is calculated as shown in Table 5 below. (This calculation assumes that Upper Division General Liberal Arts students take all of their courses in the two disciplines shown.)

Table 5

Calculation of Program Unit Cost

Discipline/Level	Direct Cost Per Credit Hour*	Hours Taken**	Total Direct Cost
LD English	$24	54	1,296
UD English	30	142	4,260
LD Math	23	25	575
UD Math	50	93	4,650
		314	$10,781

$$\frac{\$10,781}{314} = \$34.33 \text{ per program credit hour}$$

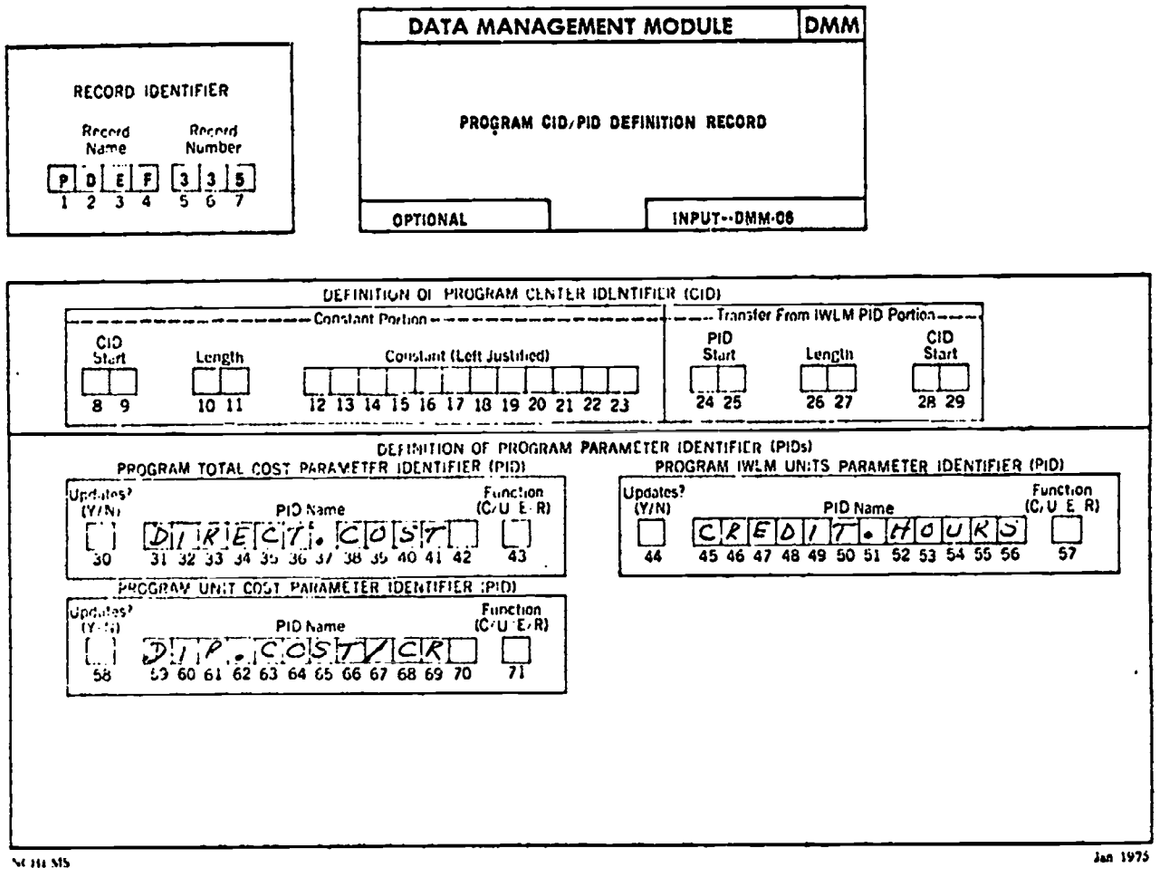
*From Step 4

**From IWLM developed in Step 2

Another Data Management Module command--the Program CID/PID Definition Record--is used in conjunction with the Discipline Unit Cost Definition Record to define the values to be used in calculating program unit costs. Figure 22 illustrates the use of this command.

