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AUTHOR Michael, Robert O.; Shaffer, Kay L.
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ABSTRACT

The development and use of a computer-based career system at Georgia State University to provide occupational and educational information to current and potential university constituents is discussed. The delivery areas and activities of the Georgia Career Information System (GCIS) are analyzed through the reduction model, a general systems model developed for evaluating program attrition patterns. This analysis creates a matrix of questions directed toward identifying information and services. The questions can be grouped into four basic categories: type of decision (e.g., continuation; withdrawal); type of individual; circumstances surrounding the decision; and system response. Specifically, decision feedback questions (i.e., the issue matrix) help to identify the existing or potential paths of individuals through education, occupation, and social service components. The reduction model uses the three basic systems of elementary, secondary, and postsecondary education. The combination of the reduction model and the issue matrix provides a method for rational assessment and planning. (SW)

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# Fulfilling the University Mission Through a Computer-based Career Information System

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Robert O. Michael
Special Project Coordinator
Georgia Career Information System
Georgia State University
University Plaza
Atlanta, Georgia 30303
(404) 658-3100

Kay L. Shaffer
Assistant Director
Georgia Career Information System
Georgia State University
University Plaza
Atlanta, Georgia 30303
(404) 658-3100

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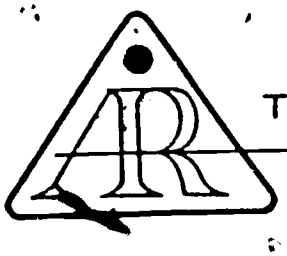

THE ASSOCIATION FOR INSTITUTIONAL RESEARCH

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D. R. Coleman, Chairman
Forum Publication
Advisory Committee

# Fulfilling the University Mission Through a Computer-based Career Information System


## Abstract

Computer technology has been applied to a wide range of activities reflecting the three-fold university mission of teaching, research, and service. Through the use of a computer-based career information system, the mission activities can be expanded to meet the needs of current and potential university constituents. The career information system and its delivery areas and activities are analyzed through the Reduction Model, a general systems model developed for evaluating program attrition patterns. This analysis creates a matrix of questions directed toward identifying existing and potential information and services which can be provided by the career information system in cooperation with a wide range of university personnel.

## Introduction

Higher education institutions are caught up in the tremendous changes resulting from the computer revolution, and they have found the benefits of the technology to be astounding. The arrival of microcomputers, minicomputers and mainframes on the college campus has helped make data and information collection, analysis, storage and dissemination less cumbersome and time-consuming processes than in the pre-revolution period. While this increase in efficiency is attended by serious concerns such as information access, manipulation and proliferation, computer technology has led to the automation of a variety of tasks in higher education. Researchers, planners, decision-makers and administrators utilizing the new tools of computer technology can now reallocate their valuable resources to issues which currently do not lend themselves to direct or complete resolution through computer applications. Registrars expedite class scheduling and registration by using OPSCAN sheets fed through the institution's computer system. Institutional researchers utilize computerized data bases to maintain pace with the ever-increasing demands placed on them for data and information for use in reporting, managerial decision-making and institutional planning. Likewise, instructors now remediate student academic weaknesses by developing or purchasing computer software which addresses the specific learning difficulty or gap.

While examples of the intrusion of the computer revolution into the university campus are seemingly endless, the intrusion nonetheless reflects the revolution's pervasiveness. Furthermore, this growth of accessible computer technology coincides with the growing demands upon the university for the delivery of its teaching, research and service mission components beyond the courtyard and ivied walls. This trend is readily seen in the increased concern of state legislatures, governing boards and the like in the

university's service to its external constituents and to its increased responsiveness to the problems of the local community and the general society. While off-campus programs, work-study degrees and inter-organizational co-operation all appear to be part of the university's effort to either recoup or avoid significant enrollment losses, these activities are also generated in response to pressures for increased broadening of the university outreach efforts.

Although the pervasive computer revolution is still quite formative, its technology can assist in the internal and external fulfillment of the university mission in the era of increasing demands upon the institution. Logical and studied applications of computer technology to the university mission activities and needs would reflect the university's acknowledgement of the immediacy and the pervasiveness of the revolution. Such acknowledgement is extremely important in a field which is strapped with a reputation for being tediously slow in completely adopting innovations of any type.

