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ABSTRACT

This paper summarizes major experiences and practices of information development units of state-based [illegible] information systems which produce accurate, current, and local occupational and educational information for career planning. It is intended as a guide for states considering setting up a similar system and for staff members in presently developing state-based [illegible] career information. Sections of the paper provide explanations [illegible] detail related to these areas: (1) characteristics of [illegible] information, (2) definition of an implementation strategy to follow [illegible] information topics to be covered, (3) staffing the information development unit, (4) use of a data collection strategy that relies on existing data sources, (5) implementation of a systematic information updating design, and (6) use of workplans to organize major tasks. Appendixes include a workplan and job descriptions of information development unit staff. (KLB)

MANAGEMENT
ISSUES IN INFORMATION DEVELOPMENT

A Report on Management Approaches in Systems of Computer-Based Career Information

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1980

Career Information System

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ONTENT

PREFACE

This paper describes major issues that Information Development units of state-based career information systems must deal with as they work to provide quality information for career planning. The subject is a timely one because many of the systems of career information have been in existence long enough to have established a variety of successful practices. Their approaches need to be documented for use by newer state systems in each of the stages of development.

The paper is a distillation of experiences reported by a number of Information Development managers in these established systems. Managers and directors of ten systems spent considerable time in conversations with the author, himself a former Information Development manager. These discussions pointed out that there were many threads of similarity in organization and approach used to carry out the Information Development function.

The following people provided great help, sharing their experiences freely. I appreciate their contributions.

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INTRODUCTION

Information Development

In the overall organization of a career information system, the function of the Information Development or Information Analysis unit is to develop information for inclusion in CIS files and to maintain it. The task is a major one. Producing accurate, current, and localized occupational and educational information for career decision makers is expensive and time-consuming. This paper will summarize some of the major experiences and practices of Information Development staffs at operating systems of career information throughout the country to illustrate approaches that are working in these ongoing operations. These experiences should provide guidance for states that are considering setting up a similar system and for staff members in presently developing state-based systems of career information.

A number of important guidelines or operational rules underlie the Information Development function in a career information system.

The sections of this paper provide explanations and detail related to these important areas:

- Characteristics of good information. Behind the whole Information Development effort must be a basic dedication to quality.

- Definition of an implementation strategy to follow and information topics to be covered. A creative dynamic needs to be recognized between the desire to be as comprehensive as possible to maintain the information at a high level of accuracy, but to do so at sustainable costs.

- Staffing the Information Development unit. The overall operation and staffing of the Information Development unit must be efficient and economical enough to be sustained in the long-run by the institutions served by a state career information system.

- Use of a data collection strategy that relies on existing data sources. Making maximum use of existing data sources requires an understanding of the strengths and limitations of the data and an ability to present information from numerous sources in a useful way.

- Implementation of a systematic information updating design. Important requirements of the information files are that they be accurate, current, and local. A systematic review, along with a process that allows continuous updating, is the process used to accomplish this objective.

- Use of workplans to organize major tasks. Formalized workplans to back up the Review Cycle and Current Updating processes enable Information Development staff to schedule work efficiently throughout the year.

I. THE ROLE OF INFORMATION IN A CAREER INFORMATION SYSTEM

It is self-defeating to think that "what you don't know won't hurt you." When confronted by an ambiguous situation, many of us look for information to help us decide on a course of action. We may seek it by reading books, talking to friends or by relying on our own past experiences. The better the information, the better the decisions we are likely to make.

When thinking about possible careers to pursue, we look for facts to guide our decision making. Some people involved in career decision making are still in school and are interested in exploring a wide range of possibilities. Others have many years of experience and a new interest in a different type of work. People at these varied points in the decision-making process need accurate information applicable to their particular needs and interests.

In the area of career planning, the problem is not so much one of too little information; rather, there are enough disparate facts related to jobs and the economy to produce an information overload. However, the overabundance of information about jobs is often technically written, scattered in many places, unorganized for the career decision maker and sometimes sadly out-of-date. It was to improve this situation that statewide career information systems were set up in many parts of the country in the last decade.

What is a System of Career Information?[1]

A career information system provides occupational and educational information to individuals who are making career decisions. Acting as a link between the producers and the consumers of career-related information, a career information system analyzes and develops the technical

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[1] This section and the following two are based on Wendy Arnold, "A Steering Committee Guide for Planning a State-Based Career Information System," Second review draft, (Eugene, Oregon: Career Information System, December 1978), pp. iii and iv.

labor market data and educational statistics available from a variety of sources into a system of understandable, current, and localized career information. It then supplies this system to institutions and agencies for use by their clients.

How Does a Career Information System Work? The career information system product--information--is stored in computer banks and continuously updated by full-time information analysts. All of that information may be accessed at a user site by one of two delivery systems: a computer terminal, linked by telephone to a computer running the career information system program; or a manual system backed by printouts of the system's information files in book form or on microfiche.

Users can access the information in many ways with both the computer and manual systems. The user can access any single file separately--occupational descriptions, programs of study, schools, and so forth. The user can also begin by sorting occupations based on personal preferences. He or she then obtains a description of any of the occupations on the list or looks at information about how to prepare for a specific occupation. This occupational information leads the user next to information about educational programs and institutions offering those programs.

Whom Does a Career Information System Serve? The need for accurate and understandable information about the world of work transcends sex, race, and age. Career information system users range from housewives re-entering the labor force to high school students planning their post-secondary futures, from inmates in correctional institutions to elementary students just becoming aware of the world of work, and from clients of a vocational rehabilitation office to CETA clients. Anyone who can follow a simple set of instructions can operate the system and explore relevant career options.

How is a Career Information System Organized? The structure of a career information system includes three major operational components: 1) information development; 2) user services, and 3) computer services.

In the Information Development (in some states called Information Analysis) unit, information analysts research existing occupational and educational data sources, analyze the information provided by these and

other sources, and compile all the information into a format which is relevant to the questions and needs of its users.

In the User Services unit, staff members market the system, provide training to user institutions and agencies in the effective use of the system, assist them in integrating career information into their service programs, and maintain effective communication with the system's users.

In the Computer Services unit, staff coordinate the computerized and manual delivery systems, do trouble-shooting, produce materials, and communicate with computer centers.

A statewide career information system is able to provide its users with current, localized career information at a remarkably low cost through consortium arrangements. This allows even small groups to enjoy the services of the system.

Quality Standards for Information

Good information is at the heart of the career information system concept. Recognizing that the Information Development function acts in concert with effective delivery systems and a strong user service program, this paper focuses on the ways good information is produced and maintained in such a system.

Paul Franklin and Don Mayall provide an excellent discussion of the quality standards for information to be included in a career information system. In a paper designed for planners of an Educational Information Center, they describe the dimensions of an ideal information system.[2]

> The good system will not sacrifice accuracy and reliability through attempts to "stretch" data further than it will go in an effort to meet a defined client need. For example, there is a dearth of good data available on the job placement rates of educational program graduates. In its absence, the comprehensive system can report the state preparatory intentions of a given program (e.g., psychology programs intend to prepare students for social service occupations.) To state otherwise (e.g., that psychology programs do prepare students for social service occupations) goes beyond the limits of the data.

[2]Paul Franklin, Educational Information and Advisement Services: A Resource Guide for Creating Local Services and Building Statewide Networks (Washington, D.C.: Department of Health, Education, and Welfare, 1978), pp. 62-63.

The good information system focuses on insuring quality in its information. The emphasis should be on providing information that can be relied upon, not on trying to fill every client need through out-of-date numbers or conjectural statements.

Another dimension of the good information system is that it recognizes that not all of its information topics will be needed by all clients. Hence, it allows users to access the particular information they want without wading through that which they do not want. The computer's ability to instantaneously access and present a single information item from a bank of a thousand items is one reason for its popularity as an information system delivery device. However, a well-indexed book or a well-catalogued career library can perform the same function but with more time and effort.

Regardless of information content and delivery methods, most practitioners agree that a good system's information will meet the following qualitative standards:

1. Accuracy -- This is akin to the statistical concept of validity. The information is what it is purported to be. It is verifiable; it is "true". Insuring accuracy requires validation; that is, standard procedures for reviewing internal consistency and for comparing against other sources.

2. Currency -- The information is applicable at the time of its use. Last year's airline schedules, like last year's college catalogs, may be accurate as historical documents, but clearly could be misleading to the user in the context of current use. Maintaining currency requires purging old data and adding new with whatever frequency best relates to the perishability rate of the particular data (e.g., daily?, monthly?, annually?).