Figure 22

Program CID/PID Definition Record



After the appropriate commands have been used, the relevant portion of the DMM matrix for NCHEMS U would appear as shown in Figure 23.

FIGURE 23
DMM STUDENT PROGRAM DIRECT UNIT COST

ACTIVITY CENTER	NAME	PARAMETER	CREDIT HOURS	DIRECT COST	DIR. COST/CR.
1.1.1501.20	LD English		1,698	40,226	24.00
1.1.1501.30	UD English		1,009	30,626	30.00
1.1.1701.20	LD Math		1,584	36,934	23.00
1.1.1701.30	UD Math		438	21,880	50.00
PRG. 1501.20	LD English		1,724	60,805	35.27
PRG. 1501.30	UD English		1,950	90,051	46.18
PRG. 4901.20	LD Liberal Arts		1,914	55,047	28.76
PRG. 4901.30	UD Liberal Arts		314	10,781	34.33

STEP 6--PREPARATION FOR FULL COST ANALYSIS

Preceding sections have described the data and steps required to produce total direct cost and direct cost by unit of instruction data for both course levels within disciplines and student levels within student programs. The next step in the implementation process is developing two additional sets of data used in the full cost analysis. These data sets describe capital cost and square footage information.

CAPITAL COSTS

In analyzing the cost of operating and maintaining an institution, some recognition must be given to the typically large investment in capital assets. To charge a discipline or student program with capital expenditures made during the period would likely cause extreme fluctuations in cost data from period to period. To reflect more accurately capital asset consumption and utilization, the concept of capital cost is used in the IEP cost study. Basically, capital costs represent a valuation placed on the services provided by land, buildings, and equipment owned (or rented) and used by an institution. The calculated capital cost consists of rental charges (for rented capital assets) and charges for depreciation (for capital assets owned by the institution).

Capital Cost of Buildings and Land Improvements

The capital cost for buildings and land improvements consists of two components:

(1) the current year's expenditures for rentals and leases related to buildings and land improvements, and

(2) a depreciation charge calculated as two percent of the total original cost of all of the institution's buildings and land improvements.

This capital cost for buildings and land improvements is to be included in activity center 9.3, Capital Cost - Buildings and Land Improvements. (Recall that the current year's rental and lease expenditures have already been crossed over to the activity center 9.2 in the first run of the ACM. Therefore, only the value of the second component of capital cost needs to be derived in this step.)

The calculation of the total capital cost for buildings and land improvements for NCHEMS U is shown below to illustrate this process. Assume that the property inventory records for NCHEMS U indicate a total original cost value of $15,000,000. Using this value and the general ledger data from Table 3, the calculation of capital cost for buildings and land improvements is shown in Table 6.