One method for partially fulfilling the university mission through computer technology is with a computer-based career information system providing occupational and educational information to the university constituents. The remainder of this paper will provide an overview of this system and its rational application to the university mission through the use of the Reduction Model and the Issue Matrix.

## A Computer-based Career Information System

Established as a center at Georgia State University, the Georgia Career Information System began in 1976 as a consortium of volunteers dedicated to developing a systematic approach to providing occupational and educational information to educational and social service agency clients in Georgia. This consortium represented a broad range of institutions, including public and

private colleges and universities, region labor department offices, and private business and industry, to name just a few. All of these members had identified a common concern for what appeared to be a student's or client's haphazard, often incomplete career decision-making process—one which high school, college and agency counselors could not combat without significant alteration in the traditional information delivery materials and methods used in the counseling process. National educational guide books, the Dictionary of Occupational Titles, local newspapers and word of mouth all serve as valuable sources of information for vital career and educational decisions; the consortium members believed, however, the the traditional methods of culling through these sources were often time-consuming, inefficient, unsatisfactory, and generally incomplete.

The consortium's research found a partial solution to the problem of providing occupational and educational information in an efficient delivery mode that had been developed by the Oregon Career Information System (OCIS). OCIS created a computerized information system consisting of a series of interactive data files. These files, which are accessed either indirectly through a brief self-assessment questionnaire or directly into the file text, provide information on occupational, educational and training opportunities throughout Oregon. In addition, OCIS had recognized that many educational and social service agencies which needed this type of system would not have access to the computer hardware for system delivery, so OCIS developed alternative delivery modes of needle-sort decks, microfiche and printed copies of the data files. These materials contain the same information available on the computer, the primary sacrifice being in the speed with which an information seeker can conduct a search.

In order to test the applicability of the Oregon Career Information System prototype, the original Georgia Career Information System (GCIS) consortium obtained grants from Georgia State University and the Presbyterian Guidance Center of Atlanta. Pilot sites were established at secondary and post-secondary institutions and at social service agencies throughout Georgia. Despite the testing of the prototype using Oregon information, evaluations from these pilot sites provided highly favorable client and counselor responses to the concept of a computer-based occupational and educational information system. These initial evaluations were substantiated by the award of the first major grants to the GCIS consortium to use the Oregon prototype for developing a Georgia-specific career information system. Funding from the Georgia Employment and Training Council, the Georgia Occupational Information Coordinating Committee and the National Occupational Information Coordinating Committee established the Georgia Career Information System in 1979 as the official career information system agency for the state of Georgia.

During this first major funding phase GCIS developed Georgia-specific information to replace the original Oregon occupational description, school, program and bibliography files. Simultaneously, marketing of the system to state and local educational and social agencies began. Because the grants from the Georgia Occupational Information Coordinating Committee and the National Occupational Information Coordinating Committee were predicated on the eventual establishment of financial independence for GCIS, system marketing was developed to include the selling of the system on a site-fee basis, along with the procurement of grants for the creation of system enhancements and contracts for consultation and research provided by the GCIS staff.

Currently serving over 125 sites representing several different types of organizations, the Georgia Career Information System offers a wide range of career and education/training decision-making information and activities. In

addition to adapting the Oregon computer system prototype, GCIS also converted the Oregon needle-sort, microfiche and data file print book delivery modes. These alternative delivery systems serve two major functions which help increase the availability and applicability of GCIS.

Because Georgia is a predominantly rural state with a wide financial disparity among school districts, many local school districts do not have the resources to obtain long distance telephone connections with the Georgia State University computer housing the system or to purchase microcomputer and minicomputer systems for the delivery of GCIS. The needle-sort decks, microfiche and data file print books, however, provide low-cost alternatives for these areas. Although direct computer users can track the daily updating of the data files, the alternative delivery mode users obtain periodic information update newsletters and yearly replacement of materials, thus keeping them as well-informed as their technologically-sophisticated counterparts..