3. Relevance -- The information topics speak to the interests and concerns of the user. When fully digested, the information should reduce the user's uncertainties and thereby facilitate choice and decision-making.

4. Specificity -- In most cases, information that is specific is more useful than information that is general. Thus, while general statements about "entrance requirements at four-year colleges", "the outlook for professional workers", or "national average wage rates for welders" are of some use, information on specific colleges, occupations, and local labor markets is of greater value.

5. Understandability -- The intended meaning of the information is conveyed to most users. This means that ambiguities are avoided and that the content does not exceed reading skills of the ultimate consumer, or, if that is not feasible, of counselors, aides, or translators who assist the consumer in using the information.

6. Comprehensiveness -- An information system may be limited as to its coverage. For example, it may cover a single state, or region, or only postsecondary educational sources, or professional careers. But within its stated scope, the user should feel confident that the information is complete--that there are no "holes," no missing colleges, programs, or career fields.

7. Impartiality -- Within its scope of coverage, the information does not reflect biases. For example, information on colleges does not promote one college or type of college over another. Status distinctions between one type of occupation and another are not promoted by the system--in content or format--but are left to the user's own values and judgment.

8. Cost -- All of the foregoing standards relate to information quality. Achieving quality in each of these dimensions will incur costs. Since the resources to support an information system are limited, it is necessary to weigh the costs of the system against its effectiveness. If economies of scale are to be achieved, the system's cost per user should be considerably less than the costs of similar information services delivered through a non-system approach.

The following chapters will discuss how to provide these kinds of quality information.

II. IMPLEMENTING AN INFORMATION SYSTEM: EARLY DECISIONS

The Information Development staff is the group of people responsible for developing and maintaining the information about occupations and training opportunities in the system. Several basic decisions face the organizer of an Information Development unit as development and implementation begin:

- Select an implementation strategy for setting up a comprehensive file of information.
- Specify content and numbers of files to include in the system.

The Implementation Strategy

There are four alternatives for implementing a system of career information: (1) develop new components and files; (2) make major design changes in an existing system; or (3) adapt an existing system's files with minor modifications; or (4) adopt an existing system's files.

A guide for planners of an Education Information Center (EIC) points out that the strategy to pursue "should be selected based on (a) the identifiable needs of the prospective users of the information; (b) the resources available for implementing and maintaining high quality information; and (c) the ability of the system to involve groups in the state to support the implementation and on-going costs of a comprehensive system."[3]

Franklin's EIC Resource Guide outlines three alternatives for implementing a complete organizational system of career information. Excerpts from the discussion follow.

> "Developing New Files: Practitioners agree that developing new files is the most costly of the alternatives. This approach fails to capitalize on the techniques and procedures

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[3]Franklin, Educational Information and Advisement Services: A Resource Guide, p. 70.

already established and operating within existing systems. If computers are chosen as delivery devices, information file formats and accessing strategies have to be developed; computer programs fully developed, written, and tested; occupational and educational information developed from scratch; and the developed system completely evaluated before it is implemented. Full-scale development is costly both in terms of money and time. Hence, unless unusual resources exist, most states would be wise not to develop an information system from the ground up.

Adapting Information Files: Most practitioners agree that the most efficient way to implement a system in a new state is to adapt an existing system. By selecting an existing system, the new state is able to concentrate its efforts on implementing the system and adapting it to meet the defined particular needs of the state. Time and money are saved over developing a new system and quality is better assured.

Again using the example of a computerized system to demonstrate adaptation processes, information file formats and the computer programs of an existing system could likely be used as is or with slight modifications, saving considerable time and money. Staff assigned to the system could concentrate their efforts on localizing the system's information to reflect the state's labor market and educational institutions and offerings.

Even at that, some of the information in the system being adapted would be useful as is (e.g., air traffic controllers perform essentially the same job duties in New Jersey as they do in Iowa), thereby reducing time and costs for developing information. Adapting an existing system will reduce money and time costs by at least one-half of the costs to develop a new system, with "bottom-line" figures depending upon the system chosen, extent and quality of existing local data sources, and the availability of appropriate delivery devices (e.g., computers if a computer system, microfilm readers, if a microfiche system, etc.).

Adopting Information Files: Another alternative is to adopt files of an existing system essentially unchanged. A state might consider adopting an existing system as a useful alternative when the state's financial and human resources alone or in concert with others will not support full-scale implementation of a state-based system. In this case, the state developers may choose to lease rights to one of the national career information systems. The advantages are that the state would have an information system to put in place immediately. The disadvantages are that national systems provide only national information and are, therefore, less relevant to local labor market conditions and lack of detail

and accuracy of educational information that can be achieved by a state-maintained information system."[4]

Making Major Design Changes: A fourth alternative to system development can emerge, not as a clear strategy, but as a position between development of a new system and adaptation of existing files. This alternative also can be quite costly. This strategy can develop after a state decides on an existing system to implement. Implementation is started with early decisions made to simply make minor modifications to the basic system selected. However, the modifications can become numerous and more major than originally intended. The modifications substantially change the design of the basic system and create problems that necessitate redesign of information formats, computer programs, or user training programs.

Some indications that the state developer is embarking on major design changes include the following: (1) computer software changes are necessary (in addition to adding new files, loading and accessing programs need to be substantially rewritten); (2) new data are needed (no existing data are usable for a specific application or existing data need to be put into a different use); or (3) changes are initiated that bring into question whether or not the user services staff can get the change understood by users. If the state developing a CIS finds that its modifications are of the sort outlined here, it may end up in a situation closer to that of the developer building a new system than to that of the system adapter.

Deciding How to Implement

Developing a new system or making major design changes in an existing system require considerable resources. Both approaches may require developers to reinvent wheels of all sorts and raise unnecessary problems and risks of failure. These plans are costly, but even more troublesome is the amount of time they take. Such considerable resources may be beyond the reach of many states wishing to develop their own system of career information. Adopting an existing system unchanged may make sense in some situations, primarily where funds are very limited and a national

[4] Ibid., pp. 70-72.

file of information would provide some help to career decision makers in the state. Adaptation of an existing system seems the best choice for states with moderate funding seeking the latitude to adjust for local conditions and provide locally produced information. Recognizing this, federal grants policy has encouraged adaptation as the preferred implementation strategy for developing state-based systems. Many existing system designs allow for modifications to accomplish the need for adaptation and if these changes are kept minor, the additional expense can be reasonable and anticipated.

In the final analysis, the decision of how to implement a state-wide career information system must be based on user needs and the resources available in the form of funding, personnel, and ability to link with others to fully support a comprehensive system. Given this assessment, existing systems or proposed new ones can be measured against content, appropriateness of delivery method(s), and overall service quality.

Content of a Good Information System

Defining the scope of the information to be covered in a state-wide career information system is an important task with cost implications too. CIS managers need to balance a desire for high quality, comprehensive information with economic realities. Some of the questions that need answers are:

- How many occupations is optimal for the system?
- How many programs of study and what types need to be included?
- How many schools and from which sectors need to be covered?
- What topics of information need to be described in the occupational, program, and school files?

Deciding on Information Topics to Include. A helpful guide to use when looking at possible information topics is the Handbook on Standards and Accreditation of the Association of Computer-Based Systems for Career Information. The following excerpt from the Standards (see Table 1) outlines the general coverage that a thorough information development program should include.

TABLE 1

STANDARDS FOR A SYSTEM OF CAREER INFORMATION

Information Development
(Selected Standards)

Standard 2.3. A system should develop information which adequately describes the occupation. Occupational topics may include but not be limited to the following:

A. Dictionary of Occupational Titles Specialties
B. Duties
C. Abilities (These are natural abilities or capacities for learning rather than learned skills.)
D. Working conditions
E. Equipment
F. Earnings
G. Employment outlook
H. Training and education
I. Methods of entry

Standard 2.9. A system should develop information that adequately describes the basic characteristics of the program. Education topics may include but not be limited to the following: program objectives, specialties, degrees conferred, sample courses, and a comprehensive list of schools offering the program. Whenever possible, an occupational objective should be given for programs, but explicit occupational objectives should not be listed when there are none.

Standard 2.11. School information topics should include, but not be limited to, general information, admission, housing, costs, financial aid, and student services. Other detailed information should be provided as available and applicable.[5]

[5]Association of Computer-Based Systems for Career Information, Handbook on Standards and Accreditation (Rev. 1980), (ACSCI Clearinghouse, 247 Hendricks Hall, Eugene, Oregon 97403), pp. 20-24. The National Occupational Information Coordinating Committee (NOICC) has adopted similar standards for their Career Information Delivery System (CIDS) program.