Table 6 **BEST COPY AVAILABLE**

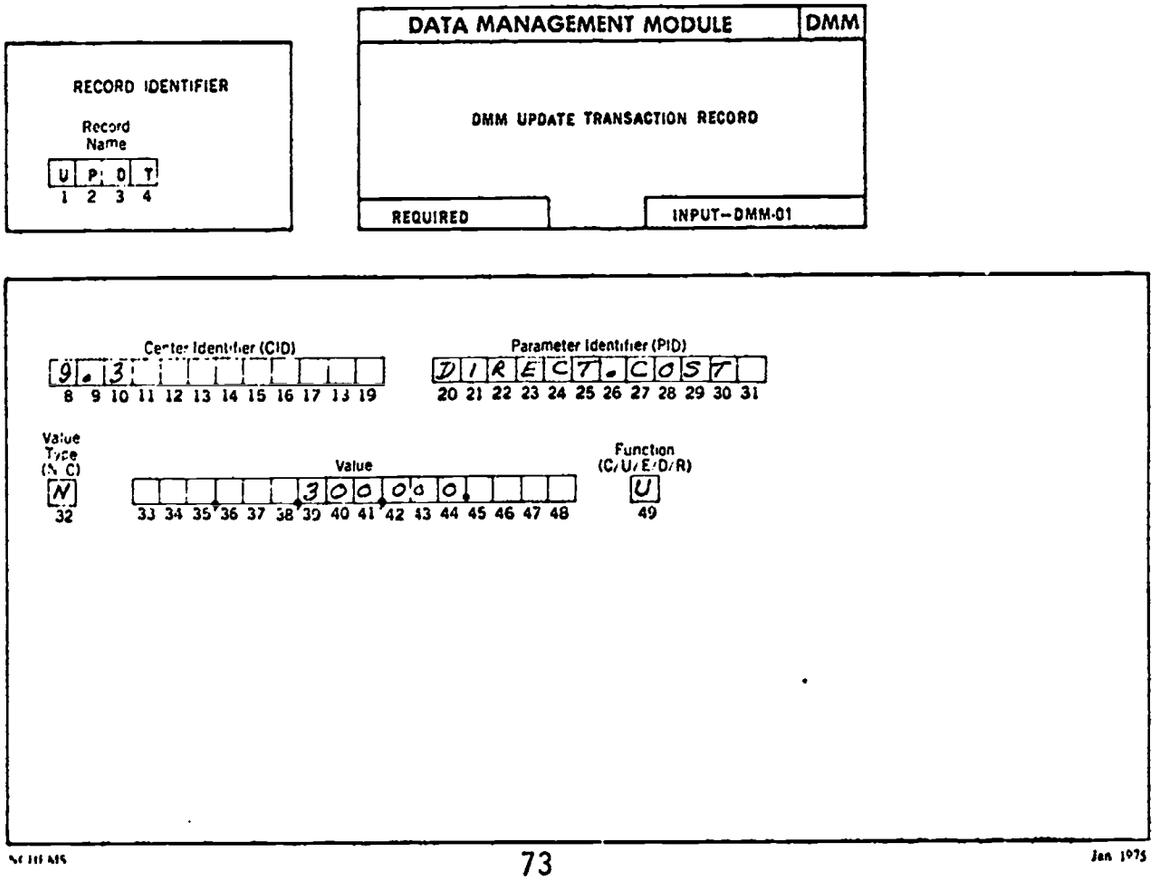
NCHEMS U Capital Cost for Buildings and Land Improvements

	Original Cost of All Buildings and Land Improvements	$15,000,000
Multiplied by:	depreciation factor	X .02
		$300,000
plus:	Current Year Rental and Lease Expenditures-- 87-576 Building Rental	4,000
9.3:	Capital Cost for Buildings and Land Improvements	$304,000

Because the $4,000 current year expenditure is already in activity center 9.3, only the $300,000 amount needs to be added to the activity center. This is done using the DMM Update Transaction Record as shown in Figure 24.

Figure 24

DMM Update Transaction Record



Capital Cost of Equipment

The capital cost for equipment is determined by calculating the total original cost of all capital equipment purchased within the last ten years and then multiplying this amount by ten percent (reflecting an assumed ten-year average life) to derive a depreciation charge.

For most institutions, the current year's expenditures for capital equipment that were crossed over to activity center 9.2, Capital Expenditures should not be used directly in this calculation because this total amount will already have been transferred to the institution's property inventory records and can be just as easily obtained from that source.

Table 7 illustrates the calculation of the capital cost of equipment for NCHEMS U.

Table 7

NCHEMS U Capital Cost of Equipment

Year	Capital Expenditures for Equipment
1974	$ 73,000
1973	15,000
1972	19,000
1971	60,000
1970	12,000
1969	20,000
1968	15,000
1967	19,000
1966	18,000
1965	20,000
Total	$271,000
Multiplied by: Depreciation rate	X .10
	27,100
Plus: Current year rental and lease expenditure - 52-570 computer rental	70,000
Total 9.4 Capital Cost - Equipment	$ 96,100

The $27,100 value then is included in the analysis by using the DMM Update Transaction Record.

SQUARE FOOTAGE DATA

Step 7 describes how support cost centers are allocated to final cost objectives for full cost analysis. This allocation may be done using either actual usage data or an IEP recommended allocation parameter. Most of the recommended allocation parameters are parameters already developed as part of the direct cost analysis, such as total direct cost or IWLM units. However, the recommended allocation parameter for IEP Activity Centers 6.5, Physical Plant Operations, and 9.3, Capital Cost - Buildings and Land Improvements, is the assignable square feet within each of the recipient cost centers.* Square footage data have not been used previously in the implementation process and therefore must be introduced into the Data Management Module at this point. Again, the DMM Update Transaction Record can be used to include these data in the analysis. Figure 25 shows 8,430 square feet being specified for the Lower Division English discipline.