The second function of the alternative delivery modes is the provision of a counseling tool which provides a broader range of system uses than is possible with just one delivery method. While the different delivery modes provide the same information, the computer mode offers a good opportunity for initial contact with and use of a computer by people whose only introduction to the new technology may have come from a venture into a video game room. The needle-sort deck, on the other hand, allows the user to see the actual sorting which occurs each time a career decision is registered on the self-assessment questionnaire. For example, a student who determines that a high school diploma is not worth obtaining merely has to insert the needle in the slot which corresponds with this response and proceed to remove over 75 percent of the cards in the occupation deck. Thus, the student has a graphic display of the occupational consequences of not completing a high school education.

In addition to updating the occupational and educational information throughout the year, GCIS must continuously identify new areas of market expansion, system enhancement and information development. While the primary objective of most organizations is survival, GCIS is directed in its survival and growth through its relation with Georgia State University. Because it is housed at Georgia State University and is viewed as a center of the University, GCIS has adopted as one of its guidelines for growth and development the University's three-fold mission of research, teaching and service (Bryson, 1982, p.4). The ongoing activities of the Georgia Career Information System are compared with this mission to determine their feasibility and appropriateness in terms of this mission. In addition, new areas of development are analyzed in terms of the goal of providing high quality occupational and educational information to Georgians and the goal of maintaining the integrity of the university mission.

## The Reduction Model

A systematic method for analyzing the various University research, teaching and service needs which can best be served by GCIS is through the application of the Reduction Model. Originally developed as a mechanism for studying institutional attrition patterns (Barbe, 1980) and conducting program analysis (Sullivan, 1981), the Reduction Model has also been used to evaluate the teacher employment needs in Georgia. Through the model the State of Georgia Board of Regents' teachers needs assessment survey subcommittee developed exploratory questions for examining teacher attrition rates, patterns and trends (Richardson, 1983).

Based upon the principles of general systems theory (Miller, 1978) and communication theory (Campbell, 1982; Maccia and Maccia, 1980) the Reduction

Model has a basic Input - Throughout - Output - Feedback structure. As depicted in Figure 1, material for system input moves from the universe to the pool and through the core Input - Throughout - Output - Feedback system and passes through different screening or decision points which cause reduction in the size of input. Each of these screens may also serve as system feedback points at which material can recycle into the system or move to another system. In addition, these screens can be used for analysis of this input decrease.

The Reduction Model as applied to the analysis of university mission outreach allows for core systems found in three basic model areas of Education, Occupation and Social Services through which individuals pass and from which they withdraw (see Figure 2). While the number of core systems may depend upon the different experiences of the individual, the Reduction Model uses three basic core systems of elementary, secondary and postsecondary education found in the education area, one basic core social service agency system in the social service area, and two employment settings or choices found in the occupation area. Each core system has the basic Input - Throughout - Output - Feedback structure and the decision screens which reduce the size of the system material. Material which does not move completely through a core system because of withdrawal through a decision screen may then move into another core system, may recycle into the core system from which it withdrew, or may move into core systems which are not covered in the Reduction Model. Such core systems might include criminal activity, unemployment without use of social service agencies, and other activities which are beyond the normal Educational, Occupation and Social Service components of the Model.