The list of possible information items to include in the occupational and educational areas is long. Many state career information systems include most topics on the ACSCI list in their occupational file.

Selecting information topics to include in the system is an area that deserves careful study, especially in the initial stages of developing system files. Questions such as availability of data, user needs, importance of individual items, and cost of development and maintenance need to be considered for each information item. Making choices and cost estimates for information topics to be included in the various files is a task that starts when the initial development of a system's files is begun and continues each year thereafter as topics are reviewed.[6]

Deciding on Numbers of Files. A reasonable goal when planning the number of occupational files in the system is to provide a list of occupational files that covers at least 90 percent of total employment in the system's service area.[7]

States vary in the number of occupational descriptions they maintain. Some states organize their occupations into 240-250 files; some have over 400. Some state systems will be using the Standard Occupational Classification (SOC) with about 660 occupational titles. However, the majority of the states use about 300 occupational description files to describe the world of work in their service areas. Some of the variation among states in their number of occupational files is due to differences in the major industries in the states. Another reason for variation is that some states break out individual occupations into separate descriptions and other states combine several occupations under a broad title in a single occupa-

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[6] In addition, many state-based career information systems also provide supplementary information files covering topics such as related resource documents, people to contact for an occupational visit, special information on women or the handicapped, national occupational and educational opportunities, or detailed financial aid information.

[7] ACSCI, Standards, p. 20.

tional description. The classification systems chosen to organize the occupations is also a factor. However, whatever the actual number of occupational files turns out to be, the aim is to differentiate among occupations and to clearly display the information describing them. The framework selected to accomplish this needs to have a sound theoretical or technical basis and data related to the selected occupational groups should be available in the system's service area.

States also have varying numbers of files of educational information. Some systems cover all of the accredited and licensed two- and four-year colleges and proprietary schools in their state. Others cover only the colleges. A wide range of options is available (private vocational schools, vocational-technical institutes, community colleges, four-year colleges and universities, graduate schools, adult education programs, industry-sponsored educational programs, and so forth). Whichever sectors of educational training are selected, however, it is necessary to develop a comprehensive list of the ongoing programs in that sector for complete coverage.

General and Localized Information Topics. The information topics in the occupational and educational files can be separated into two general groups. One group of topics is characterized by little differentiation between geographic areas. The information is more general in nature. Items in this group include:

Occupational Information

- Job Duties
- Specialties
- Working Conditions
- Industries
- Equipment
- Skills
- Physical abilities and aptitudes
- Education, training and experience requirements
- Methods of entry

Educational Information

- General description of a typical program of study (objectives, specialties, sample courses)

The second group of information topics may vary greatly among geographic areas. This requires localizing the information and

consequently the information is less readily available. Items in this group include:

Occupational Information

- Current employment
- Earnings
- Employment outlook (supply/demand)
- Licensing requirements
- Training sources

Educational Information

- Lists of schools offering specific programs
- General information about individual schools
- Admissions information
- Cost and financial aid information
- Housing information
- Student services information

Information generally considered essential in an occupational and educational information program is usually available to some extent already. More than likely other data producers also have judged them to be essential and have developed some information. Consequently, these items are least costly to collect.

A Few More Words About Cost

There is no doubt that running an Information Development unit is expensive. This is a fact which is relevant in discussing many aspects of information development covered in this paper. Costs are substantial and continuing. However, it is important to put the issue of cost into perspective before getting into a description of specific procedures used by information analysts to assure accuracy, currency, and the other quality standards outlined in the previous chapter.

The major cost in operating an Information Development unit in a state-based system of career information is file maintenance. In most state-based systems, staff spend the majority of their time updating occupational and educational information files. This insures the continued high quality of the basic product that these state-based systems are set up to produce:

- Factual information that people can confidently use to make decisions about careers
- Information that is more accurate, current, and locally relevant than anything else available in one centralized location

A continuous updating process is necessary because some of this information has a frustratingly short useful life. It also is the essential ingredient of a career information system.

The costs of this maintenance activity are relatively fixed, with most of the expense centered in personnel costs. Information analysts are professional level staff responsible for carrying out a technically demanding work schedule. Theirs is not a clerical task as will become clear in ensuing chapters. Some state systems hire additional clerical and student help for some Information Development work but all employ permanent professional Information Development staff. A well-trained, efficient Information Development staff can produce information that serves the audience of the system well and this insures continued support of the system as a whole by its users.

III. STAFFING THE INFORMATION DEVELOPMENT UNIT

One of the most significant aspects of a career information system is the quality and usefulness of the information that it delivers. The information must be accurate and reliable for career planning and the responsibility for this rests with the Information Development unit.

Unit Size and Composition

In most state systems the Information Development unit is small. The staff usually is headed by a manager, who also works as an information analyst. One to five analysts maintain the system's occupational and educational information files. In addition to a basic, permanent staff doing Information Development work, some state systems also have people working at other agencies assigned full- or part-time to work on Information Development for the state-based systems of career information. In some states the labor market economists working for the Employment Agency help the effort by providing substantial information for the system's occupational review cycle. In some cases the labor economists actually work for the career information system although they are housed and financially supported by the Employment Agency. Other state-based systems use students to supplement staff resources.

The size of the Information Development staff generally is determined by budget and by the number of information files to be included in the individual state system. (Some of the budget implications associated with decisions about numbers of files in the system, number of topics to update, and so forth are discussed in Chapter II.) One state has only one full-time analyst who does all Information Development work for the system. He receives small amounts of help from students and some part-time work from another staff member at certain times of the year. Another state with much more extensive resources has two-plus full-time information analysts inhouse in the Information Development unit and an additional one and one-half full-time analyst working

at the Employment Agency. In the middle, most state-based systems report between two and three information analysts on staff, including a part-time manager of the unit.

Systems of career information hire professional level staff analysts to do the work of the Information Development unit. Working with occupational and educational data sources in a knowledgeable fashion, analyzing the data, and writing clear and concise descriptions of the information requires a variety of technical skills. In a number of states, the technical work of the analysts is supplemented by student and clerical help. For example, students do substantial work on the Review Panel survey project in some states. They contact firms and people identified by the analysts, mail out the questionnaires, and do recordkeeping tasks. The majority of the file maintenance work, however, is done by the information analysts.

What To Look For When Staffing

The effective Information Development unit, managers say, is made up of people who:

- Catch on to things quickly
- Pay attention to detail without losing sight of the overall picture
- Are thorough in their work
- Adhere to timelines
- Work independently as individuals
- Can function as part of a team
- Display curiosity and like to find out about things
- Show a concern for quality

The work of an Information Development unit is a mix of group efforts and individual tasks. Staff members need to be organized, both in their own work habits and in putting together the work of several people into a large-scale effort.

Duties of the Information Analyst

The majority of each analyst's time is devoted to file maintenance activities, most states report. Consequently, requirements for an information analyst position usually stress experience and coursework in labor market economics or educational research. Each state system stresses the ability to write clearly and in a nontechnical style.

Most state-based systems emphasize the importance of a research background for their analysts. Some systems do not stress a research background as much if they perceive that the data-producing agencies they work with provide information in the formats needed for the system. A solid research background, however, does help the analysts deal with the strengths and limitations of the data.

Several position descriptions in the Appendix give a flavor of the information analyst's duties.

Duties of the Information Development Manager

Before discussing some of the more traditional managerial or coordinative duties of the Information Development manager, it should be mentioned that managing usually accounts for only a small part of this person's duties in many state-based systems of career information. The Information Development manager generally spends the majority of his or her time working as an information analyst. The manager provides some leadership in the Information Development area as a researcher, often having experience in a related field which is now applied to the problems of providing information to career decision makers. In a few states, the Information Development manager spends over 50 percent of his or her time on management tasks; in some others as little as 15 percent. The majority spend between 25 and 30 percent of their time managing the unit.

A survey of the managers of established career information systems pointed up the following major areas where time is spent under the general heading "management."

Coordination of Workload. Most managers report that some or most of what they do in the management area is coordination and workplanning. The day-to-day workload of the Information Development staff must be organized, and the work of that unit integrated into the ongoing center-wide activities of all of the units.

Designing Procedures and Methodologies. Several managers indicate that some regular time is spent designing procedures for receiving and analyzing information or documenting methodologies for other analysts to use when working with information and data sources.

Personnel. Managers spend some time supervising other analysts

and training new staff. Staff training can take several months or more than a year. Hiring, training, and evaluating staff is an on-going process.