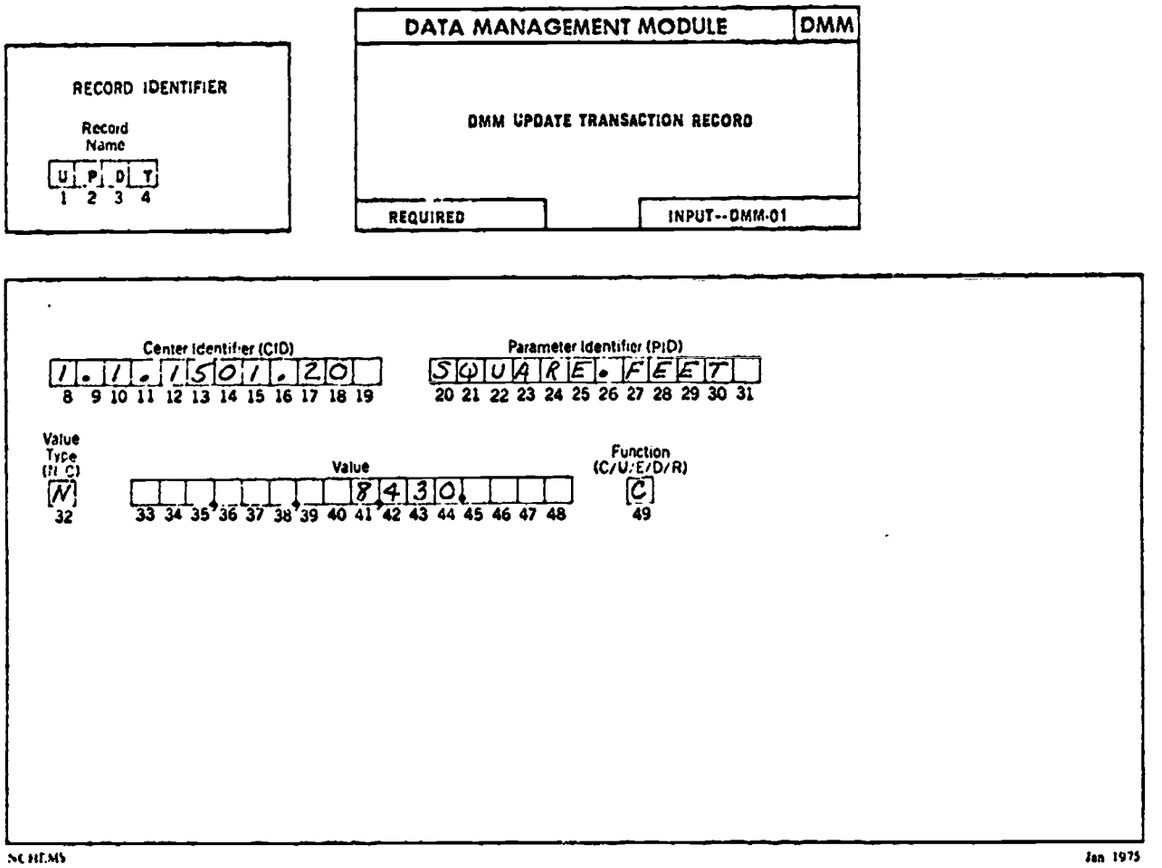
Most institutions do not maintain square footage data at the level of detail required for allocation purposes (such as Lower Division English). More aggregate data therefore may be supplied to the DMM and then distributed to lower levels of detail using a DMM

*Assignable square feet includes the sum of areas in all rooms that can be used by the building occupants to carry out their functions. Excluded is circulation, custodial, mechanical and structural area. A more detailed description of space assignment data is contained in Higher Education Facilities Inventory and Classification Manual (Romney, 1972).

feature. Examples of this are supplying square footage data for the entire English discipline and having DMM distribute it to course levels within English or supplying square footage data for the entire Business School and having DMM make the required distribution to course levels for all disciplines in the Business School (using an available distribution parameter such as direct cost).