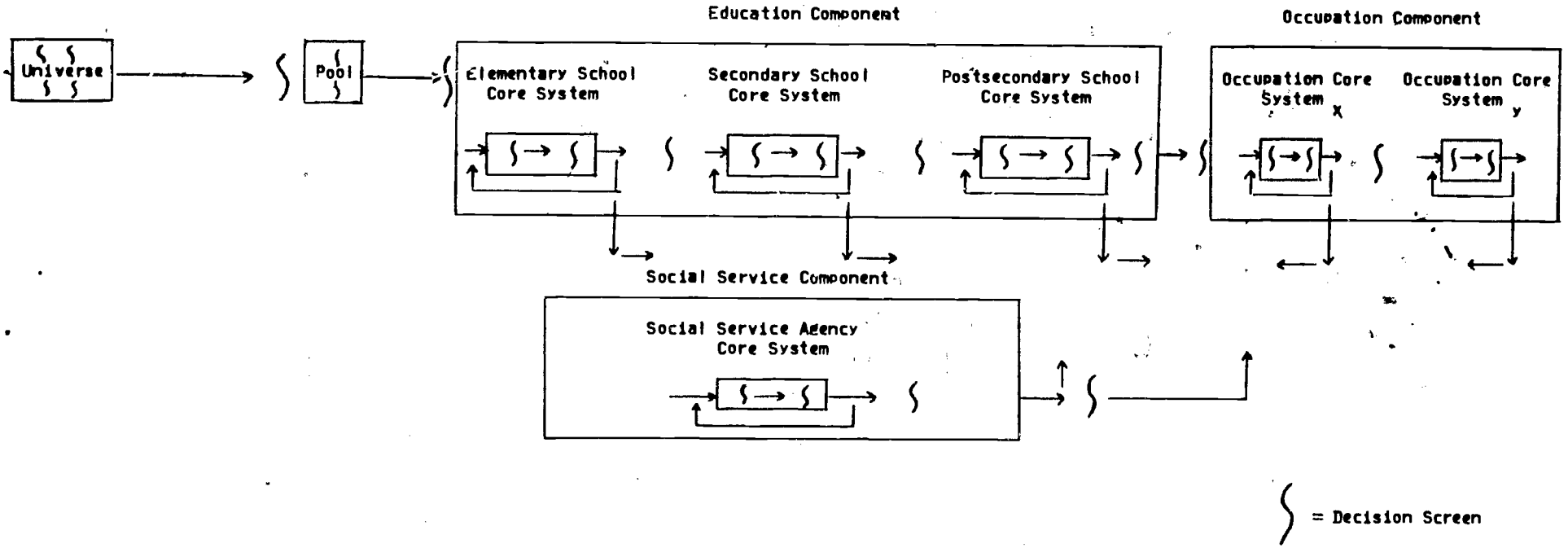


Figure 1. The Reduction Model.

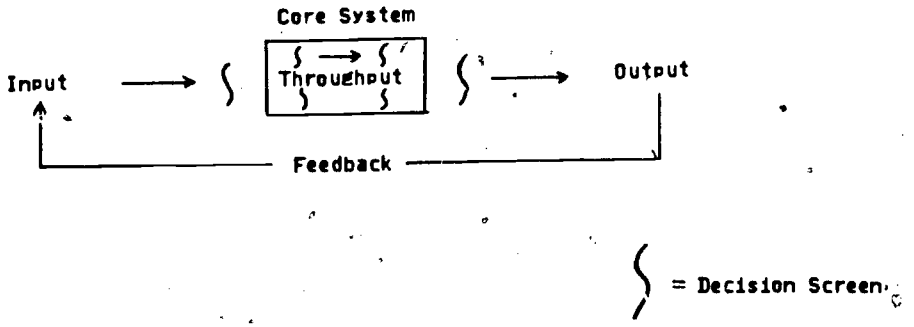


Figure 2. The basic core system of the Reduction Model.

An understanding of the Reduction Model can be obtained through a simple example. In a school district or county which has educational opportunities at all levels, a wide range of employment opportunities and several social service agencies, it is possible for an individual to move into and through at least one core system in each of the Model areas of Education, Occupation and Social Service. Likewise, it is possible for an individual to move through any portion of any of the core systems without completing that system in order to move into another component area or to withdraw from the geographical area altogether. For example, students who are ready to attend the district's elementary school are drawn from the universe of the population served by the district. Passing through the initial screen of age, the pool of five- and six-year-olds is passed through different decision screens before entering the education area and its elementary education core system. These screens may include mental and physical ability barriers, parental decision to educate the child at home, or school redistricting which geographically eliminates the child from the school district.

Once within the elementary education core system, students are faced with various decision screens through which they pass as they move through the system into the secondary and postsecondary education core systems, or out of the

education area into the Social Services or Occupation components. A student may become, for example, a client of the juvenile justice system, thus forcing removal from the education area. While this individual may participate in activities which are similar or identical to those found in the elementary school core system, the child is now a member of a core system within the social services area. Exit, or output, from this core system may be based upon decision screens such as length of sentence, parole, escape and the like.