Building Relationships with Data Sources. States vary in the amount of time devoted to building these relationships but all spend at least some time identifying sources of information, evaluating the usefulness of particular data sources, and establishing and maintaining professional relationships with researchers in data-producing agencies.

Other Duties. Some of the other activities listed under "management" include:

- Interacting with users on Information Development questions
- Communicating/linking with other units within the organization
- Attending conferences and seminars
- Preparing progress reports and budgets

Some managers also do some amount of work in the User Service unit or coordinate the production of printed materials for the system as a whole.

A position description for an Information Development Manager appears on page 81.

Different Organizational Structures

Managers of Information Development units approach their role in a variety of ways under different organizational arrangements in these state-based systems of career information. In several states, the director of the career information system plays a major role in the Information Development unit, doing the majority of the planning and design work. In organizations where the unit is quite small, the analyst may do planning, coordination with other units, research, and data gathering, along with substantial technical analysis work. In most states the manager uses about a quarter of his or her time to act as a coordinator, linking the activities of the Information Development unit with those of other parts of the system and coordinating the work of the several analysts on the staff.

The state systems generally organize their Information Development unit within a cooperative management style. At the same time, organization is tight enough to expect adherence to schedules and to editorial standards. A discipline is required by all Information Development staff to stay on schedule with file review and to meet project deadlines.

The manager of an Information Development unit usually tries to create an overall plan that allows flexibility, so that new ideas will be generated and encouraged, and at the same time is systematized and backed up by schedules, writing guides, and workplans.

IV. USING EXISTING DATA SOURCES

As the information files and topics are being defined for inclusion in the career information system, the availability of data sources must be examined. There is a gap between the large body of underutilized data already being produced by the many national and state government and research bodies on the one hand and the general public looking for attractive and easy-to-understand career information on the other. A career information system is designed to bridge that gap.

In line with this view, a career information system does not seek to establish large data gathering capabilities. Instead, the approach taken by these organizations places heavy emphasis and reliance on cooperative relationships with major data-producing agencies. Career information analysts make maximum use of existing data sources before initiating the collection of new data. This approach enables information analysis staff to concentrate on presenting existing information in a nontechnical style and supplementing the information when no adequate data sources can be found.

Arrangements With Data-Producing Agencies

Establishing Information Sources. A key element in developing a flow of information is first identifying important data-producing agencies. A list of some major agencies of this sort appears in Table 2 on the following pages. There are also thousands of other organizations such as professional and trade associations that produce some occupational information and the manager of Information Development must remain alert for other agencies that produce pertinent occupational data.

Another important task is the identification of staff members in the data-producing agencies who are knowledgeable, accessible, and in a position to release the information. This is obviously less

TABLE 2

MAJOR ORGANIZATIONS PRODUCING
OCCUPATIONAL AND EDUCATIONAL DATA

A career information system can establish liaisons with a large number and variety of data-producing as well as data-using agencies. Some of the most useful include:

- Local labor economists, personnel of the Research and Statistics and Occupational Analysis and Testing sections of the State Employment Security Agency
- State and Federal Apprenticeship and Training agencies
- State Personnel Division
- The State Center for Population Research and Census
- State Licensing Boards
- Professional Associations, Trade Associations and Unions
- Employment and Training Administration, U.S. Department of Labor
- Bureau of Labor Statistics, U.S. Deportment of Labor
- The State Education Education Coordinating Council or 1202 Agency
- The State Higher Education Agency
- Boards governing community colleges, vocational and technical institutions, and private vocational schools in the state
- The State Education Association
- The Career Education, Vocational Education, Student Services, and Teacher Certification Divisions of the State Department of Education
- The National Center for Education Statistics, U.S. Education Department
- Career education directors and coordinators, counselors, program planners, and other administrators of many local school districts and community colleges
- Career education departments of state and county education districts
- Councils of Government and other regional planning agencies
- Personnel departments of large cities and counties, and large private firms
- The Office of Institutional Research and various registrars, deans, and department heads of institutions of higher education
- The State Economic Development Department
- The State Occupational Information Coordinating Committee

TABLE 2--Continued

- The Federal Cooperative Extension Service
- The Governor's CETA Planning Agency
- The Public Welfare and Vocational Rehabilitation Agencies
- The Bureau of Governmental Research and Services, Bureau of Business and Economic Research, and Institute of Industrial and Labor Relations at universities
- Employment Standards Administration, U.S. Department of Labor
- Women's Bureau, U.S. Department of Labor
- The National Science Foundation
- The Federal Research Bank
- B'nai B'irth Career and Counseling Services
- National Center for Health Statistics

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critical when all that is desired is placement on a mailing list.

Where confidentiality of information is not an issue, cost considerations usually determine accessibility of data. When an agency publishes something of broad public interest, typically it establishes a mailing list as a means of distribution and there is no problem in obtaining the data. However, when an agency compiles a data series which it is not accustomed to releasing to the public, either because of limited interest or absence of a mailing list, it is often more difficult to obtain the data. Oftentimes it is possible to arrange a special mailing. The mailing requires more than a one-time commitment if the data are produced periodically.

When an agency does not publicize its research but the data output of the organization is important, career information analysts must take steps to identify and monitor the research output. This requires meeting with representatives of data-producing agencies, periodic surveys of research in progress, and informal inquiries about possible sources. All of these methods are helpful in identifying useful information from organizations that do not primarily produce occupational or educational data.

More difficult still is the situation where career information analysts need the information that is not already processed or prepared

for public release. Potentially there is a great deal of this information within agencies like Employment Security, Economic Development, and the Department of Education. Since data processing and preparation are potentially high cost items, agencies are naturally hesitant to commit themselves to special releases. Agencies may be more responsive if financial reimbursement is offered, but this is sometimes complicated by bookkeeping systems.[8]

People in agencies producing useful information need to be identified and one-to-one relationships established between them and the individual career information analysts. These relationships and their usefulness to both parties will vary as much as the personalities of the people involved, but many state systems of career information devote considerable time to this activity. It can pay off in efficiencies in time and money, in addition to sometimes increasing the quality of the data as CIS analysts extend use of the information to career planning areas.

Exchange of Data. Informal exchanges of information among the research staffs of the career information system and the data producing agencies are another type of arrangement that enhances the quality of information files. The establishment of these reciprocal relationships by the Information Development staff is an important activity. Typically, the exchange is initiated when one analyst contacts another, usually for information already available or data that can be provided with limited additional effort. Once these informal relationships are established, they should be documented in the Information Development files so that they can be repeated in subsequent updating cycles (perhaps by new staff if original staff moves on).

A successful example of this information and personal link is the integration of State Employment Agency labor market economists' input into some state career information system review panels. In addition to knowledgeable employers, employees and others in the community, a number of State Employment Agency's area labor market economists review occupational

[8] Bruce McKinlay, Developing a Career Information System (Eugene, Oregon: Career Information System, 1974), pp. 54-58.

descriptions. They specifically review the sections on wages, current employment and employment outlook. They are not asked to develop information for the description, but if data are already available, they are encouraged to enclose it. In turn, the labor market economists are welcome to copy and use the occupational descriptions which the career information system has developed.[9]

Subscriptions and Mailing Lists. Since up-to-date information is essential to career information system file maintenance, a majority of the published data sources used by the career information analysts are periodicals. A variety of publications are produced by federal, state, and local government agencies as well as professional and commercial publishers and many of these are helpful. Some of these publications are purchased directly and others are seen in bibliographies or as other references in separate publications and are ordered especially for a particular article.

Early in the formation of an Information Development function in a career information system, some basic material needs to be collected. Getting placed on mailing lists for standard publications of the Employment Agency in the region, the State Department of Education, the U.S. Department of Labor and Bureau of Labor Statistics is a good start. Other regulatory agencies, licensing boards, professional associations, and training institutions also provide some helpful material.

The standard publications are necessary documents to receive and it is important to become established on certain mailing lists, some of which will be at no cost while others will require a subscription fee. In addition, once on these mailing lists, releases from many of the federal and state agencies and notices of new publications will also be received.[10]

Major Labor Market Data Programs

A number of long-established, formal data programs exist and a system of career information must know their strengths and limitations to integrate relevant facts effectively into system files. Most formal, large-scale labor market information programs are at the national and state level. Much less exists at the local level. This is a problem for a career information

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[9] Ibid., p. 25.

[10] Ibid., p. 24.

system with a primary interest in relevant information about local labor markets.