Figure 25

DMM Update Transaction Record



If square footage data are not available, the alternate allocation parameter--total direct cost--should be used.

Figure 26 shows relevant portions of the DMM data after historical capital cost data and square footage data have been included.

FIGURE 26
DMM SQUARE FOOTAGE AND CAPITAL COST DATA

PARAMETER

ACTIVITY CENTER	NAME		DIRECT COST		SQUARE FEET
1.1.1501.20	LD English		40,260		8,430
1.1.1501.30	UD English		30,626		7,300
1.1.1701.20	LD Math		36,934		10,500
1.1.1701.30	UD Math		21,880		10,500
1.3	Comm. Educ.		16,660		
2.1	Research Center		56,750		100,000
4.1	Libraries		100,800		300,000
4.4	Computing Support		101,600		100,000
4.7.1501	CC Development		2,500		
5.3	Counseling/Career		70,600		30,000
5.4	Fin. Aid-Admin.		27,700		30,000
5.5	St. Aux. Services		113,500		380,000
6.1	Exec. Mgmt.		27,700		100,000
6.2	Fiscal Operations		44,300		25,000
6.5	Phy. Plant Oper.		428,700		190,000
8.1	Scholarships		300,000		
9.1	Cost of Purchases		100,000		
9.2	Cap. Expenditures		73,000		
9.3	Cap. Cost-Bldgs.		304,000		
9.4	Cap. Cost-Equip.		96,100		

Table 8

Final Cost Objectives

Activity Center		Eligible to Receive Allocated Support Costs
1.0	Instruction (all subprograms)	YES
2.0	Research (all subprograms)	YES
3.0	Public Service (all subprograms)	YES
5.5	Student Auxiliary Services	YES
5.6	Intercollegiate Athletics	YES
6.6	Faculty and Staff Auxiliary Services	YES
7.1	Institutional Operations	NO
7.2	Outside Agencies	NO
8.1	Scholarships	NO
8.2	Fellowships	NO

STEP 7 - ALLOCATE SUPPORT COSTS/CALCULATE FULL COSTS

The next to the last step in the implementation process is the allocation of support costs to final cost objectives. The Information Exchange Procedures define as final cost objectives the IEP Activity Centers shown in Table 8. Note, however, that support costs are not allocated to all final cost objectives.

Each activity center not designated as a final cost objective is a support activity center, the direct costs of which are allocated back to one or more final cost objectives. The Information Exchange Procedures recommend an allocation parameter to be used as the basis of allocation when actual usage data is not available. These recommended parameters and the recommended recipient final cost objectives for each support activity center are shown in Table 9 on the following page.

Although an allocation parameter is recommended for each support activity center, actual usage data should be used whenever possible. A Business School library, therefore, might be allocated only to the disciplines in the Business School. When usage data such as this is to be used for allocation purposes, it is convenient to crossover support costs to a lower level of detail in the IEP Activity Structure in the crossover of direct costs (STEP 3). The costs of a Business School library could therefore be crossed over to 4.1.BUS/LIBRARY rather than to the less distinguishing category 4.1.LIBRARIES.

This same technique of crossing over data to a lower level of detail may also be used in adjusting for chargebacks.