Continuing this example, a postsecondary curriculum, for example, contains different academic, procedural, social and individual requirements and barriers which allow students to continue in the postsecondary education core system or which force students to withdraw from the system. Entrance requirements, minimum competency examinations, core curriculum courses and teacher-student relationships are just a few of the items which students face as decision screens. A student may enter the nearby state university and move through all core curriculum courses during the first two years of enrollment without completing a composition course which must be successfully completed by the end of the second year of enrollment. Should the student pass the course, the decision to continue or withdraw is not forced at this point. Should the student fail, however, then the decision to continue is forced through temporary academic suspension. Now the student is faced with the choice between entering a feedback loop into the institution at the end of the suspension period or terminating postsecondary education to enter an occupation core system with a completely different set of decision screens.

As an individual moves from one core system to another, or is fed back into the system from which withdrawal occurred, the decision screen serves not only as an attrition mechanism, but also as a system feedback point for analyzing attrition and continuation behavior. Analysis of the behavior of

system individuals at each decision screen can provide valuable information which can be used as either positive feedback to allow the system to continue at its current equilibrium points, or negative feedback to correct the system equilibrium state (Miller, 1978, p. 36). This information is developed through a series of exploratory questions pertaining to the system individuals' responses or behavior at each decision screen. These questions will vary with the application of the Reduction Model, but they can be grouped into four basic categories. These categories are:

1) Type of decision (e.g. continuation, withdrawal)
2) Type of individual at the decision screen
3) Circumstances surrounding the decision
4) System response

## Application of the Reduction Model

Applying the Reduction Model to the goals and activities of university-based projects can provide a series of feedback questions which can assist project operators in identifying, maintaining, reducing or expanding involvement in any or all of these mission areas. The application of the Model to the activities of the Georgia Career Information System (GCIS) is a method for analyzing project activities and for selecting project development in terms of the University mission as well as the center's goals.

In order to analyze existing and potential use of a computer-based career information system directed toward fulfilling the university mission, the Georgia Career Information System has begun to apply the Reduction Model as an analysis, planning, decision-making and evaluation tool. Using the Model to identify the existing or potential paths of individuals through the Education, Occupation and Social Service components, GCIS developed decision screen feedback questions which are analyzed in terms of GCIS, Georgia State University and

other organizational responses, current and future needs, planned actions and area of University mission involvement. These dimensions and questions are contained in the GCIS Issue Matrix (Figure 3). Each decision screen, the client needs to be addressed at the screen point, and the source which identified the decision point are also listed on the Issue Matrix. Thus, the combination of the Reduction Model and the Issue Matrix provides a method for rational assessment and planning.

In order to use the Issue Matrix, a Reduction Model decision screen or situation must first be identified. This identification may be developed through staff research, by a series of requests from system clients, or any other number of sources. Once the need has been identified, verified, and located within the Reduction Model, the Issue Matrix questions are addressed. The use of the Issue Matrix allows for a systematic analysis of the situation at the GCIS, the University, and the discipline/field levels and serves as a guideline for generating the planned response of the organization as listed in the Planned Action Steps portion of the matrix. In addition, responses generated in this matrix are analyzed in terms of adherence to both the GCIS goal of information development and dissemination and the University mission of teaching, research and service.

One such need for occupational and educational information identified using the Reduction Model and the Issue Matrix is located in the Occupation component. In planning sessions the GCIS staff indicated that in this era of mid-career changers and women re-entering the work force, adult needs for current and accurate occupational and educational information are just as pressing as the information needs of secondary and postsecondary students. By using the Reduction Model Occupation component, three basic decision screens were identified. The first is the termination screen which may occur

Issue Matrix

Date _____

Georgia Career Information System

Issue: _____

_____

Need Identifier: _____
(Source)

Reduction Model Point: ___ Elementary ___ Occupation
___ Secondary ___ Social Service
___ Postsecondary