For Information Development staffs looking for a basic list of major labor market data programs at the state and national level, their State Occupational Information Coordinating Committee (SOICC) can provide some help. At the national level, the NOICC publication, A Framework for Developing an Occupational Information System discusses (1) occupational demand, (2) occupational supply, and (3) occupational characteristics information.[11]

Formal and Informal Data Sources

A wide range of information sources is used in an Information Development unit. Producing a single occupational description can involve the use of many formal and informal data sources (see "Engineers" description on page 36).

Formal Data Sources. Many of the agencies listed in Table 2 produce formal data useful to a state-based system of career information. Formal data sources are usually published material resulting from systematic data collection programs. Often the data are accompanied by a published methodology describing how the information was compiled and the uses and limitations of the data. Formal data programs usually produce information on a regular basis, often as part of a continuing data program (e.g., the Employment Agency's Occupational Employment Statistices (OES) program which produces regular publications describing employment trends and employment projections for specific occupations in a state). Some formal data sources may be produced only once (e.g., a final report of a wage survey done by a professional association) but they often do not need extensive verification by the analyst.

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[11] National Occupational Coordinating Committee, A Framework for Developing an Occupational Information System, (Washington, D.C.: Bureau of Labor Statistics, October 1979).

Some of the formal data sources cited in the occupational description for "Engineers" at the end of this chapter include: The Dictionary of Occupational Titles, Annual Salary and Employment Survey of the American Chemical Society, and Area Wage Survey-Portland Area and Licensed Occupations in Oregon, publications of the Oregon State Employment Division.

Formal data sources do have limitations. Most of the large-scale data programs are reliable at the national and state levels. Data are moderately good for geographic areas with populations of 250 thousand and larger, but not as good, often based on inferences from large areas, for places of 50 - 250 thousand. When analyzing differences among the major geographic areas of a state, Information Development staff must recognize the limitations of major data programs and verify information with informal sources. Informal information sources become more necessary in these smaller, local areas which are usually the primary interest of the staff of a career information system. Through informal channels, situations can be clarified and gaps in information bridged.

Both formal and informal sources are essential to the analyst's work. The development and use of these data sources are the basis upon which file maintenance is done and the quality of the sources and the sensitivity with which they are used indicate the quality of the file maintenance process in the career information system.

Informal Information Sources. The more informal information sources vary greatly and are less standardized than formal ones. Information obtained from informal sources require verification; analysts need to check the facts before using them. This type of information may come to the analyst's attention through items in the newspaper or in magazine articles, or it may be identified and pursued through telephone conversations, discussions at meetings, and other kinds of verbal communication.

Some informal information sources used in updating the occupational description for "Engineers" includes newspaper articles, career materials from professional organizations, and comments from review panel members.

Informal sources are usually developed through one-to-one encounters between analysts and individuals such as managers of professional registries or placement services, principal employers, representatives of employee associations, and labor market economists. As with any

non-empirical source, their observations reflect both labor market events and their own perceptions. Experience teaches the competent analyst, like the good reporter, to question and to listen discriminatingly.

The informal, professional relationships between CIS staff and staff at data-producing agencies can provide a good sounding board for analytical judgments about what is happening in the labor market and its effect on particular occupations. The analyst does not use these contacts in the same way that information from formalized data collection programs is used. But in the search for information that describes the local situation, the perspective of knowledgeable people in the area is of great benefit for verification of the information in the system's files.[12]

Using Local Sources - An Illustration

Local analysis employs a mix of formal and informal information sources and requires good analysts to know the uses and limits of these sources. In many of the established state systems of career information, incorporating information from knowledgeable people in the community into the file updating process has become a helpful activity. The information in these system's occupational descriptions has been developed over a number of years and is based on empirical research. Verification of this information by review panel members each year improves the quality of the files. Review panel members also can provide information on areas such as job duties, work setting, and hiring practices. They also can suggest names of other people to contact about the occupation.

Using local sources is not a step-by-step procedure. There is nothing methodologically dramatic involved, but a hypothetical example can give a flavor of the approaches that can be used. In our example an information analyst reviewing an occupational description may see the name of a contact person suggested by a review panel member and follow up with a telephone call to verify information about wages and outlook for the occupation. In this example, the information analyst finds out that there is a placement officer in the

[12] Bruce McKinlay, "National Conference for State Vocational Education Planning Staffs", Final Report, (Minneapolis, Minn: Dept. of Vocational and Technical Education, November 1976). pp. 3-5.

same company who recently did an earnings survey for a local association. The analyst places a second call to the placement officer, requests the survey and learns that this person knows about the employment situation in areas other than the city where he is located because of his involvement in several professional organizations. He also suggests that a person he works with on a committee may also be helpful. A third call is placed. Here the analyst talks to the committee member who is active in an educational group that studies the availability of training programs for a number of professional occupations in addition to the occupation that the analyst currently is working on. She agrees to send some reports and other information on several occupations and also consents to be added to review panel groups for those occupations.

This example illustrates a chain of data collection that includes both formal and informal sources. Several facts gained in this manner required further checking by talking to other people. Differences in opinions given by knowledgeable people require analyst judgment. Usually opinions are checked against each other and facts that may put the opinions into a perspective or suggest a pattern are sought.

Staff Time Spent Working with Data Sources

Identifying major data sources can be time-consuming. Over the years, even though a number of basic sources of national labor market and educational data have been identified, individual state-based systems of career information still spend a great deal of time identifying and working with sources to obtain state and local data.

A survey of ten state-based systems points out varying amounts of time spent in this kind of activity. Most staffs share responsibility among analysts and manager for developing and maintaining these relationships. Two of the state systems say that they have one or more additional analysts working on career information system file maintenance housed in and financially supported by the State Employment Agency. These systems therefore concentrate on developing relationships in other, more removed agencies.

State systems vary in the importance they place on this data gathering activity although all spend some time in this area. State systems with

limited financial resources who must depend on data-producing agencies for most of the facts they use in the informational files, need to concentrate their efforts. They must not only identify useful data sources but also study the quality of specific data for its applicability and then persuade agency personnel, when possible, to prepare data in formats specifically useful to the career information analysts' purposes. Some state systems allocate quite a bit of staff time in Information Development to review and analyze the information. In these cases, limitations in the data can be worked with and additional verification done. A wider range of data can be used in these circumstances.

Using Data Sources - Other Factors

Creativity. Sometimes formal data sources are used in creative ways that require additional verification with knowledgeable sources to insure accuracy. For example, a research project that provides the ages of people in a particular occupation in the state can indicate trends that can affect outlook because openings may be increasing due to large numbers of people employed in this occupation nearing retirement age.

There are many places to look for useful data. At the same time, analysts needs to be always aware of the limitations of the data that they use and the methodologies upon which the data are based. At no time does a career information system want to risk applying data to uses for which they are not appropriate. This can only lead to errors and misleading statements.

Confidentiality. Sometimes the analyst discovers a study or report that may be helpful but the organization that produced it wants to withhold the information because it is sensitive material. Their reservations can often be overcome if the analyst agrees to keep the information confidential and for inhouse use only. Further, the analyst may use the information in a general way (for example, using averages or ranges to give approximations of wages in a salary survey). In some cases, the information can be used if the source or specific people or employers cannot be identified. The source of information needs to be protected when the source indicates sensitivity. When the

analyst respects these limitations, the system can continue to receive sensitive material when it is needed.

The Personal Touch. In working with data sources, the career information analyst often acts as an investigative reporter. Information is not taken on face value; instead, data sources are studied for their basic methodologies and specific data used with sensitivity to clearly and accurately analyze a collection of facts. The information analyst also knows that the personal touch is needed when dealing with data-producing agencies. It is not enough simply to identify major data sources. The analyst must make a specific contact, explain the uses to be made of the information, and continue to build relationships with the people in the agencies who produce the data.

The information analyst in a career information system makes numerous requests of people in these data-producing agencies. Consequently, the analyst must work to see that this activity does not cause a burden to the agencies. The analyst can point out benefits of cooperation to agency staff. It is through the efforts of a system of career information that significant numbers of general users are exposed to the information that the data-producing agencies have available. Often researchers at these agencies help the career information system in their state because they see this as a good way of disseminating their data to a wide and interested audience.

The information analyst needs to work thoughtfully and efficiently with staff from data-producing agencies. The effort can facilitate a smooth flow of good information to the Information Development unit. This information is crucial to the unit's work.