TABLE 9

RECOMMENDED ALLOCATION PARAMETERS AND RECIPIENT ACTIVITY CENTERS

Activity Center	Preferred Parameter	Alternative Parameter	Recipient Activity Centers: Instruction (1.1 and 1.2 only)	Recipient Activity Centers: Instruction, Research & Public Service	Recipient Activity Centers: All Final Cost Objectives*
4.1 Libraries	Direct Costs	None Specified		X	
4.2 Museums & Galleries	Direct Costs	None Specified		X	
4.3 Audiovisual Services	Actual Usage Data	Direct Costs	X		
4.4 Computing Support	Actual Usage Data	Direct Costs		X	
4.5 Ancillary Support	Actual Usage Data	Direct Costs		X	
4.6 Academic Administration	Direct Costs	None Specified		X	
4.7 Course & Curriculum Development	Direct Costs	None Specified	X		
4.8 Academic Personnel Development	Direct Costs	None Specified		X	
5.1 Student Service Administration	Semester Credits	None Specified	X		
5.2 Social & Cultural Development	Semester Credits	None Specified	X		
5.3 Counseling & Career Guidance	Semester Credits	None Specified	X		
5.4 Financial Aid Administration	Semester Credits	None Specified	X		
5.5 Student Auxiliary Services	Final Cost Objective				
5.6 Intercollegiate Athletics	Final Cost Objective				
6.1 Executive Management	Direct Costs	None Specified			X
6.2 Fiscal Operations	Direct Costs	None Specified			X
6.3 General Administrative Services	Direct Costs	None Specified			X
6.4 Logistical Services	Direct Costs	None Specified			X
6.5 Physical Plant Operations	Assignable Square Feet	Direct Costs			X
6.6 Faculty & Staff Auxiliary Services	Final Cost Objective				
6.7 Public Relations & Development	Direct Costs	None Specified			X
6.8 Student Recruitment, Admissions & Records	Semester Credits	None Specified	X		
7.1 Independent Operations/Institutional	Final Cost Objective				
7.2 Independent Operations/Outside Agencies	Final Cost Objective				
8.1 Scholarships	Final Cost Objective				
8.2 Fellowships	Final Cost Objective				
9.3 Capital Cost - Bldg. & Land Improvements	Assignable Square Feet	Direct Costs			X
9.4 Capital Cost - Equipment	Direct Costs	None Specified			X

*All final objectives except scholarships, fellowships, and independent operations.

Chargebacks that have been reversed for direct cost purposes then may be "restored" in the allocation process and only any uncharged balance in the supplying service center would be allocated using an allocation parameter.

Using this same technique to allocate the capital cost of buildings and land improvements and the capital cost of equipment to specific users may be particularly worthwhile and may assist in avoiding distorted full costs. If some buildings or equipment can be identified with specific activity centers, the capital cost for those items may be calculated separately, recorded at a lower level of detail, and then allocated only to the activity centers using the assets. The capital costs of a nuclear accelerator (and its separate building), for example, can be calculated separately, assigned to activity centers 9.3.1902 and 9.4.1902, and then allocated only to Physics Instruction and Physics Research in the allocation phase.

ALLOCATION IN THE DMM

The allocation command in the DMM permits both simple and complex allocations to be performed easily. A typical allocation command would appear as (paraphrasing):

> Allocate 100% of 5.4, Financial Aids Administration across all activity centers in the range 1.1.0000 through 1.2.9999. Use CREDIT.HOURS as the allocation parameter. Name the result ALLOCAT.COST.

This procedure would be followed in allocating the costs of the other support cost centers. After allocating all support costs, the parameter ALLOCAT.COST will contain the total dollars allocated to each final cost objective. (If additional detail is desired by an institution, the computer software and implementation process permit determining for each final cost objective the amount allocated from each support cost center. This would permit displaying, for example, that Lower Division English was allocated $4,816 from 6.5, Physical Plant Operations; $2,914 from 6.1, Executive Management; $1,831 from 4.1, Libraries; and so forth. However, this amount of detail is not used in the Information Exchange Procedures data set.)

For most institutions, all allocations may be done in a single run of the relevant DMM programs. After the allocations have been performed, the full cost for all activity centers is calculated using other DMM commands that add together the direct cost balance and the amount allocated to each activity center. If this result is called FULL.COST, portions of the DMM matrix would appear as shown in Figure 27.