| | What are the current activities? | R | S | T | What resources are needed for activity maintenance? | R | S | T | What are the identified future activities? | R | S | T | What resources are needed for future activities? | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| What is the response of GCIS to the issue? | | | | | | | | | | | | | | | | |
| Administration | | | | | | | | | | | | | | | | |
| Information Development | | | | | | | | | | | | | | | | |
| Marketing | | | | | | | | | | | | | | | | |
| Research & Evaluation | | | | | | | | | | | | | | | | |
| What is the response of Georgia State University to the issue? | | | | | | | | | | | | | | | | |
| Area 1: | | | | | | | | | | | | | | | | |
| Area 2: | | | | | | | | | | | | | | | | |
| Area 3: | | | | | | | | | | | | | | | | |
| What are the other responses to the issue? | | | | | | | | | | | | | | | | |
| What are the Planned Action Steps to meet issue activities? | | | | | | | | | | | | | | | | |
| Administration | | | | | | | | | | | | | | | | |
| Information Development | | | | | | | | | | | | | | | | |
| Marketing | | | | | | | | | | | | | | | | |
| Research & Evaluation | | | | | | | | | | | | | | | | |
| Other | | | | | | | | | | | | | | | | |

University Mission Tenets:
R - Research
S - Service
T - Teaching

Figure 3. The Issue Matrix used in conjunction with the Reduction Model.

for reasons such as incompetence, incompatibility, or reduction in force. The second screen is the amicable exit point which leads from one employment setting or career to another. The third screen is actually a series of career moves existing within an organization. Thus, the staff identified three different situations which they believed demand the type of information which GCIS produces and disseminates.

The opportunity to develop the Issue Matrix for the occupation core system decision screens identified by the staff quickly arose when one of Atlanta's largest corporations (herein referred to as Corporation A) decided to provide its employees with information about the different career, education and training opportunities within its organization. Corporation A was searching for an information system similar to GCIS, but containing company-specific information.

Upon receiving the initial request for a planning meeting between Corporation A and GCIS, the GCIS staff examined the possible project through the Issue Matrix. By using this matrix, the staff determined that the development of a company-specific career planning system required the research, analysis and system development capabilities which were already utilized by GCIS and by various University departments which would be willing to participate in the project. Through the matrix application it was decided that the development of the Corporation A system was a job analysis and systems design project which addressed both the research and service tenets of the University mission. The implementation of the project would also ultimately further the development of GCIS by expanding its research and service capabilities to include the adult working population.

In addition to assisting GCIS in identifying areas which could use the services of GCIS as they already exist, the Reduction Model and Issue Matrix

also serve as tools for analyzing the needs of the system itself. For example, current evaluations of GCIS by high school students and counselors have identified the need for new file access strategies which would allow students to link their interests more directly into the different information files. Access to these files is currently possible only by going first through the occupational description file and then into the specific files cross-referenced in the occupational description file.

Since no such file access strategies exist in any of the computerized career information systems used in most states, GCIS saw the development of these alternative strategies as being of both local and national interest. With University sponsorship and support, funding requests for access strategies developed have been initiated which would touch upon all three components of the University mission at all levels of the GCIS organization. Within GCIS, the project would require administrative support, would enhance marketing efforts, and would involve the efforts of both the Research and Evaluation and the Information Development sections of the organization.

The actual development of the access strategies is a project which would extend the research, service and teaching components of the University. The project would bring in the extra research funds necessary, thus adding to the stature of Georgia State University as a research institution. The enhanced marketing efforts of GCIS would broaden the visibility of the University as a service agent. Furthermore, the new access strategies could be incorporated as teaching instruments in the vocational and career development courses at the University, many of which already use both the system and the GCIS staff as instructional components.

## Conclusion

Although many university-based projects have a primary goal toward which they are directed, they are similar to the Georgia Career Information System

in that they also are subsumed under the three-part university mission of teaching, research and service. These projects generally are easily identified with one of these three parts, and they often do not have the resources to become aligned with all three. A gene-splicing project can be easily identified as research mission oriented, a drug awareness project can be easily identified as service mission oriented, and an instructional materials project can be easily identified as teaching mission oriented. It would be generally difficult, however, for each project to claim equal participation or goal direction in either or both of the two other mission tenets. Through the application of the Reduction Model and the Issue Matrix they do, however, have the potential for expanding their perspective to include or to recognize those activities which support portions of the other mission tenets without jeopardizing their resources or original goal attainment.

The use of the general systems theory-based Reduction Model and its attendant Issue Matrix represents Georgia Career Information System's attempt to maintain organizational viability and institutional mission. It also serves as an example of planning for the logical and rational expansion of computer technology and data bases to diverse audiences needing current and accurate occupational and educational information for decision-making and learning activities.

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