SAMPLE DATA SOURCES

FOR SELECTED CIS INFORMATION FILES

Source notes for the statewide occupational file for Engineers illustrate the variety of sources used to develop occupational material. Each occupation presents its own data problems, so sources vary with the occupation and the local area for which the material is being developed.

OCCUPATIONAL DESCRIPTION

DESC FOR 2411 ENGINEERS

ENGINEERS DETERMINE HOW TO COMBINE RAW MATERIALS TO PRODUCE GOODS OR BUILD PROJECTS SUCH AS ROADS, DAMS, AND BRIDGES. DUTIES VARY WITH ENGINEERING FIELDS, BUT MAY INCLUDE PLANNING AND OVERSEEING CONSTRUCTION AND RESEARCH PROJECTS, DESIGNING EQUIPMENT AND MACHINERY, AND INSPECTING AND TESTING MATERIALS AND PRODUCTS.[1]

SPECIALTIES: AEROSPACE (DOT# 002.061-014), CIVIL (005.061-014), INDUSTRIAL (012.167-030), NUCLEAR (015.061-014), CERAMIC (006.061-014), CHEMICAL (008.061-018), ELECTRICAL (003.061-010), AND MECHANICAL ENGINEERS (007.061-014). FOR MORE INFORMATION ON AEROSPACE ENGINEERS, SEE DESC 24111; CIVIL ENGINEERS (DESC 24113); ELECTRICAL ENGINEERS (DESC 24114); MECHANICAL ENGINEERS (DESC 24116). CIS RELATED OCCUPATIONS: MATHEMATICIANS & STATISTICIANS (SEE DESC 2332), PHYSICAL SCIENTISTS (DESC 2624).[2]

---APTITUDES: ABOVE AVERAGE ABILITY TO VISUALIZE OBJECTS OF TWO AND THREE DIMENSIONS TO PERCEIVE DETAIL, AND TO COMMUNICATE VERBALLY AND USE NUMBERS; ABILITY TO PLAN AND MAKE DECISIONS BASED ON DATA AND TO WORK ACCURATELY; A LIKING FOR WORK OF A SCIENTIFIC OR TECHNICAL NATURE. HIGH MATH AND SCIENCE APTITUDE.[3]

---WORK SETTING: MOST WORK BOTH INDOORS AND OUTDOORS. EMPLOYERS: MANUFACTURERS SUCH AS ELECTRICAL AND ELECTRONIC EQUIPMENT, AIRCRAFT, MACHINERY, CHEMICAL, SCIENTIFIC INSTRUMENT, AND METALS FIRMS, GOVERNMENT, CONSTRUCTION, AND PRIVATE CONSULTING FIRMS.[4]

[1] Occupational Outlook Handbook, (1980-81 ed.), pp. 282-292.

Dictionary of Occupational Titles, 4th ed., pp. 15-36.

California Occupational Guides, Nos. 3, 5, 8, 11, 12, 39, 367, 426.

Career materials from professional organizations (see note *).

CIS Review Panel (see note **).

[2] Dictionary of Occupational Titles, 4th ed., pp. 15-36.

Occupational Outlook Handbook, (1980-81 ed.), pp. 282-292.

[3] Dictionary of Occupational Titles Data Display Tape, 1978.

[4] Tomorrow's Manpower Needs, IV pp. 124-129.

Occupational Outlook Handbook, (1980-81 ed.), pp. 282-292.

California Occupational Guides, Nos. 3, 5, 8, 11, 12, 39, 367, 426.

Career materials from professional organizations*

CIS Review Panel**

---HIRING PRACTICES: ENTRY LEVEL POSITIONS REQUIRE A BACHELOR'S DEGREE; SOME EMPLOYERS PREFER APPLICANTS WITH EXPERIENCE OR A MASTER'S DEGREE. LICENSING: NOT REQUIRED AT ENTRY LEVEL, HOWEVER, NECESSARY FOR THOSE WHO WANT TO PRACTICE PROFESSIONAL ENGINEERING. TRAINING: AVAILABLE AT SEVERAL 4-YEAR SCHOOLS IN OREGON (SEE PREP 2411).[5]

---CURRENT EMPLOYMENT: AROUND 9,700 EMPLOYED IN OREGON WITH THE MAJORITY CONCENTRATED IN THE WILLAMETTE VALLEY.[6]

---WAGES: VARY WITH ENGINEERING SPECIALTY; MOST BEGINNING ENGINEERS START AT $1,200-1,500/MONTH. NATIONALLY, THE AVERAGE OFFER MADE TO THOSE WITH A BACHELOR'S DEGREE IS AROUND $1,500/MO.[7]

[5] Oregon State Employment Division, Licensed Occupations in Oregon, p. 51.

CIS Review Panel*

Career Information System, "Engineering Programs", Programs of Study and Training, Fall 1980.

[6] State of Oregon Employment Division, Research and Statistics Occupational Employment Trends in the State of Oregon, 1978-86.

Oregon Technical Information Exchange, Engineers in Oregon.

American Chemical Society, Annual Salary and Employment Survey.

Society of Women Engineers, Women in Engineering.

Directory of Oregon Manufacturers, 1980.

[7] Local Government Personnel Institute, Cooperative Salary Survey (1979-80).

Job Bank Opening Summary, U.S. Employment Service, Office of Technical Support (1979).

State of Oregon Compensation Plan (1980), pp. 19, 21.

State Salary Survey, August 1, 1980.

Area Wage Survey, Portland, Oregon - Washington Metro.

College Placement Council, Salary Survey, 1979-80.

Lane County Personnel Division, Compensation Plan July, 1979.

American Chemical Society, Annual Salary and Employment Survey.

"Occupational Outlook Quarterly," Summer 1980.

Wise Personnel Agency, Salary Survey, 1980.

CIS Review Panel**

---OUTLOOK: SLIGHT SURPLUS OF ENTRY-LEVEL APPLICANTS; BALANCE OF THOSE WITH SEVERAL YEARS EXPERIENCE. FACTORS AFFECTING OUTLOOK INCLUDE CONTINUED EMPHASIS ON A RAPIDLY CHANGING TECHNOLOGICAL ECONOMY, IMMIGRATION OF ENGINEERS FROM OTHER STATES, INCREASE IN THE NUMBER AND USE OF ENGINEERING TECHNICIANS, SUPPLY OF NEW ENGINEERS ENTERING THE LABOR FORCE AND CHANGING ECONOMIC CONDITIONS. PRESENTLY, PROSPECTS ARE BETTER FOR SOME SPECIALTIES THAN FOR OTHERS. ELECTRICAL ENGINEERS, FOR EXAMPLE, ARE IN SHORT SUPPLY, WHILE THE RECENT SLOWDOWN OF CONSTRUCTION ACTIVITIES HAS DECREASED THE NUMBER OF JOBS FOR CIVIL ENGINEERS. OPPORTUNITIES ARE GOOD FOR THOSE WILLING TO RELOCATE AND FOR QUALIFIED WOMEN AND MEMBERS OF MINORITY GROUPS.[8]

PREPARATION FILE

PREP FOR 2411 ENGINEERS

---SKILLS: KNOWLEDGE OF ENGINEERING AND DESIGN; ABILITY TO PLAN AND MAKE DECISIONS; KNOWLEDGE OF MATHEMATICS, PHYSICAL AND SOCIAL SCIENCES.
---LICENSING: PROFESSIONAL ENGINEERS MUST BE LICENSED; REQUIREMENTS INCLUDE:
- 8 YEARS ACTIVE PRACTICE IN ENGINEERING WORK AS APPROVED BY STATE BOARD AND PASS EXAM. (EXAM FEE: $25)

OR HAVE A:
- B.S. IN ENGINEERING PLUS 4 YEARS PRACTICE IN ENGINEERING WORK AS APPROVED BY STATE BOARD AND PASS THE EXAM

OR BE:
- CERTIFIED AS AN ENGINEER IN TRAINING (EIT) WHICH REQUIRES 4 YEARS PRACTICE IN ENGINEERING WORK AS APPROVED BY STATE BOARD AND PASS THE EXAM. (EIT CERTIFICATION FEE: $20).