FIGURE 27

DMM ALLOCATED COSTS AND FULL TOTAL COST

ACTIVITY CENTER	NAME		DIRECT. COST		ALLOCAT. COST	FULL. COST
		PARAMETER				
1 1 1501 20	LD English		40,260		35,800	76,060
1.1.1501.30	UD English		30,626		27,850	58,476
1.1.1701 20	LD Math		36,934		29,500	66,434
1.1.1701 30	UD Math		21,880		22,000	43,880
1.3	Comm.. Educ.		16,660		5,500	22,160
2.1	Research Center		56,750		42,100	98,850
4.1	Libraries		100,800		—100,800	
4.4	Computing Support		101,600		—101,600	
4 7.1501	CC Development		2,500		— 2,500	
5 3	Counseling, Career		70,600		— 70,600	
5.4	Fin. Aid-Admin.		27,700		— 27,700	
5.5	St. Aux. Services		113,500		148,700	262,200
6.1	Exec. Mgmt.		27,700		— 27,700	
6.2	Fiscal Operations		44,300		— 44,300	
6.5	Phy. Plant Oper.		428,700		—428,700	
8.1	Scholarships		300,000			300,000
9.1	Cost of Purchases		100,000			100,000
9.2	Cap. Expenditures		73,000			73,000
9.3	Cap. Cost-Bldgs.		304,000		—304,000	
9.4	Cap. Cost-Equip.		94,800		— 94,800	

STEP 8--CALCULATE FULL UNIT COSTS

The last step in the cost study implementation is the calculation of full cost by unit of instruction for both disciplines and programs. This is accomplished with the same commands used to calculate direct cost by unit of instruction in Steps 4 and 5. In this step, however, the commands refer to the full cost parameters. Figure 28 illustrates the DMM matrix for NCHEMS U after these commands have been processed.

FIGURE 28
DMM FULL UNIT COSTS

ACTIVITY CENTER / PARAMETER	NAME	CREDIT. HOURS	DIRECT. COST	DIR. COST/CR	FULL. COST	FULL. COST/CR
1.1.1501.20	LD English	1,698	40,226	24.00	76,060	45.79
1.1.1501.30	UD English	1,009	30,626	30.00	58,476	57.95
1.1.1701.20	LD Math	1,584	36,934	23.00	66,434	41.94
1.1.1701.30	UD Math	438	21,880	50.00	43,880	100.18
PRG. 1501.20	LD English	1,724	60,805	35.27	108,147	62.73
PRG. 1501.30	UD English	1,950	90,051	46.18	156,722	80.37
PRG. 4901.20	LD Liberal Arts	1,914	55,047	28.76	94,131	49.18
PRG. 4901.30	UD Liberal Arts	1,879	61,888	34.33	121,684	64.76

CONCLUSION

The eight steps described provide an overview of the Information Exchange Procedures cost study implementation process. In addition to the data produced explicitly for the IEP cost study, the implementation process also provides information for other analyses that may be desired by the institution. The RRPM 1.6 input that may be produced has already been mentioned. In another option, the Student Data Module provides information on the number of full-time equivalent (FTE) students in each program and student level to the Data Management Module. With these data, the DMM may be used to calculate the direct and full costs of an FTE student in each program and level, in addition to the program credit hour costs described in Steps 5 and 8. Another example of a useful calculation is the determination of a faculty productivity ratio for each discipline and course level. This can be calculated in the DMM by using the discipline IWLM units from the Student Data Module and the service months for instructional personnel provided by the Personnel Data Module.

These examples illustrate just a few of the additional analyses supported by the data collected in the IEP implementation process and the NCHEMS Costing and Data Management System. Individual institutions undoubtedly will find many more uses that meet their unique needs.

The development and exchange of the cost data recommended by the Information Exchange Procedures are not insignificant tasks. However, with the help of a concise series of implementation steps and computer software support this task becomes managable. The use of IEP information from both a single institution and from several similar institutions should provide benefits in the planning and management process that far outweigh the effort involved.

APPENDIX I

OBJECTS OF EXPENDITURE

Some institutions may wish to conduct a more detailed cost study for their own internal management purposes and include object of expenditure in their analysis. Without including object of expenditure in the analysis only the total direct cost of each IEP activity center is available. When objects of expenditure are included in the analysis, more detailed cost data, such as Supplies and Service expense in 6.1, Executive Management, and nonexempt staff compensation in 5.4, Financial Aid Administration, are available.

Regardless of the level of detail of a cost study, the implementation steps are almost identical. However, several technical differences do exist in the implementation process. The primary differences are:

(1) Both an IEP activity and an object of expenditure category (parameter identifier) must be specified for each account crossed over by the Account Crossover Module when objects of expenditure are included. (When objects of expenditure are not used, a single default "object" or parameter identifier is used by the Account Crossover Module.)