INITIAL LICENSE FEE: $5, ANNUAL RENEWAL FEE: $13. FOR MORE INFORMATION CONTACT THE OREGON STATE BOARD OF ENGINEERING EXAMINERS, 4TH FLOOR, LABOR AND INDUSTRIES BUILDING, SALEM, OR 97310. PHONE: 378-4180.
---PREPARATION: SEVERAL COLLEGES OFFER 4 OR 5-YEAR BACHELOR'S DEGREE PROGRAMS, AND MANY OF THOSE ALSO OFFER MASTER'S DEGREES. SOME COLLEGES HAVE COOPERATIVE PROGRAMS WITH OUT-OF-STATE SCHOOLS. COMMUNITY COLLEGES ALSO OFFER 1 AND 2 YEARS OF GENERAL COURSEWORK THAT CAN BE TRANSFERRED TO A SCHOOL OFFERING AN ENGINEERING DEGREE.
RELATED EDUCATIONAL PROGRAM: ENGINEERING (SEE PROG 251).[9]

[8] Occupational Outlook Handbook, (1980-81 ed.) pp. 282-292.

Society of Women Engineers, Women in Engineering.

Engineering Council for Professional Development, Minorities in Engineering.

CIS Review Panel**

Job Bank Opening Summary.

Labor Market Economist, Oregon State Employment Service, telephone interview.

College Placement Council, Salary Survey 1979-80.

Projections of Science and Engineering Doctorate Supply and Utilization 1980 and 1985 Outlook.

Newspaper articles***

[9] Occupational Outlook Handbook, (1980-81 ed.), pp. 282-292.

State of Oregon Employment Division, Licensed Occupations in Oregon, pp. 19-20.

Board of Engineering Examiners.

California Occupational Guides, Nos. 3, 5, 8, 11, 39, 367, 426.

Career materials from professional organizations.*

Opportunities in Engineering Technology Careers.

CIS Review Panel**

NOTES:

*Career Materials from Professional Organizations.

American Society of Civil Engineers, Is Civil Engineering for You? and Careers in Civil Engineering
General Electric Company, What's It Like To Be an Engineer?
Engineers' Council for Professional Development, Women Engineers and Engineering
The Black Collegian (Jan./Feb. 1978), "Black Engineers"
American Institute of Mining, Metallurgical and Petroleum Engineers, Careers in Metallurgical Engineering
American Society of Agriculture Engineers, Agricultural Engineering and You
Western Interstate Commission for Higher Education, Mineral Engineering Program
U.S. Department of Agriculture, Engineers in the Agricultural Research Service
National Society of Professional Engineers, Engineering

**CIS Review Panel - employees, educators and placement officers in Oregon in the field of Engineering.

Paul Christenson, State Board of Engineer Examiners, Salem, Oregon.
F.J. Burgess, Dean, School of Engineering, Oregon State University, Corvallis, Oregon.
Andy Hyde, Staff Engineer, Barrett & Associates, Portland, Oregon.
David Van Dyke, Consulting Engineers, Salem, Oregon.
Robert Hill, R.J. Hill Engineering Co., Eugene, Oregon.
Edwin Herbes, Blue Mtn. Engineering Services, Pendleton, Oregon.

***Newspaper Articles.

Portland Oregonian
Eugene Register-Guard
Daily Journal of Commerce
Chronicle of Higher Education

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V. CARRYING OUT A SYSTEMATIC INFORMATION UPDATING DESIGN

The basic product of a career information system is good information that a person can use when deciding about a career to pursue. To be useful, the information in all of the files must be accurate, current and locally relevant. Assuring that the information in system files meets these quality standards requires an extensive and systematic updating procedure. An annual review of each file is essential and, in addition, a process is needed to allow updating whenever facts change or discrepancies are found. This chapter describes the updating process in state-based systems of career information. Producing high quality information requires a great deal of time and energy, as the following pages will make clear.

The Updating Process

The most important aspect of the Information Development function in a career information system is not the initial development of the information files. In fact, these developmental activities can be abbreviated in some useful ways (see page 9 for a discussion of early developmental strategies in this area). Instead, the primary focus of Information Development needs to be an ongoing, rigorous commitment to the maintenance of high quality information in the files. A great deal of information in the system goes out-of-date sooner or later, situations change frome locale to locale, and inaccuracies crop up. If the user of a career information system discovers inaccurate or outdated information in any single file, he or she will probably conclude that the system as a whole is not of much use. If the career information system purports to be current, accurate and locally relevant, staff must have the resources and the mechanism to keep it that way.

A systematic information updating design has been set up for state-based career information systems to enable this ongoing file maintenance to be accomplished successfully. The updating design is a continuous one because the task of keeping the files accurate is too large and complex to be handled as a one-shot effort. A permanent staff of analysts is needed to maintain an

ongoing and at least annual review of all system files.

The major elements of the plan are the processes labeled the Review Cycle and Current Updating.

The Occupational Review Cycle. To assure an annual review of each individual occupational and educational file in the system, a Review Cycle schedule is set up and maintained. The review of occupational description and preparation files is generally organized to enable an analyst to substantially review major topics in each occupational file at least once a year. A number of states schedule a 12-month cycle with an equal number of occupational descriptions and their matching preparation files scheduled for review each month. The description and preparation files are often reviewed simultaneously because a number of the same data sources and contact people need to be used for topics in both files.

State CIS's vary in the details of their occupational review cycle schedule. Discussions with ten state-based systems pointed up the following major approaches.

-- 12-month indepth review: Some states schedule an extensive review of topics within each occupational description and preparation file. The files are evenly distributed throughout the year among the available analysts. Each file is reviewed systematically on a continuous cycle.

-- Year-long indepth review with some scheduled breaks: Although a 12-month cycle is scheduled, some states also schedule pauses to enable analysts to work on other projects or to reflect the unavailability of data sources at certain times of the year. For example, one state does not do Review Cycle work in December because the Christmas holidays interfere with contacts with many resource people. Several states pause in the cycle for one or more months in the summer for projects such as printing production or updating educational file information. One state reports scheduling a six-month cycle that covers all occupations in the system.

-- Indepth review of selected topics for all files: Some states schedule a substantial review of a few of the many topics covered in the occupational description and preparation files each year. The rest of the topics are reviewed briefly or not at all.

-- Indepth review of selected occupational files: Some states select 1/3 to 1/2 of their occupational files for an indepth review each year. The rest of the occupational files are looked at quickly or are deferred to the next year for the more comprehensive review.

Most state systems substantially review each year the topics "current employment", "wages", and "outlook". Other topics are also selected for coverage in the Review Cycle but these topics vary as the analysts select areas of the files needing special review in a particular year.

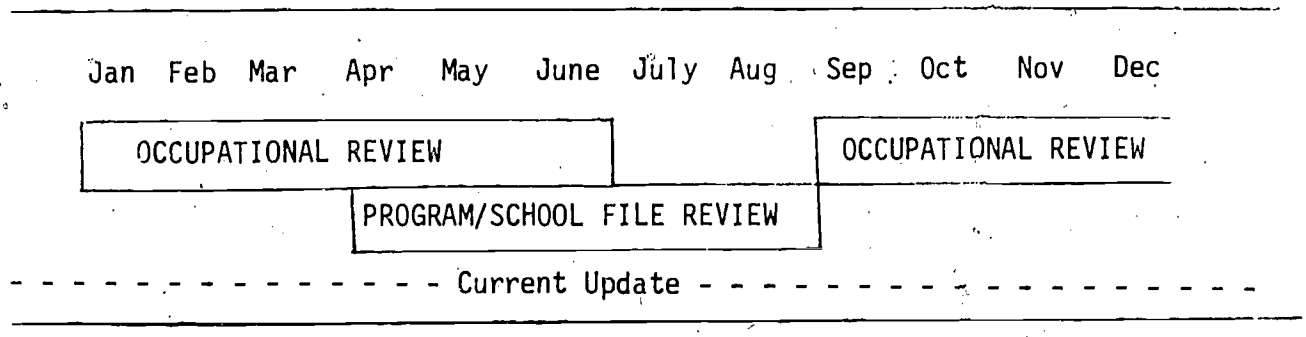
Several workplans for the Occupational Information Review Cycle appear at the end of this paper. They provide a general picture of the extent to which the occupational descriptions can be reviewed. (See Appendix.)

Discussions with the ten state-based systems in the survey (all of which have been in existence for at least two years) indicate that most carry out a year-long review cycle. One state has not done this to date but plans to do a year-long review in the current year. Five of the states said they review occupational descriptions each of the 12 months; three said there were one, two or three months, spread throughout the year, when the occupational review cycle was suspended (mainly for production or data availability reasons); one state carries out the review in six months. All indicated that at least 50 percent of the information analysts' time was spent on the Review Cycle. Several states indicated that over 80 percent of staff time went into the Occupational Review Cycle.

The Educational Review Cycle. The educational program and institutional files in the system are also updated annually with a review cycle procedure. The timeline for this review is substantially shorter than that set up for the occupational files. In many states, the review cycle for the educational files begins in April when material is sent to the educational institutions in the state for their review. The material is returned in May, June and July and the files are updated during the summer months. This shortened timeline recognizes that most educational institutions make their major decisions about programs to offer, tuition rates, and so forth in the spring and early summer. Changes are finalized before the beginning of the fall term in September for the students' benefit. Career information system staffs try to meet that September deadline so that CIS users can find current facts when school begins in the fall. For the rest of the school

year, the facts about the institutions are relatively stable and so a longer review cycle is not necessary.

The following chart illustrates a typical timeline for updating major files during a year-long review cycle.



In most states, one information analyst is assigned to update the educational files. Several state systems, however, report using substantial amounts of student help in updating these files.

The systematic review accomplished by this Review Cycle plan assures the accuracy of the information. As another section of this paper on data sources indicates, the use of a wide range of resources, including a Review Panel for each occupational file (a panel made up of people knowledgeable about the occupation), assures that the files undergoing this annual review also stay locally relevant for the various geographic areas of the state covered by the CIS (see page 32).

Current Updating. Each file in the system is updated to some extent once annually via the Review Cycle process. This assures a certain degree of accuracy, currency and specificity to local areas. However, there are cases where facts change at times of the year other than the time an occupational or educational file is scheduled for the indepth review. As an example, the wage rates for carpenters could change as a result of a new union contract put into effect in January. If the occupational file for carpenters was updated in October, there would need to be a way to update the information without waiting for the Review Cycle the following October. The procedure used by career information analysts is Current Updating. Current Updating is a continuous process wherein analysts receive current bits of information from

numerous data sources throughout the year. Usually once a week each analyst spends several hours going through current facts and new information about the many occupations he or she is assigned and updates relevant facts that are important enough to put into the computer files immediately. Many state systems keep a tickler file to remind the analyst of dates when facts may change. The current updating process updates any pertinent information files as new information becomes available. Current updating facts are used to update not only the occupational description and preparation files, but the program of study and school files as well.

In summary. Through the Review Cycle and Current Updating processes, CIS information files are continuously updated. The Review Cycle facilitates systematic improvements throughout all files in an indepth, periodic review. Current updating allows staff to respond quickly to new information and further improve accuracy and currency. This continuous updating process recognizes that facts change year-round. The computer-based information system has the capability to absorb these changes on a daily basis. Analysts make changes in the information files virtually every day resulting in information for the user that is far more up-to-date than printed material.

VI. WORKPLANNING

File maintenance, accomplished through the Review Cycle and Current Updating processes, takes a majority of the information analyst's time in most career information systems. In addition, a number of other regular as well as special projects are assigned to Information Development staff. Planning to accomplish these general tasks needs to be done systematically. Workplanning is the key organizational tool.

Workplanning in the Information Development Unit

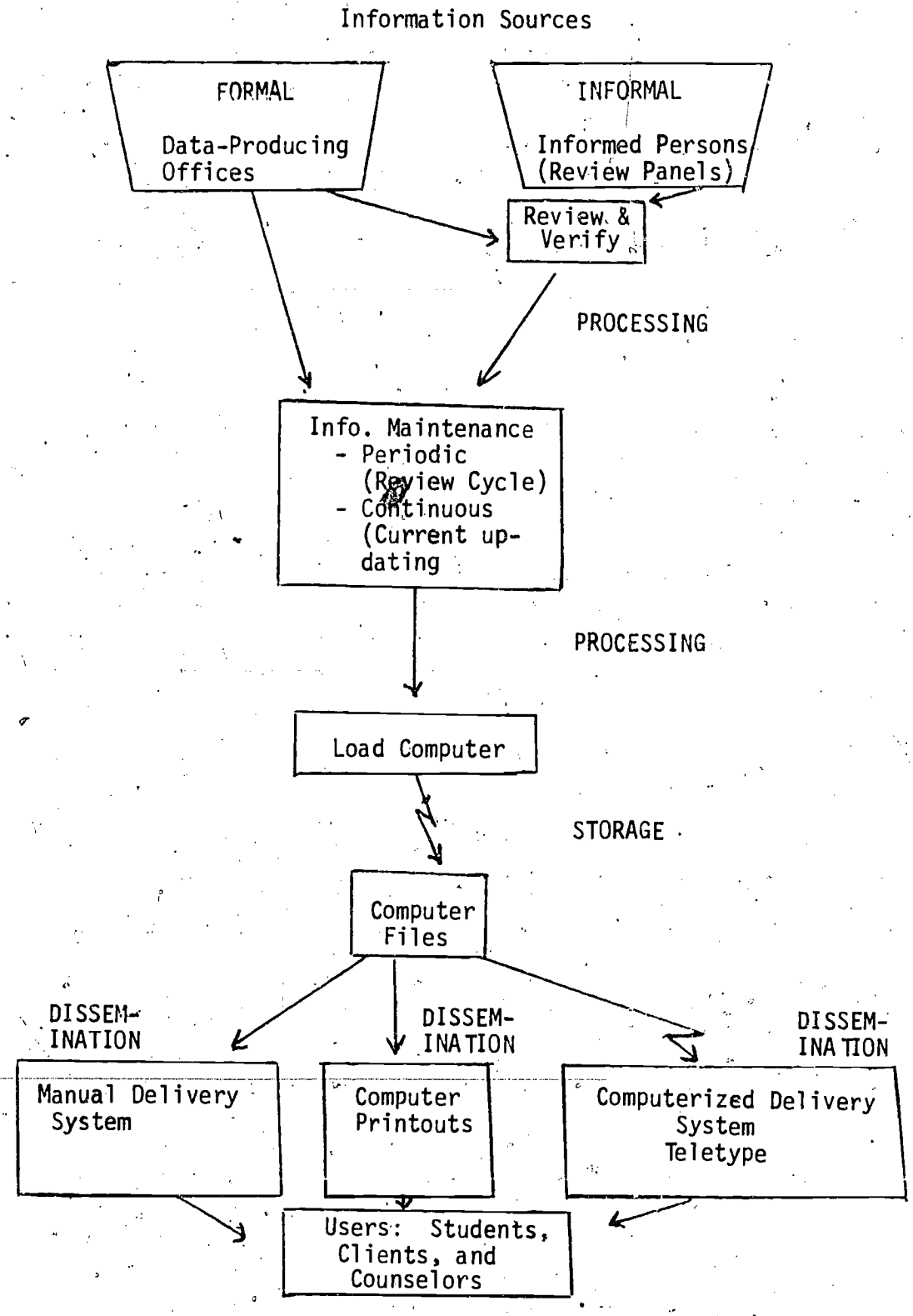
Every aspect of managing a career information system takes some degree of planning and most systems produce an overall plan to integrate every unit's work into the goals of the organization as a whole. This chapter focuses on the unit workplanning that is done specifically in the Information Development unit. The work of this unit is formally planned for the following reasons:

- Fulfilling the basic charge to systematically update the information files implicitly requires a plan.
- Data entry into the computer is best done on a continuous basis, rather than creating irregular overloads and dry periods.
- Computer tapes and printed materials based on updated information files are produced on a regular schedule and continuous updating automatically insures a supply of changes for these.
- A program of field services to users is also based on communicating recent changes according to a regular time schedule.
- A standard of accountability for analysts and the unit is needed.
- A shield against crisis management is provided.

The following Information Flow Chart depicts the general activities in the updating process that need to be systematized in the Information Development unit.

Table 3

Career Information System[13]
INFORMATION FLOW CHART



[13] McKinlay, Develo[illegible] p. 70.

Benefits of Workplanning

Workplans are used by the manager
gress and to set priorities. Workplans
unit do not have to cover everything th
a day, but the key tasks needing to be
period are subject to a written workpla
jointly between the unit manager and th
out clearly the necessary steps of the
results of the work; and (4) are writte
There are several other benefits to wor
of how a job was done for future refere
management tool; (3) they serve as an i
of coordinating work of several people;
personnel evaluation.[14]

When to Prepare Workplans

Write a workplan when the activity

- involves several people
- hasn't been done before
- requires that several things co
  quality product to meet a deadl
- involves considerable time
- will be done again and a record
- requires assigning a specific p
- sounds like a good idea but you
  the work

Routine tasks (those that are part
clearly spelled out in a job descriptio
These activities are ones the person in
know what to expect, few people are inv
little special planning.[15] At the end

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[14]Oregon Career Information System
Personnel and Office Policies Manual, R
Information System).

[15]Ibid.