(2) When objects of expenditure are not being included, features of the Account Crossover Module facilitate crossing over groups of accounts with a single crossover instruction. For example, in most institutions a single instruction can be written to crossover all

Library accounts to the IEP activity center 4.1, Libraries. Another instruction will crossover all business office accounts to 6.2, Fiscal Operations, and so forth. When doing a more detailed cost study, it is difficult to take advantage of these computer software features and individual crossover instructions must usually be prepared for each account. When objects of expenditure are combined into one category, institutions will typically prepare manually 300 to 1,000 crossover instructions (depending primarily on the number of organizational units recognized in their accounting system). When objects of expenditure are included, the number of crossover instructions that must be prepared usually at least quadruples and may increase by a factor of ten or twenty. Conceptually, the task remains the same but the physical task is increased substantially.

(3) An additional Data Management Module step must be used to add together the components of direct cost to calculate total direct cost for each Activity Center.

If objects of expenditure are used the following categories are recommended:

Instruction/Research/Professional Personnel Compensation

Administrative/Support Professional Personnel Compensation

Nonexempt Staff Compensation

Supplies and Services (includes travel, communications, etc.)

Rental Expenditures - Buildings and Land Improvements

Rental Expenditures - Equipment

Capital Expenditures - Equipment

Capital Expenditures - Building and Land Improvements

Scholarships and Fellowships

Expenditures for Items Purchased for Resale

These categories are taken from Report of the Joint Accounting Group and will facilitate performing additional financial analyses suggested in that manual.

APPENDIX II

FACULTY ACTIVITY ANALYSIS

An institution may use the NCHEMS Faculty Activity Analysis Survey Instrument or a similar faculty survey instrument to obtain additional information on the activities of faculty members Most institutions then would use the Faculty Activity Module of the NCHEMS Costing and Data Management System to "preprocess" these data for input to the Personnel Data Module. Since the activities reported in the Faculty Activity Analysis Survey Instrument are more detailed than the activities in the Activity Structure, some consolidation of Survey activities will be required. Table 10 indicates recommended conventions.

934160000004540:
SC:175:WICHE:2BA194:
4.5M:275:GD:LLR:2BA194

TABLE 10

NCHEMS FACULTY ACTIVITY/IEP MAPPING CONVENTIONS

FACULTY ACTIVITY*	IEP ACTIVITY CENTER		COMMENTS
A.1 Scheduled Teaching	1.1.XXXX.XX 1.2.XXXX.XX 1.3 1.4	General Academic Instruction Occupational & Vocational Instruction Community Education Preparatory & Adult Basic Education	Department and course numbers can be used to determine the specific IEP activity center codes.
A.2 Unscheduled Teaching			To be distributed proportionately across all scheduled teaching activities.
A.3 Academic Program Advising			To be distributed proportionately across all scheduled teaching activities.
A.4 Course & Curriculum Research & Development	4.7.XX00	Course and Curriculum Development	Discipline codes should be maintained at the 2-digit HEGIS level.
B.1 Specific Projects	2.1 2.2.XX00	Institutes and Research Centers Individual or Project Research	Research activities funded through a formal research organization should be coded 2.1. Research activities managed by an academic department should be coded 2.2.XX00 (with discipline distinctions maintained at the 2-digit HEGIS level).
B.2 General Scholarship and Professional Development	4.8.XX00	Academic Personnel Development	Discipline codes should be maintained at the 2-digit HEGIS level.
C.1 Student-Oriented Service	5.3	Counseling and Career Guidance	Other student service activities will need to be coded on an exception basis.
C.2 Administrative Duties	4.6.XX00	Academic Administration	Discipline codes should be maintained at the 2-digit HEGIS level.
C.3 Committee Participation	4.6.XX00	Academic Administration	Discipline codes should be maintained at the 2-digit HEGIS level.
D Public Service Activities	3.2	Community Services	Other public service activities will need to be coded on an exception basis.

*Complete definitions and examples of these faculty activities can be found on the NCHEMS Faculty Activity and Outcomes Survey form.

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